ESSENTIALS OF EXERCISE & SPORT PSYCHOLOGY

AN OPEN ACCESS TEXTBOOK

EDITED BY

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Essentials of Exercise and Sport Psychology: An Open Access Textbook

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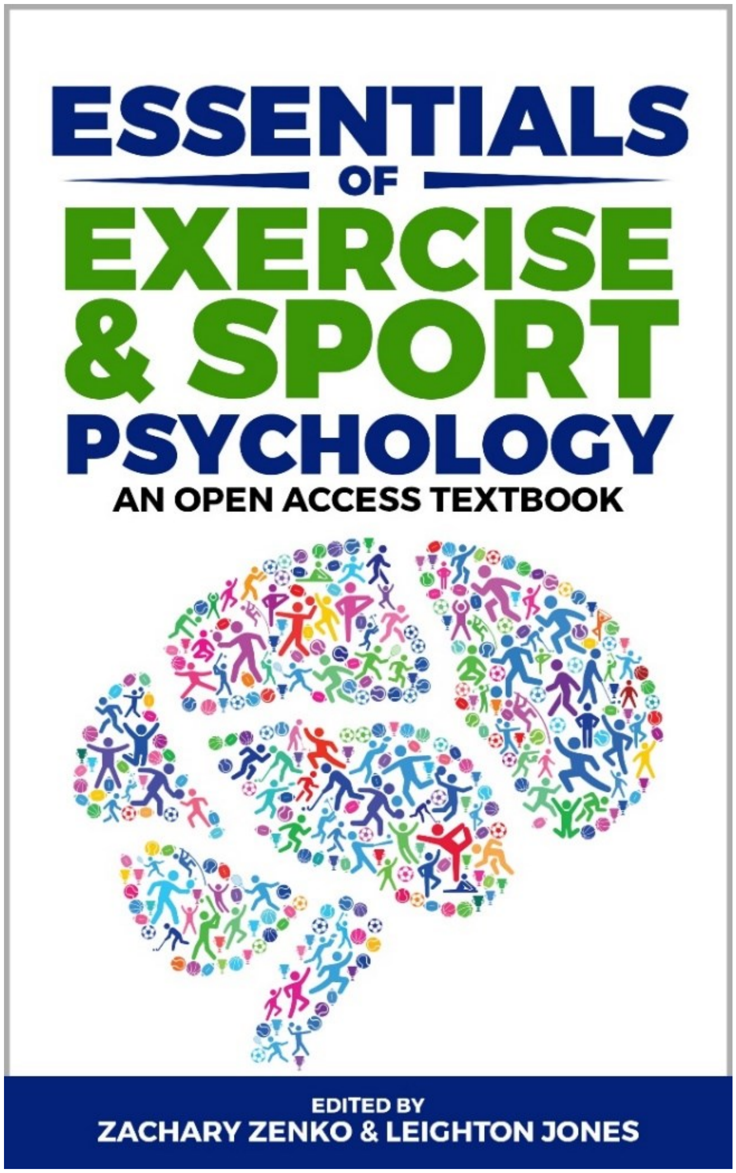

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Preface

Essentials of Exercise and Sport Psychology: An Open Access Textbook

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This text represents the collaboration of more than 70 authors from multiple countries. *Essentials of Exercise and Sport Psychology: An Open Access Textbook* brings this diverse set of experts together to provide a free, open, accessible textbook for students studying exercise and sport psychology. Primarily directed at undergraduate students, this well-referenced book is also appropriate for graduate students.

The topics covered are broad, ranging from an Introduction to Exercise Psychology (Chapter 1), to an Introduction to Sport Psychology (Chapter 19), to Working in Sport, Exercise, and Performance Psychology (Chapter 33). Importantly, students should recognize that each author brings their individual perspectives, experiences, and expertise to this book. Therefore, some chapters may share overlapping content, but the content is discussed in unique ways. For example, Chapters 2, 3, 4, and 5 focus on physical activity and exercise behavior. While content in these chapters is related, it is not redundant. To fully understand the complex world of exercise and sport psychology, students are encouraged to engage with diverse perspectives from many authors.

Chapters also contain learning exercises to prompt students and instructors to engage with the material on a deeper level. For effective review, students and instructors are encouraged to complete these learning exercises and discuss responses together.

The majority of this textbook was written during the global COVID-19 pandemic. We are tremendously grateful for all of the efforts and expertise of the many contributors to this project. Despite the challenges of teaching, researching, and surviving in the pandemic, the authors persisted. As a result, *Essentials of Exercise and Sport Psychology: An Open Access Textbook* is completed; we think you will enjoy using it as you pursue this challenging and fascinating area of study!

Chapter 1
Introduction to Exercise Psychology

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Chapter Overview

Within this chapter, you will be introduced to the field of Exercise Psychology and how it differs from Sport Psychology. This chapter attempts to (a) differentiate Exercise and Sport Psychology, (b) provide an overview of the themes of Exercise Psychology, (c) introduce the various scientific approaches to studying Exercise Psychology and their unique contributions, and (d) emphasize the importance of considering various perspectives in order to fully understand physical activity behavior.

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An Introduction to Exercise Psychology

Exercise and Sport Psychology investigates the psychological antecedents and consequences of physical activity behavior. This includes: (a) understanding factors that predispose individuals to avoid or engage in physical activity (e.g., motivation, individual differences); (b) understanding how engagement in physical activity influences an individual's general well-being (e.g., self-esteem, mental health) throughout the lifespan; and (c) the application of psychological principles to improve athletic well-being and performance (APA Division 47). In such endeavors, the study of Exercise and Sport Psychology intertwines concepts, theories, and knowledge across a wide variety of scientific disciplines (e.g., Sport and Exercise Science, Psychology, Sociology, Neuroscience, Physical Science, and Health Science). Before examining the various perspectives taken by Exercise and Sport Psychology, it is worthwhile to become familiar with some terms related to physical activity.

Physical Activity refers to any bodily movement that results in a substantial increase in caloric (energy) expenditure beyond resting values (ACSM, 2018). Therefore, physical activity refers to numerous types of activities, including household (e.g., vacuuming, car washing, doing laundry), leisure-time (e.g., trail walking, kayaking), transportation (e.g., walking or biking to school/work), and occupational (e.g., heavy lifting, carrying objects) physical activities along with exercise (e.g., running, weight lifting) and sport (e.g., basketball, soccer, boxing). Even though exercise and sport[1] activities more readily come to mind when considering types of physical activity, they are simply subcomponents of physical activity.

Exercise and Sport Psychology, while appearing to be a single area of study by title, are actually considered two distinct content areas, namely Exercise Psychology and Sport Psychology. *Exercise Psychology* is concerned with the antecedents and consequences of physical activity behavior (including, but not limited to, exercise). Meanwhile, *Sport Psychology* is concerned with psychological principles as they relate to athletes and athletic performance. This chapter will focus on the common goals and approaches of Exercise Psychology, while Sport Psychology will be discussed in more detail elsewhere (see Chapter 19; Hill & Mellano, 2021).

While the term "exercise" will be primarily used throughout the rest of this chapter, it should be made clear that the study of Exercise Psychology is interested in all forms of physical activity (e.g., household, leisure-time, transportation, occupational, exercise, and sport), not just structured exercise, and is often studied in the context of the general population or specific subgroups of the population (e.g., individuals with depression, individuals with autism). Research and study in Exercise Psychology is generally divided into three, broad themes:

- **Exercise Behavior Promotion**: Here priority is given to the influence of internal and external variables as constraints and facilitators to the initiation of, and lifelong adherence to, physical activity behavior.

- **Dynamic Exercise Psychology**: This refers to the basic science of psychological phenomena that occur while engaged in physical activity, or the "state of the mind" and its relation to the body during physical activity.

[1] Exercise is defined as planned, structured, and repetitive bodily movements that are carried out to improve and maintain at least one component of health or physical fitness. Sport, on the other hand, generally refers to competitive physical activity engagement, completed alone or with a group that requires physical skills and often provides a means of entertainment.

- **Exercise and Health Psychology**: Research in this theme considers the effects of physical activity on psychological development and health. Areas of interest include mental disorders, cognitive performance, emotion regulation, social engagement, and other areas including and beyond physical health.

Approaches to Studying Exercise Psychology

Similar to the parent discipline of Psychology, the field of Exercise Psychology makes use of several perspectives (i.e., affective, biological, cognitive, personality, sociological) in order to understand the various psychological phenomena of physical activity. These various approaches to the study of Exercise Psychology, while using different methodologies and measures, ultimately provide a more inclusive and complete understanding about why and how we engage in physical activity. They also offer the potential to explain why and how physical activity influences our thoughts, feelings, social interactions, and behavior.

A general assumption made within Exercise Psychology is that a person's feelings and thoughts are intimately intertwined with their physical state. This is referred to as "monism", that is, the mind and body are components of a single unit, not separate entities[2]. Consider the mechanism of a gear train, illustrated in Figure 1.1. An interlocked gear train is dependent on the successful movement of all connected gears and impeding or accelerating a single gear will impact the entire system. A single gear within a gear train is analogous to a single mental or physical component within an individual; just as one gear can influence an entire gear train, so too can a single mental or physical component influence the entire individual.

To illustrate this idea in the context of physical activity, imagine you have just been asked to participate in a race with your classmates from one end of the hallway to the other. Take a moment to really visualize what you are being asked to do. Now consider how you feel[3]: are you nervous, excited, apathetic, or somewhere in between? What are you thinking: are you rationalizing reasons for why you may not win or even participate? Now reflect on your physical state: did your heart rate increase? Did you feel a sense of energy pulsing through your body? Did you produce a smile or a scowl?

Upon reflection of what occurred, did the feelings and thoughts produce the physical state changes or did the physical state changes produce the feelings and thoughts? This is a main, albeit philosophical, question asked by scientists studying the mind–body connection. Regardless of which came first, or if they occurred simultaneously, an important takeaway is that mind and body are so intimately intertwined that a change in psychological state will occur with a change in physical state, and vice versa. This is an important concept to understand in Exercise Psychology, as the assumption of the mind–body connection is paramount for studying the effects of acute and long-term physical activity. If the assumption of the connection between the mind and body were denied (i.e., dualism), it becomes difficult, for example, to support the notion that individual differences (e.g., personality, sense of autonomy, self-confidence) influence the likelihood of physical activity behavior or to explain changes in psychological factors (e.g., the reduction in depressive symptoms) resulting from physical activity. Thus, when examining Exercise Psychology from the various perspectives, it is important to keep in mind that a change in a mental or physical component of the individual simultaneously alters all other components

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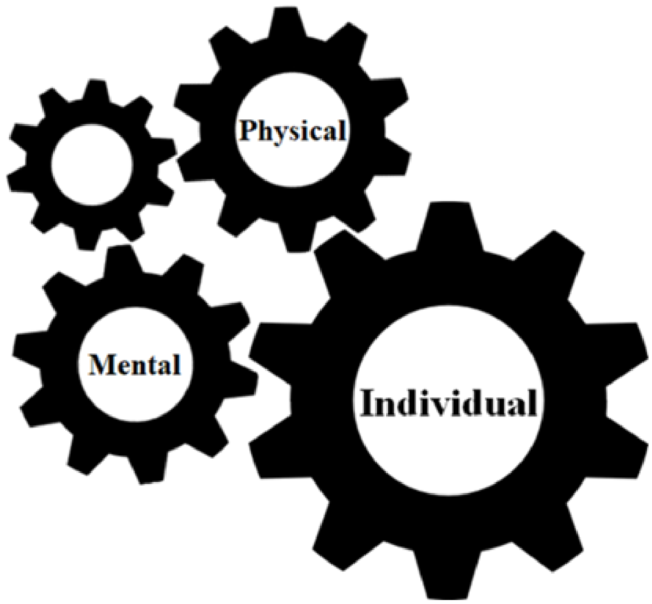
[2] Whereas monism is the belief that mind and body are inseparable, dualism takes the position that mind and body are separate entities and can be studied independently of one another.

[3] *Introspection*: Generally referred to as the examination or observation of one's own mental (feeling) states. *Interoception*: The brain's representation of all sensations from your internal organs and tissues, which provides one's basic feeling of pleasantness or unpleasantness and wakefulness. Even without conscious awareness, interoceptive activity is always occurring within the brain, adjusting the body systems appropriately. Introspection is required to "tap into" your own interoceptive activity in order to articulate how you may feel.

of the individual, and these changing components subsequently influence the way the individual may interact with their environment.

Figure 1.1
The Human Gear Train



Affective Perspective

Affective science is the broad study of feeling states. This perspective often provides philosophical arguments for the mind–body connection, investigates feeling states as motivators for and outcomes of behavior, and delves into the intricacies of affective disorders (e.g., depression, anxiety, stress disorders). Endeavors in the affective perspective in Exercise Psychology are important because, theoretically, humans have an innate tendency to pursue pleasure and avoid displeasure or pain, a school of thought referred to as Hedonics or Psychological Hedonism (Ekkekakis, 2014; Rozin, 1999; Young, 1952). However, humans are also capable of applying thought and reason to “override” such innate desires. A person is thus motivated, at least to some degree, to engage (or not) in physical activity because of their current and expected feeling states.

In addition, accumulated evidence suggests acute and long-term physical activity behavior can reduce anxiety, depressive states, and has a stress-buffering effect in healthy individuals as well as in those diagnosed with Anxiety, Depressive, and Stress disorders (Biddle, 2016; Landers & Arent, 2007; Scully et al., 1998). As recognition of mental health (i.e., referring to an individual’s psychological and emotional well-being) continues to spread, there is a great need to understand whether particular health behaviors (e.g., physical activity) can buffer against, improve resilience to, or aid in the treatment of mental health challenges (Teychenne et al., 2020).

Given some evidence of the importance of affective states, it should be made clear that feeling states alone do not provide enough information to satisfy the complete understanding of antecedents and consequences of physical activity behavior. Only studying feeling states oversimplifies motivations for behavior and subtly suggests that only feelings can be influenced by physical activity. This could not be further from the truth. As alluded to earlier, feeling states are not only intertwined with physical (biological) states and cognition (i.e., thoughts, reason), but also become a piece of one’s identity (personality) and are prevalent in social interactions.

Photo by Andres Ayrton from Pexels

Biological Perspective

Biological science refers broadly to the study of living organisms, understanding the physiological mechanisms underlying how these organisms function, and adaptations that are made to deal with changing environments (both internal and external). The biological perspective considers many areas of study, including (but not limited to) biochemistry, endocrinology, neuroscience, and electrophysiology. Those incorporating a biological perspective in the study of Exercise Psychology may take on different titles to more appropriately address how they are studying psycho-physiological phenomenon (e.g., Exercise Psychophysiologist, Exercise Psychobiologist, Exercise Neuroscientist). Regardless of the title and which area of study (and similar to the affective perspective), the biological perspective attempts to understand the mind–body connection (i.e., how physical states relate to mental states), investigates physical states as facilitators of and barriers to behavior, and explores the complexities of a broad range of psychological phenomena, including mental disorders/diseases. As you may have gathered, incorporating a biological perspective in Exercise Psychology encompasses numerous methods of assessing physical states in relation to psychological phenomenon within the context of physical activity.

Taking an electrophysiological approach involves the study of the electrical properties of biological cells and tissues. Two prominent organs influenced by electrical properties are the heart and brain. While almost every bodily organ is influenced, or at least innervated, by the nervous system (to which sensory and motor information is passed via electrical signals), the heart and brain are primary sources of electrical activity and are often studied in relation to psychological phenomena. Electrical activity of the heart and brain can be assessed via electrocardiography (ECG/EKG) and electroencephalography (EEG), respectively, through surface (on the skin) electrodes. Indeed, evidence from EKG studies have linked more consistent heart beats[4] with negative affect (e.g., depressed, sad), while evidence from EEG studies has also linked greater relative brain activity in the frontal lobe over

[4] At rest, there is usually beat-to-beat variability in which consecutive heart beats may be separated by 0.6 seconds, then 1.3 seconds, and then 0.9 seconds. This inter-beat variability is reflected within Heart Rate Variability (HRV), a psychophysiological measurement of the beat-to-beat interval and is considered a valid index of autonomic nervous system innervation (Thayer et al., 2012).

the right hemisphere, when compared to the left hemisphere, with negative affect (Davidson, 2004; Thayer et al., 2012). In addition, these same heart and brain electrical patterns are associated with less physical activity engagement (Blom et al., 2009; Threadgill et al., 2020).

Another approach within the biological perspective is endocrinology, the study of the endocrine system and its secretions (i.e., hormones). Thus, taking an endocrinological approach within Exercise Psychology often involves a primary focus on the relationship between hormones and psychological phenomena. One of the most-studied phenomena within this context is stress and the influence of physical activity on the stress response as reflected in the release of stress hormones (e.g., catecholamines, cortisol). Building on this psycho-biological connection, research has demonstrated that regular physical activity behavior (and often greater fitness as a result of that activity) evokes favorable adaptations in the biological stress response. More specifically, individuals who are more physically active tend to respond more positively (or less negatively) to various types of stressors (e.g., exams, social conflict; Dienstbier, 1989; Sothmann et al., 1996). This has been demonstrated in terms of stress hormone profiles that are more adaptive (i.e., more catecholamines, less cortisol) in the reaction to the stressor and in a faster recovery once the stressor is over.

Even though several methods and techniques (e.g., electrophysiology, endocrinology, genetics, neuroscience) are used to explore relationships between physical and psychological states, the goal remains to develop a better understanding of psychological phenomena. While the biological perspective is interesting and informative, it does not provide a full understanding of the antecedents or consequences of physical activity behavior by itself. For example, studies investigating whether particular genomes are predictive of long-term exercise behavior may dismiss important confounders like social priorities (e.g., taking care of a child or parent), experienced feelings and thoughtful expectations, and so on. Thus, while the biological perspective adds to understanding Exercise Psychology, it cannot and should not stand alone.

Cognitive Perspective

Cognitive science encompasses a large, interdisciplinary field broadly concerned with understanding the mind and its processes. This includes investigating concepts of intelligence, language, memory, perception, and so on. Like the previously discussed perspectives, cognitive science is also interested in the mind–body connection and investigates higher-order psychological processing that occurs between some stimulus and the response for a given behavior. In addition, cognitive science examines the intricacies of various cognitive disorders (e.g., Attention Deficit Hyperactivity Disorder, Autism, Dementia). As Exercise Psychology is primarily interested in the antecedents and consequences of physical activity behavior, we will focus on cognition in the context of such behavior. In fact, research has demonstrated physical activity can both influence, and be influenced by, cognitive processes.

Cognitive functioning includes several cognitive processes (or abilities) that are needed for learning and critical thinking. This includes attention, memory, language, perception, and executive functioning. Within the physical activity context, the focus has been primarily on the cognitive process referred to as executive functioning, which has three primary components: updating, inhibiting, and shifting (Miyake & Friedman, 2012). The first component, updating, sometimes referred to as working memory, is the ability to maintain and update relevant information. Inhibition, also referred to as cognitive control, is the ability to intentionally constrain unwanted thoughts and behavior impulses. Lastly, shifting[5] is the ability to quickly and accurately switch between mental tasks.

[5] It is actually not possible to "multi-task" (i.e., perform multiple mental task at the same time). Thus, someone who is a good "multi-tasker" is actually very efficient at "shifting" or switching between multiple tasks (Miyake & Friedman, 2012).

Some theorists suggest a regulatory process occurs between the components of executive functioning and physical activity behavior such that greater executive functioning leads to more physical activity engagement, and more physical activity engagement improves executive functioning (Hall & Fong, 2007). Indeed, executive functioning has been shown to predict planned physical activity behavior (Hall et al., 2008), and a large body of evidence suggests regular physical activity behavior improves the components of executive functioning in children, adolescents, and adults (Colcombe & Kramer, 2003, 2018; Khan & Hillman, 2014). Moreover, physical activity behavior has been shown to protect against and slow the progression of memory disorders, such as Dementia and Alzheimer's (Rovio et al., 2005).

The cognitive perspective provides invaluable information on human thought and reason in the context of physical activity behavior. This perspective often implicitly assumes humans to be rational decision makers, but humans are not always rational. Thus, like any other perspective, the study of cognitive function only supplies a piece of the puzzle and should be considered alongside various other factors (e.g., feeling states, physical states, social contexts, physical environment) to more completely understand the dynamic intricacies of human behavior.

Personality Perspective

The study of Personality involves the exploration of various psychological characteristics and traits with the goal of understanding how these traits relate to behavior. This perspective investigates personality traits as facilitators and inhibitors of cognition, emotion, and behavior and also explores personality disorders (e.g., Bipolar Disorder, Obsessive-compulsive Personality Disorder). An individual's traits and characteristics develop and become relatively stable across the lifespan. The personality perspective in Exercise Psychology seeks to understand whether particular traits are commonly related to physical activity engagement either by facilitating or inhibiting engagement in physical activity or the extent to which physical activity might influence such traits (i.e., consequence).

A quick online search of "personality tests" results in numerous surveys offering to outline your personality upon completion. Given that self-exploration is often useful and helpful, these tests may provide information for such thoughtful and personal reflection. However, only a handful have been empirically demonstrated to be reliable and valid within the context of behavior. One such personality model is referred to as "The Big Five" or the five-factor model (Costa & McCrae, 1992; Digman, 1990; John et al., 1991). The Big Five consists of five, higher-order personality traits: Openness to experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism (commonly referred to by its acronym OCEAN; John & Srivastava, 1999). In brief, the trait Openness to Experience is greatest for those who consistently seek out behaviors that are intellectual or imaginative in nature. Individuals with greater degrees of Conscientiousness are orderly, responsible, and dependable. Extraverts, in contrast to introverts, are talkative, assertive, energetic, and prefer (or do not mind) to be the center of attention. Those who exhibit greater degrees of Agreeableness are good natured, dependable, cooperative, and trustful. Lastly, Neuroticism is captured by the tendency to be emotionally reactive, easily upset, and "moody". Of these five traits, the constellation of higher extraversion, greater conscientiousness, and less neuroticism (or more emotional stability) has been most consistently linked with greater likelihood of physical activity engagement (Wilson & Dishman, 2015).

The personality perspective considers individual variability. As such, it considers how the individual, with their own set of personality characteristics, typically responds to and interacts with the environment. This perspective provides additional insight that may not be considered by other perspectives, but, again, it does not alone adequately explain the antecedents and consequences of physical activity behavior.

Social Perspective

Social science is broadly devoted to the study of social interaction and societies. Similar to the other perspectives, social science encompasses a broad range of major fields of study. These include, but are not limited to, anthropology, behavioral economics, and sociology. Together, these fields inquire how humans develop, behave, and adapt in response to positive and negative social interactions and social expectations within the context of a given group, institution, culture, or society more broadly. The social perspective in Exercise Psychology is primarily interested in understanding (a) how social relationships and interaction promote or hinder the likelihood of physical activity behavior, and (b) how social relationships mediate the influence of physical activity on an individual's well-being and quality of life.

Compelling evidence suggests social isolation, less social integration, and feelings of loneliness are risk factors for poor health and even early death (Berkman, 1995; Cacioppo & Cacioppo, 2018; House et al., 1988; Smith & Christakis, 2008). From a theoretical perspective, positive social interaction, social support, and feelings of relatedness (i.e., feeling connected to or having things in common with someone) are believed to promote initiation and adherence to health behaviors. Indeed, evidence supports the notion that social networks and perceptions of support are associated with greater physical activity behavior (Anderson et al., 2006; Hawkley et al., 2009; Watt et al., 2014).

Humans are innately social creatures, and thus understanding social dynamics is a worthy avenue of research. However, like the other perspectives, the social perspective alone fails to provide a full understanding of the natural complexity of human behavior. For example, if we only considered the social perspective, we would potentially lose individual variability within such social dynamics. Extraverted individuals are more adept in socially complex environments than their more introverted counterparts and thus are more likely to seek out a larger social network. This does not mean an introvert is inherently at greater risk of an early death because of their decision to spend less time engaged in socially stimulating environments. On the contrary, behavior, and the subsequent risk to health, must consider the individual as a whole.

Importance of Integration

Understanding human behavior, such as engaging (or not) in physical activity, is undeniably complex. Because of such complexity, Exercise Psychology is often studied in comprehensible "chunks" through the various perspectives described in this chapter. However, as the renowned neurobiologist Robert Sapolsky wrote, "the boundaries between different [perspectives] are often arbitrary, but once some arbitrary boundary exists, we forget that it is arbitrary and get way too impressed with its importance" (2017, p. 6). That is, the "perspectives" used to understand behavior are much like using a telescope to focus on a single star. Just because you are focused on a single star, and uniquely captivated by its impressiveness, does not mean the entire galaxy in which it resides disappears. On the contrary, the galaxy continues to not only exist outside of our scope or perspective, but is also in motion, continuously affected by the properties of stars, planets, gas clouds, debris, black holes, dark matter and so on. Thus, it is imperative in the exploration of the intricacies of human behavior, even within the context of physical activity, to keep in mind each perspective "zooms" into a single component of a much more complex entity.

Learning Exercises

1. How does Exercise Psychology differ from Sport Psychology?
2. What are the three main themes typically studied within Exercise Psychology?
3. What were the different scientific approaches discussed? Briefly explain each.
4. Can physical activity behavior be fully and reliably explained by a single perspective?

Further Reading

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Chapter 2
Theories of Physical Activity Motivation

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Chapter Overview

This chapter describes four types of behavior theories and presents discrete examples of each type of theory as applied to physical activity. *Social cognitive theories* assume that we are motivated to behave based on intentions, and that intentions are based on our expectancies and values about the behavior. Social cognitive theories presented within are the *health action process approach* and *temporal self-regulation theory*, which consider not only the determinants of intentions, but also factors that influence whether intentions are likely to translate into physical activity. *Humanistic theories*, such as *self-determination theory*, share the notion that humans have a common drive to pursue fulfillment. Self-determination theory proposes that we have a set of basic psychological needs that, when met, lead to internal reward. *Dual-process theories* describe two different influences on behavior: reflective processes that are slow, reasoned, and deliberate; and automatic processes that are spontaneous, sometimes irrational, and uncontrollable. The two dual-process theories described here, *hedonic motivation theory* and *theory of effort minimization in physical activity*, describe the outcomes of competition between automatic processes (e.g., a dread of physical activity), and reasoned processes (e.g., a desire to be more physically active). *Maintenance theories* consider why we are physically active, as well as how continuing physical activity regularly in the same context can lead to habit formation. This chapter provides a snapshot of physical activity motivation theories which are continually changing over time to account for new scientific findings as well as innovations in measurement and analytics.

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Physical Activity Motivation Theories

The abundant physical and mental health benefits of physical activity provide ample reason why people *should be* physically active, but seldomly do these explain why people *are* physically active. Think about the people in your life that are regularly active. What motivates them on a day-to-day basis? And those people you know who have started being active but quit: what moved them to start being active? Why did they quit?

Theories provide general frameworks or structures to describe, predict, or understand physical activity behavior or behavior change (Bem & Looren de Jong, 1997; Rebar & Rhodes, 2020). There are many behavior change theories available: one review documented more than 80 theories that are available to organize thinking about which factors impact behavior change and through which pathways (Michie et al., 2014). Practically, theories can inform our efforts to change people's behavior and to understand why certain behavior change efforts may work and others may not (Michie & Abraham, 2004). Throughout this chapter, we consider different types of theories, and provide illustrative applications of these to physical activity motivation.

Historically, theories of physical activity motivation have been adapted from sports and performance psychology (Rebar & Rhodes, 2020; Rhodes & Nigg, 2011), the aim of which is to achieve (e.g., win, improve). Hence, many theories of physical activity motivation focus on the processes of setting and achieving goals to change physical activity. Influences from public health, developmental psychology, social psychology, evolutionary psychology, and neurobiology have led to expansions in the conceptualization of physical activity motivation. Now, nonconscious influences like habits and urges are considered in physical activity motivation theories as well as evolutionary tendencies for humans to exert as little effort as possible when moving (Cheval et al., 2016; Kwasnicka et al., 2016). Additionally, innovations in measurement and analysis have transformed theory from accounts of motivation and behavior on single occasions, towards a portrayal of motivation and behavior as dynamic, changing on a moment-by-moment basis, and acknowledging the longer-term process of maintenance (Dunton et al., 2019; Rebar & Rhodes, 2020).

This chapter is not a comprehensive inventory of physical activity motivation theories. Rather, it showcases different types of theories, and provides illustrative examples of how theories of each type have been applied to physical activity motivation science. Table 2.1 depicts the categories of theories and physical activity motivation theories covered in this chapter. Notably, these categories are not mutually exclusive; many theories could fit within multiple categories. The organizational structure offers a heuristic framework for thinking about the different ways in which physical activity motivation has been theorized.

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Table 2.1
Overview of the Categories of Theories and Examples of Specific Theories as Applied to Physical Activity Motivation

Category and Assumptions	Example Theories
Social cognitive theories: Behavior is motivated by intentions/goals, which are based on expectancies and values about the behavior.	Health Action Process Approach (Schwarzer, 1992, 2008, 2016) Temporal Self-Regulation Theory (Hall & Fong, 2007, 2010, 2015)
Humanistic theories: Behavior is motivated by the common human pursuit of fulfillment.	Self-Determination Theory (Deci & Ryan, 1980, 2002)
Dual-process theories: Behavior is motivated by two different types of processes: reflective processes that are deliberate and reasoned, and automatic processes that are spontaneous and uncontrollable.	Hedonic Motivation Theory (Williams, 2018; Williams & Bohlen, 2019) Theory of Effort Minimization in Physical Activity (Cheval & Boisgontier, in press) Affective-Reflective Theory (see Chapter 4; Brand & Ekkekakis, 2021)
Maintenance theories: Motivation to initiate a change in behavior is distinct from motivation to maintain behavior change.	Theoretical Explanations for Maintenance of Behavior Change

Theories of Physical Activity Motivation

Social Cognitive Theories

The main premise of social cognitive theories is that behavior is driven by our goals or intentions, which are informed based on our values and expectations about that behavior. Social cognitive theories take on an agentic view (Bandura, 2001), meaning that people are seen as the active decision-makers and main drivers guiding our own behavior. Due to the assumption that our behavior is the result of acting on deliberative reasoning, social cognitive theories are described as a *reasoned action approach* (Ajzen & Fishbein, 1977; Head & Noar, 2014).

The main predictor of behavior within social cognitive theories is our goal or intention about the behavior. *Goals* are targets or purposes aimed at achievement (Locke et al., 1981), and set the standard for satisfaction of performance (Locke & Latham, 2006). *Intentions* are defined as our perception of the probability that we will do the behavior (Ajzen, 1991; Ajzen & Fishbein, 1977). Intentions can be deconstructed into two components: direction and strength (Rhodes & Rebar, 2017). As applied to physical activity, *intention direction* represents the decision of whether or not to do physical activity (or how much, how often, or which activity to do). *Intention strength* is defined as the intensity of the commitment to enact the behavior or not.

Early social cognitive approaches focused primarily on predicting intentions or goals with the implicit assumption that behavior will follow. However, a multitude of evidence revealed a phenomenon referred to as the *intention-behavior gap*, describing the reality that goals and intentions often do not lead to behavior and behavior cannot be reliably predicted only by goals or intentions (Rhodes & de Bruijn, 2013; Sheeran & Webb, 2016). For example, evidence from physical activity research suggests that if 100 people make intentions to engage in physical activity, 54 of them will likely fall short of enacting their intended physical activity (Rhodes & de Bruijn, 2013).

Goal theories have evolved to propose that translation of goals into behavior is dependent on characteristics about the goal such as how difficult or specific it is (Kwasnicka et al., 2020; Swann et al., 2020). Intention-based theories have evolved to consider *action control*, a term that encapsulates the factors that impact whether intentions translate into behavior or not (Kuhl, 1984; Rhodes, 2017). Action control factors oftentimes consist of cognitive or regulatory processes that aide in implementing intentions such as planning or self-monitoring (Gollwitzer, 1999; Rhodes, 2017). The two social cognitive models we will be describing further are contemporary evolutions of traditional social cognitive theories, which incorporate action control.

Health Action Process Approach

The health action process approach (Schwarzer, 1992, 2008, 2016; Table 2.2; see specifically Schwarzer, 2008, p. 6, Figure 1) describes physical activity motivation as two separate processes with different cognitive, behavioral, and situational determinants: The first phase is the motivation phase, which culminates in the formation of physical activity intentions. The second phase is the volition phase which leads to actually doing the intended physical activity. The health action process approach theorizes that we experience a shift in mindset when transitioning between motivation to volition phases. A variety of cognitive, behavioral, and situational factors can either help or hinder physical activity intention strength and the translation of intentions into physical activity.

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Table 2.2
Health Action Process Approach Applied to Physical Activity

Phases	
Motivation: Developing physical activity intentions	*Volition:* Acting on physical activity intentions
Stages	
Non-intentional: Physical activity intention is absent	*Intentional:* Physical activity intention is formed but no change in physical activity has occurred
Pre-intentional: Physical activity intention is being developed	*Actional:* Intended physical activity is being engaged in
Constructs	
Task self-efficacy: the perceived capability to start physical activity, given current circumstances	*Action plans:* detailed plans for implementing intentions that include when, where and how decisions
	Coping plans: detailed anticipated barriers with specific contingency plans; alternative to initial action plans
Outcome expectancies: the expected balance of positive and negative outcomes of engaging in the intended physical activity	*Action control:* the ongoing regulatory processes of evaluating behavior in regard to the intention
Risk perceptions: perceived health threat of not changing physical activity behavior	*Coping self-efficacy:* the perceived capability to maintain the intended physical activity behavior even in the face of barriers
	Recovery self-efficacy: the perceived capability to recover an intended behavior if it has been stopped

The motivation phase involves making physical activity intentions. This phase describes behavioral intentions in different stages of formulation, incorporating stages of “non-intention” (the absence of any intention) and “pre-intention” (the early emergence of intention). Factors theorized as influencing intentions are task self-efficacy, outcome expectancies, and risk perception. *Task self-efficacy* is our own perception of our capability to do physical activity, and the theory proposes that stronger self-efficacy will lead to stronger physical activity intentions (Bandura, 1997). *Outcome expectancies* are perceptions of the likely outcomes of physical activity. Outcome expectancies incorporate both anticipations of good and bad outcomes of physical activity, and the weighted cost-benefit balance of them (Bandura, 1997). The health action process approach proposes that the more favorable the anticipated outcomes, the stronger the physical activity intentions will be. *Risk perception* is the perception of risks associated with changing physical activity behavior, relative to the perceived risks of not changing physical activity (Renner & Schupp, 2011). Typically, this is conceived in physical activity research as the perceived health risks of not engaging in regular physical activity, and the theoretical expectation is that a high risk of poor health consequences of inactivity will lead to the initial decision to make a strong physical activity intention.

The volition phase of the health action process approach consists of the enactment and maintenance of intentions. There are two stages of the volition phase: we are in the stage of “intention” when the intention has been made but not acted on, and we are in the “action” phase once the intended physical activity has been initiated. Progression through these volitional phases of health action process approach is proposed to be implemented initially through action plans and coping plans then followed through with action control. *Action plans* are detailed plans describing when, where, and how intentions will be implemented and are expected to regulate the implementation of intentions. *Coping plans* are set in place as alternatives to the initial action plans with specific anticipated barriers and plans to overcome them, such that potential implementation problems are foreseen and so the enactment of intentions is not derailed (Schwarzer & Luszczynska, 2008). Whereas the plans are intended to be made prior to behavioral engagement, the regulatory process of *action control* is defined within the health action process approach as the continual regulatory process of self-monitoring behavior, reflecting on intentions, and making effortful regulatory action to align behavior with intentions (Schwarzer & Luszczynska, 2008; Sniehotta et al., 2006). When we shift from the volition to the action phase, self-efficacy continues to be integral, but behavior relies less on self-efficacy for engaging in physical activity. Instead, it relies more on *coping self-efficacy*, our certainty that we can maintain the intended physical activity even when barriers are faced, and *recovery self-efficacy,* our belief about to what extent we can recover physical activity if we stop for a while (Schwarzer & Renner, 2000).

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Temporal Self-Regulation Theory

Temporal self-regulation theory (Hall & Fong, 2007, 2010, 2015; Table 2.3; see specifically Hall & Fong, 2007, p. 14, Figure 5) is an evolution of social cognitive theories that present pre-intention and post-intention phases of motivation and accounts for potential factors that may influence whether we act on our intentions or not. Unique to temporal self-regulation theory is the premise that the impact of social, cognitive, and biological influences on behaviors depends on the perceived timing between the anticipated costs and benefits of engaging in the behavior.

Temporal self-regulation theory proposes that physical activity behavior is predicted by intention strength, self-regulatory capacity, and behavioral prepotency. Physical activity intention strength is hypothesized to depend on our connectedness beliefs and temporal valuations (Hall & Fong, 2007). *Connectedness beliefs* are our perceptions about the impact of behavior for later outcomes (e.g., belief that physical activity will reduce risk of future chronic disease), and it is expected that the more we believe that physical activity will lead to an outcome, the stronger our intentions for physical activity will be. *Temporal valuations* are perceptions of the value of behavioral outcomes (e.g., how important it is to reduce the risk of chronic disease), and it is hypothesized that the more valuable the perceived outcome, the more likely it is that we will strongly intend to engage in physical activity.

Table 2.3

Temporal Self-Regulation Theory Applied to Physical Activity

Phases	
Motivational: The impacts on the development and strength of intentions	*Post-motivational:* The impacts on the likelihood of enacting intentions into behavior
Constructs	
Intention strength: the degree of commitment to engage in physical activity behavior	
Connectedness beliefs: the perceived link between behavior and anticipated outcomes of the behavior	*Self-regulatory capacity:* ability to effortfully regulate behavior, accounting for both cognitive capacity and physiological energy
	Behavioral prepotency: the impact of the frequency of past behavior and/or the presence of triggering cues to action in the environment
Temporal valuations: the perceived value of the anticipated outcomes of the behavior	*Ambient temporal contingencies:* the perceived disparity in timing of the anticipated costs vs. benefits of the behavior

Self-regulatory capacity (or executive control resources) refers to an ability to effortfully regulate behavior and accounts for both cognitive capacity and physiological energy. Considered also within self-regulatory capacity is the ability to compensate or overcome the need for high amounts of self-regulation when it is not available (Hall & Fong, 2010). It is expected that more self-regulatory capacity will enhance the likelihood of acting on physical activity intentions. *Behavioral prepotency* captures the impact of the frequency of past behavior and the presence of environmental cues to action. Behavioral prepotency is thought to be driven by internal urges like hunger or thirst, as well as automatic behavioral tendencies like habits. It is expected that behavioral prepotency that is more supportive of physical activity will lead to more physical activity and make it more likely that physical activity intentions are enacted.

The impact of self-regulatory capacity and behavioral prepotency on the likelihood that we will enact our intentions is theorized as depending on *ambient temporal contingencies,* the balance between the perceived timing of the anticipated costs and benefits of engaging in the behavior (Hall & Fong, 2015). Reward is devalued by time; for example, if it is difficult to engage in physical activity in the current environment and the perceived benefits feel a long way away, the likelihood that we will enact our intentions for physical activity relies more heavily on our self-regulatory capacity and behavioral prepotency than when the environment is more supportive of physical activity. Notably, temporal self-regulation theory describes ambient temporal contingencies as possibly deriving from both social (e.g., support from friends) and physical environmental factors (e.g., neighborhood safety). Additionally, this theory postulates that there is a feedback loop, such that behavior impacts the determinants of future behavior. Specifically, it is theorized that experiences while engaging in physical activity will impact connectedness beliefs and temporal valuations to engage in physical activity in the future.

Humanistic Theories

Humanistic theories emphasize *self-actualization*: the belief that people are innately driven towards personal growth and strive toward achievement of full potential (Goldstein, 1995; Maslow, 1943; Rogers, 1961). Humanistic theories frame behavior as motivated by our intentional pursuit to achieve self-actualization. Importantly, humanistic theories promote the idea that humans have freedom to act and control their own behavior. It is proposed that people have a common tendency to behave in ways that are adaptive, goal-directed and self-fulfilling. We achieve self-actualization through *learning*: the acquisition of new knowledge, behaviors, skills, and values through study, practice, or experience (Madsen & Wilson, 2012). Humanism postulates that behavior is directly controlled via learning (Knowles et al., 2014). The learner is an active part of this process by making active decisions about what is gained from experiences and what experiences are sought.

Another major tenet of humanistic theories is that humans cannot be reduced to distinct, quantifiable components. A humanistic perspective suggests that behavior is not driven separately by our values, expectancies, goals, and circumstances, but rather that these factors influence our learning about what is and is not fulfilling, and the main predictor of behavior is the internal drive towards self-fulfillment. In accordance with the humanistic perspective, learning is most effective through positive and negative lived experiences (Rogers, 1961). For example, successful achievement of a goal-driven behavior elicits a sense of accomplishment, inherent growth, and self-improvement (Deci & Ryan, 2002). These positive inherent effects of mastery are why humans continue to perform behaviors and strive to perform better than previous attempts (Lavigne et al., 2009). While the mastery of a behavior can be seen to provide a sense of self-fulfillment, the enjoyment of performing a behavior may be equally fulfilling. For example, we do not necessarily need to be expert swimmers to enjoy the experience of swimming. As humanistic theories posit that people are innately driven to actions that promote personal growth and fulfillment, it is reasonable to suggest that behaviors that satisfy such self-fulfillment and reward are naturally motivating (Deci et al., 1999; Teixeira et al., 2012).

Self-Determination Theory

Self-determination theory (Deci & Ryan, 1980, 2002; Table 2.4; see specifically Howard et al., 2017, p. 1347, Figure 1), arguably the most popular humanistic theory applied to physical activity behavior, suggests that behavior is motivated by different types of motivation: *autonomous* and *controlled* motivation. Autonomous and controlled motivation capture our reasons for engaging in physical activity. *Autonomous motivation* for physical activity leads toward self-actualization either through enjoyment, achievement of goals, or consistency with how we want to be. *Controlled motivation* for physical activity is dependent on external pressures, such as a desire to gain external rewards or avoid externally imposed punishments. For example, people who are motivated to be physically active by enjoyment of engaging in activity are autonomously motivated, whereas those influenced by guilt or obligation to others are directed by controlled motivation. While both autonomous and controlled motivation can prompt physical activity, when external pressures are no longer present, physical activity directed by controlled motivation will likely be discontinued. However, physical activity motivated by autonomous motivation will more likely be reliably engaged in long-term because we are doing it for ourselves; it is *self-determined* (Deci & Ryan, 2002).

Self-determined motivation can be further broken down into degrees of controlled or autonomous motivation (Deci & Ryan, 2002). *Amotivation* is the complete absence of motivation. *Extrinsic motivation* is a controlled form of motivation exerted by external pressure or anticipated external reward for engaging in physical activity, such as anticipation of a certificate or trophy. *Intrinsic motivation* arises from the anticipation of accomplishment, enjoyment, and innate reward from doing the physical activity.

Self-determination theory provides perspective on the types of behavioral regulation that result in differing degrees of controlled and autonomous motivation. *External regulation* captures motivation to act out of desires for external reward or the dread of future punishment. *Introjected regulation* captures motivation of partially internalized ideas and values such as to avoid guilt, seek approval, or protect our sense of self. *Identified regulation* captures influences of more internalized motivation based on our own values and priorities. *Integrated regulation* captures the influence of self-awareness and the motivation to act in line with how we define ourselves. *Intrinsic regulation* represents the influence of purely self-determined motivation, driven by satisfaction and enjoyment from engaging in the behavior.

Initially, these forms of regulation were portrayed on a continuum, with certain types of regulation leading to more autonomous motivation at one end and those leading to more controlled motivation at the other. However, more recent evidence has shown that we can have motivational influence from more than one type of regulation and that their alignment with autonomous vs. controlled motivation is not straightforwardly represented on a continuum (e.g., Howard et al., 2020). We can likely be motivated by more than one type of regulation and the regulation types do not necessarily dictate whether our motivation for physical activity is more autonomous or controlled.

Self-determination is theorized as being achieved through three universal and basic psychological needs that, when satisfied, are important components in establishing intrinsic motivation for behaviors such as physical activity (Deci & Ryan, 2002). Specifically, *relatedness* refers to the need to be socially connected and accepted by others. *Autonomy* speaks to the need for self-governance and the freedom to make decisions about behavior in line with our personal beliefs and values. *Competence* encompasses our belief that we can enact chosen physical activities (Brooks et al., 2018; Deci & Ryan, 2002).

Table 2.4

Self-Determination Theory Applied to Physical Activity

	Motivations	
Amotivation: No motivation or intention to engage in physical activity.	*Extrinsic motivation:* Motivated by external factors not related to the physical activity or self.	*Intrinsic motivation:* Motivated by internal rewards, personal growth and enjoyment of physical activity.
	Regulations	
External regulation: Motivated by external reward or punishment. *Introjected regulation:* Motivated by gains of social approval or avoidance of social disapproval. *Identified regulation:* Motivated by personal values and self-improvement. *Integrated regulation:* Motivated by acceptance of physical activity into one's life.		
	Basic Psychological Needs	
Relatedness: Enjoyment, belongingness, and accountability through social connections and support. *Autonomy:* Empowerment through sense of control, freedom of choice and self-governance. *Competence:* Confidence in one's ability to successfully engage in and perform the activity.		

Dual-Process Theories

Some theories propose that behavior is dictated, at least in part, by automatic desires and biases. These theories are considered dual process because they propose that behavior is influenced by two types of processes: *reflective processes*, which are the deliberate, effortful processes that translate into reasoned action, and *automatic processes*, which are rapid, sometimes nonconscious, and not dependent on cognitive resources. Common to most dual-process models is the postulate of *default-interventionist architecture*: an expectation that people will, by default, be influenced by automatic processes, unless they have sufficient motivation, opportunity, and self-regulatory capacity to inhibit them (Brand & Ekkekakis, 2018; Evans & Stanovich, 2013). Also common to most dual-process theories is the notion that reflective processes are slower to engage and enact than automatic processes, because reflective processes involve effortful cognitions such as making intentions to engage in a behavior or not, and self-regulation such as planning and problem solving to enact intentions.

Most automatic influences referred to in dual-process theories are considered as manifestations of mental associations between a behavior and cues or attributes (Evans & Frankish, 2009; Rebar, 2017). Such *connectionist models of memory* describe working memory as a network of connected concepts with varying degrees of strength of associations linking concepts. For example, the automatic influence of habit on physical activity behavior is conceived as the mentally held link between "physical activity" and a triggering "cue" (Gardner, 2015). Similarly, tendencies to approach or avoid opportunities to be physically active can be experienced as a result of learned associations between the notion of "physical activity" and the attributions of "good" or "bad" (Conroy & Berry, 2017; Rebar, 2017). Rebar (2017) postulates that there are multiple automatic influences on physical activity behavior which are distinct but related, because they all form a network of overlapping associations of the notion of "physical activity" with a variety of other concepts or attributes. Although not covered in this chapter, a full overview of an additional dual-process theory, the affective-reflective theory of physical inactivity and exercise (Brand & Ekkekakis, 2018) is presented in Chapter 4 (Brand & Ekkekakis, 2021).

Theory of Hedonic Motivation

The theory of hedonic motivation (Williams, 2018; Williams & Bohlen, 2019; Table 2.5; see specifically Williams & Bohlen, 2019, p. 133, Figure 15.1) proposes that environmental cues trigger dual motivational processes that influence behavior: reflective motivation and hedonic motivation. *Reflective motivation* is influence from the desire to engage in physical activity or not, based on expectations and values of physical activity. *Hedonic motivation* is influence from the immediate, uncontrollable feeling or "urge" of wanting to do physical activity or wanting to avoid physical activity. Whereas reflective motivation is based on cognitions about past experiences of physical activity and values and expectancies about physical activity, hedonic motivation originates from genetic predispositions and psychological hedonism. *Psychological hedonism* is our human tendency to pursue pleasure and avoid displeasure (Williams, 2018). Based on our past experiences of physical activity as being pleasant or unpleasant, we will be automatically drawn to approach or avoid physical activity opportunities, respectively.

The theory of hedonic motivation proposes that the dual processes of reflective and hedonic motivation might have the same direction of influence on behavior, in which case behavior would follow the added influences of reflective and hedonic motivation. For example, if you have intentions to engage in more gym workouts and have hedonic motivation of wanting to work-out at the gym, you will work-out at the gym more. But sometimes hedonic and reflective motivation can compete, leading to opposing influential forces on behavior. For example, you may want to be more physically active due to your knowledge of the health benefits (reflective motivation) but have to overcome a sense of dread of physical activity before starting (hedonic motivation; Williams & Bohlen, 2019). In such circumstances, when reflective and hedonic motivation conflict, the theory of hedonic motivation proposes that a decision is made as to whether to act in line with hedonic or reflective motivation. The decision is dependent on the relative strength of hedonic and reflective motivation, self-control resources, and the situational context (Hofmann et al., 2009). If your reflective motivation is strong, self-control is high, and there are few barriers, your reflective desire to engage in physical activity can overcome your hedonic dread to avoid it. However, if your hedonic dread is strong, there are contextual barriers, and your self-control is depleted, it is more likely the hedonic dread will win out and you will not do physical activity. In accordance with the theory of hedonic motivation, whether the decision translates into physical activity behavior or not depends on *access:* the opportunity to engage in physical activity or not, such as access to gym equipment.

Table 2.5

Theory of Hedonic Motivation Applied to Physical Activity

Cue	
Stimulus: contextual triggers of the concept of physical activity that initiate the motivational processes underpinning movement	
Psychological Processes	
Controlled processing: cognitions about expectation of future consequences of physical activity behavior based on past experiences and values	*Automatic association:* mentally held association between physical activity and pleasant or unpleasant, acquired through past responses to physical activity
Reflective motivation: influences from the desire to engage in physical activity or not, based on deliberated expectations of the pleasantness or unpleasantness of physical activity	*Hedonic motivation:* influence from the immediate, uncontrollable feeling or "urge" of wanting to do physical activity or wanting to avoid physical activity
Influential Variables	
Situational context: factors in the surrounding context that might inhibit or facilitate physical activity behavior	
Self-control situation: the circumstance in which hedonic and reflective motivation are opposing, and people may elicit self-control to act in line with reflective motivation, overcoming hedonic motivation	
Decision: the determination of the "winning" influence of doing physical activity vs. not doing physical activity when hedonic motivation and reflective motivation are opposing	
Access: opportunity or lack of opportunity to perform physical activity	

Theory of Effort Minimization in Physical Activity

The theory of effort minimization in physical activity (Cheval & Boisgontier, in press) centers around the evolutionary perspective that people have evolved to have automatic attractions toward effort minimization. *Effort minimization* is the process of acting in ways that require the least perceived amount of effort or energy expenditure. Notably, this perception of effort might occur automatically, reflectively, or both. The theory of effort minimization in physical activity puts forth that humans have evolved to avoid unnecessary physical effort, to conserve energetic resources for reproductive activity and somatic maintenance. The theory thus assumes that physical effort is a perceived cost to be avoided and that this leads to a general human tendency to avoid physical activity. The influence on behavior of this automatic draw towards inactivity varies depending on factors of the person, behavior, and context.

The proposed process of the theory of effort minimization in physical activity is that movement-related cues elicit both automatic and controlled evaluations, which in turn lead to controlled or automatic precursors to behavior that direct the decision and plan to produce movement (e.g., physical activity). *Movement-related cues* are contextual triggers of the concept of physical activity that initiate the motivational processes underpinning movement. *Automatic evaluations* are the spontaneous pleasant or unpleasant reactions to movement or sedentary related cues (Conroy & Berry, 2017).

Controlled evaluations are the pleasant or unpleasant reflective judgments about enjoyment and anticipated feelings about physical activity (Rhodes et al., 2009). *Perceived effort* is the perceived experience and anticipations of the effortfulness of physical activity. For example, you may be cued by your rowdy dog with their lead in their mouth. This may elicit unfavorable automatic evaluations of physical activity for you, which elicits your tendency to avoid physical activity. However, the cue may also elicit your values and beliefs about walking being good for both you and your dog, so now you are faced with the decision to act in line with your automatic physical activity-avoidance impulse by not going on the walk or your controlled intention to go on the walk.

Table 2.6
Theory of Effort Minimization in Physical Activity

Cue	
Movement-related cues: contextual triggers of the concept of movement-based behaviors including sitting, standing, and different intensities of physical activity that initiate the motivational processes underpinning movement *Physiological state:* levels of energy and activation	
Evaluation	
Controlled evaluation: reflective judgments about the overall pleasure/displeasure, enjoyment, and feelings expected from physical activity, as well as reflective knowledge about the benefits of physical activity	*Automatic evaluation:* the pleasant or unpleasant experiences that arise rapidly and involuntarily when the concept of physical activity is activated in a person's mind
Perceived effort: the subjective experience/anticipation of the effortfulness of the physical activity	
Planning	
Motor plan: specifications about the place, timing, and specific actions of the physical activity	

Maintenance Theories

If you decided to do some physical activity next week, you could probably muster up the necessary motivation to get it done. The call to be active every day for the rest of your life, though, may seem daunting. We can better anticipate likely barriers and plan in the coming days than we can over the rest of our lives. Even with the strongest commitment and best made plans, there will be things that "pop up" to throw you off. What happens if you get sick or don't feel like being active some days? What happens if you get a new job, have kids, or develop chronic illness or pain? Leading a physically active lifestyle is not as simple as getting really motivated one day and deciding to change your behavior. Maintenance theories differentiate between behavioral initiation factors and behavioral maintenance factors (Fleig et al., 2013; Rothman et al., 2009). *Behavioral initiation factors* capture motivational influences needed to instigate changes in behavior. *Behavioral maintenance factors* are the motivational influences needed for long-term continuation of the behavior change.

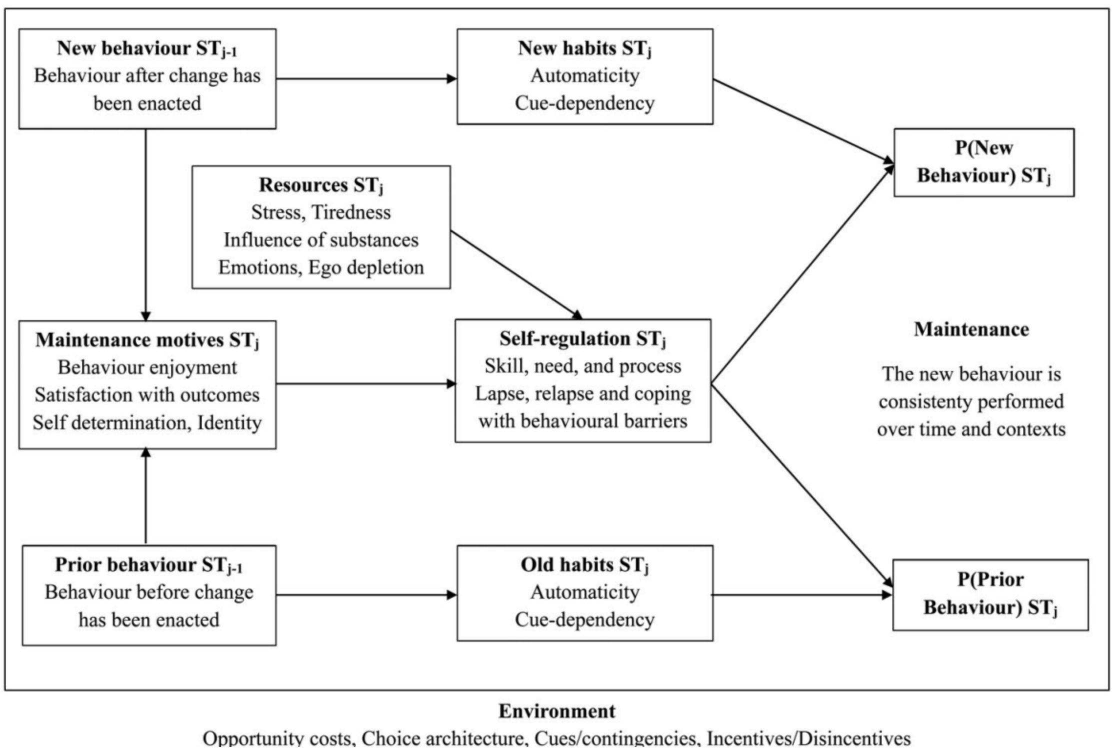
Maintenance theories of behavior change describe how at any point in time, we have multiple behavioral options, only one of which may be physical activity. Decisions about whether to do physical activity or not can occur on a daily or even momentary basis (Dunton & Atienza, 2009). The likelihood that we will "choose" a given behavioral option at a given moment in a certain context is described as *behavioral potential* (Kwasnicka et al., 2016; Rotter, 1960). In accordance with this line of reasoning, behavior will be determined by the option with the highest potential in each moment. If the same behavior tends to have occurred in the same occasion, under similar circumstances in the past, then that behavioral option will likely have the highest behavioral potential, making behavior change quite difficult. That past behavior is thought to influence future behavior through changes in motivation is a concept referred to as *dynamic reciprocity* (Kwasnicka et al., 2016). For example, your past experiences with physical activity may influence your attitudes about how future activity will make you feel, thereby influencing the behavioral potential of you to engage in physical activity, relative to other behavioral options.

Theoretical Explanations for Maintenance of Behavior Change

Multiple maintenance theories are available. Here, however, we present common themes shared across those theories, as extracted in a systematic review of maintenance theories (Kwasnicka et al., 2016; Table 2.7; Figure 2.1). While these factors do not represent a theory in the same way as theories cited above, they capture a broad range of inputs on behavior maintenance.

Figure 2.1

Relationships Between Themes from Maintenance Theories Identified by Kwasnicka et al. (2016)



Note. Reproduced from Kwasnicka, D., Dombrowski, S. U., White, M., & Sniehotta, F. (2016). Theoretical explanations for maintenance of behaviour change: A systematic review of behaviour theories. *Health Psychology Review, 10*(3), 277–296. https://doi.org/10.1080/17437199.2016.1151372 under a Creative Commons Attribution License (CC BY).

Kwasnicka et al. (2016) identified five important theoretical considerations for behavioral maintenance: maintenance motives, self-regulation, resources, habit, and environmental and social influences. *Maintenance motives* are the deliberate reasons we have for wanting to maintain physical activity based on views of ourselves, our values, or our beliefs. *Self-regulation* leads to behavioral maintenance through our diligent self-monitoring and adjusting of behavior, and implementation of effective strategies to adjust behavior when it does not align with our goals or intentions. *Resources* are important for maintenance in that psychological and physical resources such as self-control and energy are necessary for behavioral maintenance. *Habits*—i.e., the processes by which your behavior is influenced from a cue to act based on well-learned associations between cues and behaviors (Gardner, 2015; Rebar et al., 2020)—are essential for maintaining behavior without relying on self-regulation. *Environmental and social influences* are essential for behavioral maintenance because we tend to maintain behavior which is in line with our social influences and accessible in your physical context.

It is theorized that we need at least a single maintenance motive, or reason, to maintain physical activity behavior. Typically, initial behavior change will occur when motivation is high and there is ample opportunity. As motivation wanes and priorities and opportunities change, self-regulation becomes more relevant for physical activity maintenance. The more often we engage in physical activity within the same context, the more likely it will form into a habit, which means the decision to continue to maintain physical activity will require less deliberation and self-regulation. Importantly, whether we maintain physical activity will also be dependent on the environmental and social context that surrounds you. The theory is that more stable contexts are more likely to lead to habits because it allows for repeated experiences of behavior in the same context such that the cue-behavior associations that underpin habits will be developed and strengthened.

Table 2.7

Theoretical Explanations for Maintenance of Behavior Change Applied to Physical Activity

Themes
Maintenance motives: the reasons people do physical activity
Self-regulation: effort applied to actively control behavior by overcoming temptations for inactivity and/or acting on physical activity intentions
Resources: psychological and physical factors that support physical activity
Habits: the processes by which your behavior is influenced from a cue to act based on well-learned associations between cues and behaviors
Environmental and social influences: access to and support of physical activity opportunities

Conclusion

There is no single, optimal way to think about physical activity motivation or behavior change. We have covered only a few of the many available theories of physical activity motivation and behavior (see Michie et al., 2014), and notably, those that we have presented are psychological in nature, so assume that the individual is the most appropriate unit of analysis. Indeed, all theories make assumptions about humans and behavior that are important to keep in mind when attempting to apply them to real-world settings. Social cognitive theories propose that behavior is driven by intent and reasoning based on expectancies and values. Humanistic theories propose that humans are driven toward fulfillment, and motivation is heavily influenced by learning. Dual-process theories posit that there are both reasoned and automatic processes that influence behavior. Maintenance theories postulate that the reasons someone starts physical activity will likely not sustain their maintenance in physical activity over the long-term. Based on these premises, a set of theories have been put forth to help describe and potentially target physical activity behavior change from a motivation perspective. People are unique, situations are unique, and moments in time are unique. As a result, the factors that impact whether we engage in physical activity are many and complex. Theories represent attempts to organize these factors into coherent structures, but in so doing, may over-simplify the motivational processes involved in physical activity.

By identifying and organizing determinants into a coherent structure, theories can help us to develop physical activity interventions by identifying discrete psychological targets for change, potential pathways by which change may be brought about, and specific techniques that may be most likely to bring about change via those targets and pathways (Michie & Prestwich, 2010). Continued development of theory is needed to help us to continue to refine our physical activity intervention approaches. Theories currently in use, and those that will continue to emerge in the future, can help provide useful frameworks for understanding and potentially enhancing physical activity behavior.

Learning Exercises

1. Why are motivation theories important for physical activity and sport domains?
2. Which two theories within this chapter posit that behavior motivation is derived from intentions and goals, expectations, and values about the behavior?
3. Which theory presented in this chapter suggests that motivation is driven by external and internal regulations?
4. What two types of processes are said to be involved in dual-process theories?
5. What is the difference between behavior initiation and behavior maintenance?
6. What does it mean if a behavior is described as having high behavioral potential?
7. Our previous experiences with the behavior will influence the level of behavioral potential. What is this concept known as?

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Chapter 3
Promoting Self-Determined Motivation for Physical Activity: From Theory to Intervention Work

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Chapter Overview

Why did I get up at 5:00 am to go to yoga this morning? Why does my 72-year-old father attend his local early morning parkrun event every Saturday, come rain or shine? Every behavior we undertake in life (working, exercising, travelling etc.), is underpinned by motivation. Motivation is one of the most important concepts to understand for those interested in promoting health and well-being via participation in physical activity.

In this chapter, we will explore how motivation has been defined, and focus on self-determination theory (SDT; Deci & Ryan, 1985, 2000, 2017) as one of the most popular and useful theories that has been applied to the study of motivation to be active. We also illustrate how SDT can be applied in real life settings, using two recent projects as examples to explain how significant others in physical activity settings (e.g., exercise instructors, walk leaders) can say and do things to support the development of adaptive motivation among those they work with. Finally, we provide recommendations for future research and practice.

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Introducing Motivation: "What Do I Do, and Why?"

Motivation is a central concept to all human behaviors. Fundamentally, it represents the impetus or urge to move, and is often thought of as a quantifiable entity (Ntoumanis et al., 2018). Definitions of motivation have focused on the direction (i.e., "where do I invest my effort?"), origin ("what caused me to do this?"), intensity (i.e., "how hard do I try?"), and persistence ("when or why will I give up?") of behaviors. In recent decades, research in this field has shifted focus from quantity to the quality of motivation. Whereas the quantity of motivation refers to *how much* motivation one has, quality of motivation refers to the reason *why* an individual is motivated to engage in the target behavior. Understanding the reasons for motivation tells us more about what is regulating the behavior than simply knowing how much there is; hence motivational reasons are sometimes referred to as motivation regulations or behavior regulations. The concept of motivation quality has gained popularity in physical activity research, as a large body of evidence has shown that motivation regulations are critical determinants of cognitive (e.g., attention, reasoning), emotional (e.g., enjoyment, anxiety), and behavioral (e.g., effort, persistence) outcomes. SDT (Deci & Ryan, 1985, 2000, 2017) is a popular approach that has been the basis of much of this work and will be the focus of this chapter. The phrase physical activity is an umbrella term used to refer to an array of bodily movements that expends energy. Exercise is a sub-type of physical activity that is intentional, structured and repetitive, usually associated with fitness maintenance or improvement goals (Caspersen et al., 1985). SDT-based physical activity research has focused on motivation for intentional, structured or planned behaviors such as that undertaken for the purpose of fitness goals (e.g., exercise classes), and the theory has also been applied to less structured but intentional activity such as leisure walking (Teixeira et al., 2012). For the purposes of this chapter, we will use the term physical activity, unless we are specifically referring to exercise undertaken in an exercise context (e.g., structured exercise classes).

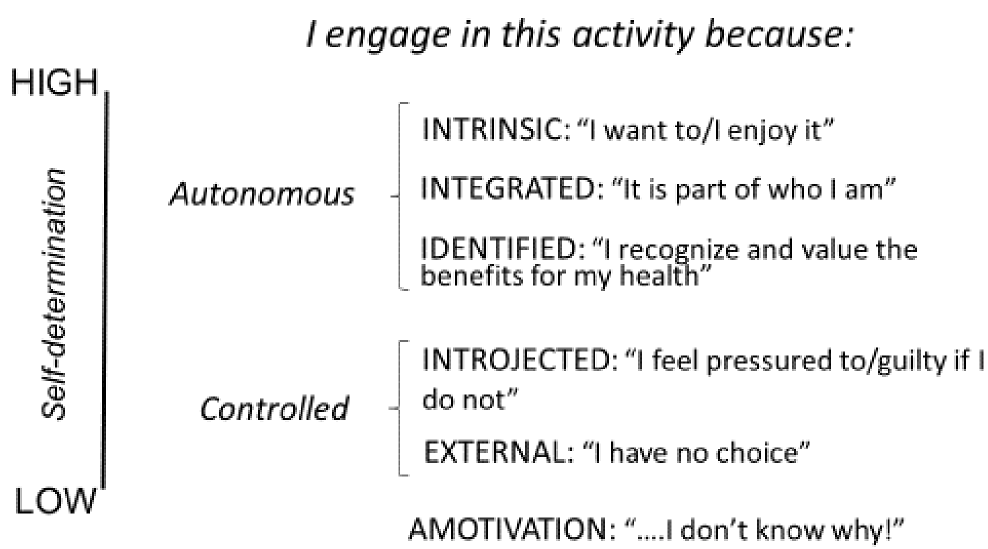
An Overview of Self-Determination Theory (SDT)

SDT recognizes that being motivated by lower quality reasons can be detrimental for the individual's health and well-being, even if the person engages in the behavior. Decades of SDT research has generally found that the same factors that can stimulate more autonomous interest in an activity are also those that promote health and wellness (Deci & Ryan, 2017). In this section, we will provide a detailed overview of the key constructs in SDT to explore how we can capitalize on those to promote physical activity engagement and health and well-being. We will also discuss the risks that may be present from utilizing ill-informed approaches to motivate others. When motivation is optimized, individuals are likely to take part in physical activities because they value, benefit from, and enjoy the activity.

Autonomous and Controlled Motives to Be Physically Active

Like the majority of health behaviors, engagement in physical activity is a choice. Therefore, an important consideration for motivation researchers is to identify how to support people to move towards healthy behavior choices and thrive when engaging in those behaviors. SDT proposes that healthy choices are more likely to be made and sustained when behavior is autonomous. Examples of autonomous behavior regulations would be doing an activity willingly because you want to engage in the behavior for its own sake (e.g., "I run because I enjoy the experience of running") or because it is part of your identity (e.g., "being an exerciser is part of who I am"). The former example describes *intrinsic* motivation and the latter *integrated* motivation. Identified motives include being active because you recognize the value and worth of the activity (e.g., "I go to the gym because I value fitness and health") and are also autonomous. On the other hand, individuals will sometimes engage in behaviors for non-volitional reasons. *Introjected* motivation is underpinned by internal pressures or contingencies, such as fear (e.g., "I'm scared of the consequences of being inactive"), guilt (e.g., "I would feel guilty if I let my instructor down") or contingent self-worth (e.g., "I have to stay in shape to feel good about myself"). *External* regulations have no internal driver, and reflect force, pressure or coercion from someone else (e.g., "I have been told by my doctor that I must exercise to avoid dying young"). Sometimes people's engagement in physical activity is *amotivated*. Amotivation describes a state in which the individual lacks intention or reason to continue (e.g., "I don't see the point"). If amotivation becomes more prominent than controlled or autonomous regulations then it is likely that the individual will disengage from the behavior, or not start at all. SDT describes these motivations as falling on a continuum (see Figure 3.1). It is often the case that multiple motivation regulations underpin behavior. However, people will experience most benefit when the motivations are all, or predominantly, autonomous (Ntoumanis et al., 2018).

Figure 3.1
Examples of the Motivation Regulations and Where They Place on a Continuum of Self-Determination



According to SDT, the degree of self-determination one feels about their engagement in an activity is critically important. When behavioral engagement is regulated by autonomous reasons (i.e., more self-determined), individuals are likely to persist longer, try harder, enjoy the experience more, and feel better about themselves. Indices of physical and psychological health have also been positively linked to autonomous motives. On the contrary, controlled regulations and amotivation tend to predict boredom, disengagement, indices of compromised physical and psychological health, and dropout (Ntoumanis et al., 2020; Ryan & Deci, 2017).

Basic Psychological Need Satisfaction and Frustration

SDT proposes that the degree to which autonomous and controlled motivations are supported or undermined depends on the extent to which three basic psychological needs are satisfied or frustrated (Deci & Ryan, 2017, Bhavsar et al., 2020). *Basic need satisfaction* is considered fundamental for people to thrive, not merely survive. The three needs highlighted by SDT are 1) *competence* (i.e., to feel capable, can meet challenges, efficacious), 2) *autonomy* (i.e., volitional and willingness to take part in the behavior) and 3) *relatedness* (i.e., feel respected, cared for and connected to others). Originally, SDT differentiated only between high and low need satisfaction. However, recent advances have pointed to the potential for needs to be frustrated, reflective of a feeling that one's needs are actively undermined by significant others (Bartholomew et al., 2011, Bhavsar et al., 2020). *Autonomy need frustration* refers to the feeling that one has been pushed or forced to behave in a certain way. *Competence need frustration* reflects feeling useless and hopeless. *Relatedness need frustration* refers to feeling disliked, excluded, or deliberately ignored. When needs are frustrated, behavioral engagement is likely to be controlled by introjected or external regulations, which subsequently leads to an array of negative consequences, as previously outlined.

Photo by [Monstera](#) from [Pexels](#)

The Role of the Social Environment

SDT has particular utility as an approach to understanding motivation in exercise and other forms of structured physical activity, as the theory identifies how the social environment can be optimized to create the most appropriate conditions for adaptive motivation to ensue. The basic psychological needs can be considered inner motivational resources that mediate the relation between the experiences one has in their social environment (e.g., what their instructor says and does in an exercise class) and the motivation regulations that underpin engagement in the target behavior (Deci & Ryan, 2000; Bhavsar, et al., 2019). If the social environment is characterized by *need supportive* strategies, the individual will be more likely to experience need satisfaction, which leads to more autonomous motivation for the activity, and in turn, adaptive outcomes. However, when the social environment is characterized by *need thwarting* strategies, needs are likely to be frustrated, motivation is likely to be controlled, and maladaptive consequences are predicted to ensue. Need supportive social environments are those in which the social agents (e.g., instructors, coaches) use autonomy supportive, competence supportive, and relatedness supportive strategies. In need thwarting environments however, autonomy, competence and relatedness thwarting approaches are evident. Table 3.1 presents descriptions of what constitutes need supportive and need thwarting strategies. The third column in the table describes a third category of *need relevant* behaviors, namely *need indifferent* behaviors. This relatively new addition to the SDT picture of the social environment describes those things others in the social environment may do that overlook or neglect another person's needs (Bhavsar et al., 2019; Cheon et al., 2019). Such an approach is hypothesized to lead to unfulfilled needs; however, as yet, there is no empirical support for this relatively new proposition. Bhavsar and colleagues (2019) recently developed a scale to assess the social environment created by sport coaches, using the tripartite perspective we describe in Table 3.1. Research utilizing this scale in a range of physical activity contexts will help to identify the role need indifferent behaviors may play in predicting motivation to be active and physical activity behaviors.

Table 3.1
Descriptions of Need Supportive, Thwarting, and Indifferent Behaviors in Physical Activity Settings

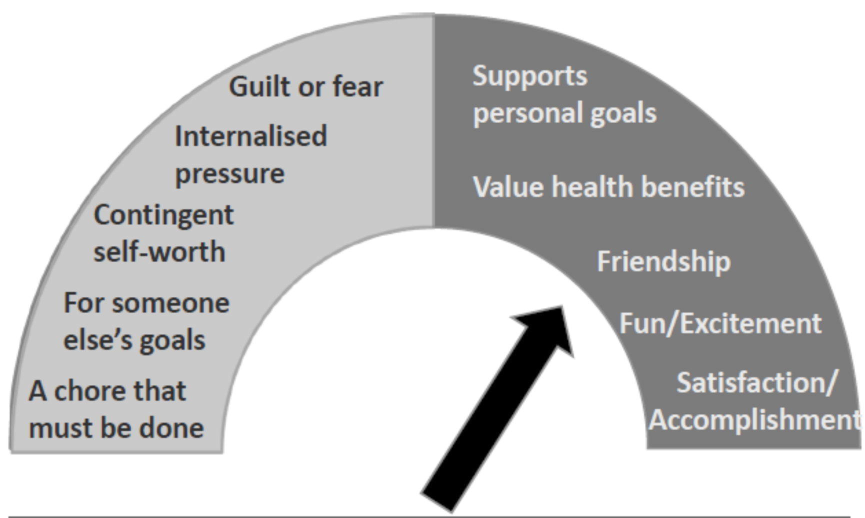
Supportive	Thwarting	Indifferent
Autonomy - Acknowledge, recognize and nurture the inner motivational resources of others - Offer meaningful choices - Attempt to understand others' perspective - Give personally meaningful rationales - Encourage input into decision-making - Give opportunities for self-initiated behavior	**Autonomy** - Pressure others to think, feel, and behave in certain ways - Dismiss or devalue others' perspectives - Apply excessive personal control in situations - Use coercive strategies to control how tasks are performed - Dismiss or devalue others' perspectives	**Autonomy** - Negligence or inattention towards individuals' perspectives and their inner motivational resources
Competence - Guide individuals to feel capable of tackling challenges or experiencing meaningful success - Convey clear expectations and information to help others reach desired goals and outcomes - Provide constructive, thorough feedback - Encourage skill development and learning - Support setting of realistic goals	**Competence** - Emphasize mistakes - Be overly critical - Highlight failures and faults - Repeatedly give negative feedback - Communicate perceptions of participants' ineffectiveness and doubt improvements	**Competence** - Negligence or inattention towards providing adequate guidance, feedback, and organization to help participants' feel capable of facing challenges and/or experiencing success
Relatedness - Demonstrate affection, care, and emotional stability - Demonstrate warmth and empathy - Show interest and support	**Relatedness** - Demonstrate aversion or dislike of others - Being critical - Being hostile - Exhibit active dislike	**Relatedness** - Negligence or inattention towards promoting a sense of connectedness with the participants

Overview of SDT as Applied in Exercise and Other Physical Activity Contexts

SDT lends itself well to intervention work, as the theory is explicit about the circumstances under which motivation can be optimized. A number of researchers have capitalized on the opportunity to test the theory in exercise settings, by exploring whether improving the levels of need support in the social environment positively impacts basic need satisfaction, motivation quality, and the targeted outcomes. Such studies will often use a train the trainer style design, in which those in positions of authority or leadership are trained in how they can create more need supportive environments for those with whom they interact. There are many challenges with regard to the design and delivery of such interventions, and many of those are caused by a need to balance the ideal scenario with what is realistic or feasible (for a discussion of challenges and solutions, see Ntoumanis et al., 2018). For example, those professionals and volunteers who are willing to take part in research have to fit in training amidst their other day-to-day professional and personal commitments, and they often have no background in SDT, motivation or psychology. Therefore, training duration, content, and timing needs to be realistic for them. Once training is complete, there is no guarantee that the trained individuals will adhere to the principles of effective motivation, and it can be difficult to determine whether interventions have been delivered as intended (Quested et al., 2017). Ensuring that the most important key concepts are conveyed in a way that is accessible and relevant to those delivering the intervention can help to address both of these issues. For example, understanding of motivation as an entity that can range in quality can be helpful for instructors and leaders to understand how their words and behavior can have an impact on the motivation of those they work with.

Figure 3.2

The Motivation Barometer, Used to Support Teaching of Motivation Regulations



Note. Light grey shaded area presents controlled motivation, referred to as red motivation. Dark grey shading presents autonomous (green) motives.

Figure 3.2 presents a simple graphical representation of the range of motivation regulations that we have created and adapted for use in several intervention studies. It is intended to be easily understood by the lay public. The motivational barometer offers a visual depiction of autonomous (green) and controlled (red) motivation regulations and can be used in a variety of learning activities to help to convey how the social environment can influence whether motivational reasons are red or green, as well as how motivation may fluctuate day to day, or moment to moment. The green and red labelling provides the instructors/leaders with a simple terminology for thinking about or discussing motivation regulations without needing to remember or fully comprehend theoretical terms. The figure may appear simplified; however, we consider it fit for purpose. That is, it is very useful for helping instructors/leaders to understand how motivations to be physically active can differ in quality, and it can be used as a visual aid when exploring how the provision of need support can shift the type of motivation and individual experiences.

Effective SDT-based interventions usually help individuals to learn how to appropriately support the basic needs of others, and how to respond in a way that is appropriate for the circumstances faced. Essentially, the goal is to up-skill the instructor/leader in using the need supportive strategies described in Table 3.1. In order to make the information accessible to lay audiences, it is important to adapt these strategies by using regular language and making the examples context specific. In the next section, we provide an example of how this can be done.

Practical Application #1: An Application of Self-Determination Theory in the Context of Group Cycling Exercise Classes

Rationale for the Project

Despite the widespread popularity of group exercise classes, turnover of attendees is high, with approximately 50% of new attendees dropping out within the first six months (Berger et al., 2002). It is relatively common for exercise instructors to be heard to be adopting a no pain, no gain mentality using phrases such as "I need you to push harder; it's got to hurt if it's going to make you fitter". This approach is often driven by the assumption that more controlling, pressurizing environments will make fitness class attendees exert more effort. Despite the evidence that suggests that this approach undermines rather than fosters quality motivation, fitness instructors typically do not receive training in how to motivate exercisers in a more adaptive way. The aim of this study was to develop and test a training program for group exercise instructors on how to adopt a motivationally supportive communication style based on the principles of SDT.

More specifically the study explored:

- Whether the training program resulted in instructors and exercisers perceiving instructors to adopt a more motivationally adaptive communication style
- Whether the training program led to increases in instructor and exerciser need satisfaction and self-determined motivation
- Whether the training program was feasible and acceptable to instructors
- The barriers and facilitators experienced by instructors when putting the motivational strategies into practice

How the Study was Conducted

After ethical approval was granted by the University ethics board, an opportunistic sample of Les Mills International (LMI) certified RPM™ indoor cycling instructors and their exercisers were recruited. LMI is a multi-national fitness company offering a variety of exercise training programs. Forty-three instructors (29 intervention, 14 control group, mean age = 39.88 years, standard deviation [*SD*] = 13.12) and 321 exercisers (246 intervention, 75 control group, mean age = 37.28 years; *SD* = 7.65) participated in the study.

The study used a two-arm quasi-experimental design. Exercisers were asked to rate their perceptions of their instructors' motivational style, including the extent to which they provided autonomy support (Williams et al., 1996), control (i.e., autonomy thwarting; Ntoumanis et al., 2017), structure and involvement (i.e., competence and relatedness support; Markland & Tobin, 2010). Exercisers also rated the extent to which they felt that their basic psychological needs were satisfied in the exercise class (Vlachopoulos et al., 2010) and their motivation for attending the class (Markland & Tobin, 2004). Finally, questionnaires assessed exercisers' feelings of subjective vitality (Ryan & Frederick, 1997), attention during class, and intentions to continue participation (Ntoumanis et al., 2017).

Instructors' perceptions of their own motivational style were measured using the same items and rating scales as those employed for exercisers, but with minor amendments to the wording. Instructors were also asked to rate the extent to which they felt that their basic needs were satisfied (Chen et al., 2015) when delivering their workouts, and their quality of motivation for their job role (Tremblay et al., 2009).

After participants completed baseline questionnaires, the training program was delivered. Follow-up measures were taken three months after baseline, following completion of the training program. A sub-sample of instructors (*n* = 10) also took part in semi-structured interviews to explore their views on the feasibility and acceptability of the training program.

Intervention Format and Content

The training aimed to teach instructors how to maximize their use of motivationally adaptive strategies and minimize their use of motivationally maladaptive strategies during group exercise classes. To simplify the presentation of the strategies to the instructors, we grouped the need supportive strategies using the acronym LARS (a popular Scandinavian first name!):

- **L**istening to your participants
- **A**dvising your participants
- **R**elating to your participants
- **S**tructuring your class

Strategies to Incorporate

We offered 10 specific examples of how these LARS strategies can be operationalized, in consultation with experienced cycling instructors (who were not participants in the study). These instructors were key stakeholders and so were able to give critical insight to ensure that our examples were relevant to the indoor group cycling context. The participant instructors were encouraged to try out a couple of the following specific strategies each week:

1. Taking time to listen and be responsive to your participants' needs
2. Encouraging questions and feedback from your participants about their goals, problems or preferences
3. Giving meaningful and appropriate explanations
4. Giving specific and constructive feedback
5. Using an inclusive language (e.g., "we could try…")
6. Acknowledging the participants' feelings and responding appropriately
7. Offering meaningful praise which is unconditional
8. Create opportunities for participants to have input and make decisions about the workout
9. Offering choice and variety which are realistic and relevant to your participants' needs
10. Find opportunities to interact with all participants

Strategies to Avoid

We also explored with the instructors how to avoid using strategies that would be likely to neglect or thwart the basic needs; these strategies were grouped under the acronym PEAS:

- **P**ressuring language
- **E**mpty communication
- **A**ppearing cold
- **S**tructuring your class

The PEAS strategies were exemplified with 10 specific strategies; instructors were encouraged to focus on *avoiding* two to three of these strategies each week:

1. Using commands and directives (“must”, “should”, “need you to”) or inducing guilt and shame
2. Criticizing, belittling, devaluing or dismissing participants
3. Imposing goals and rules with no explanations, or explanations which are confusing, inappropriate or pressuring
4. Offering no specific feedback/praise, or talking in ways that are motivationally “empty” (e.g., “keep going”)
5. Appearing cold and indifferent to your participants’ positive and negative feelings; appearing to talk to a “camera”
6. Appearing unresponsive to or discouraging your participants’ preferences, opinions and feedback
7. Using “no pain-no gain” language
8. Offering little variety and/or choices that are not meaningful
9. Not mixing with your participants
10. Comparing participants against each other or being overly competitive

The intervention was developed and customized for the group cycling context using information gathered from observation of classes, and ongoing consultation and feedback from experienced LMI group cycling instructors.

The training consisted of three face-to-face workshops, each lasting three hours. The sessions included information about SDT and the proposed motivation/communication strategies, exemplar video clips of instructors demonstrating both adaptive and maladaptive approaches to motivating exercisers, group discussions and activities, brainstorming, individual planning, and practice using the strategies in the cycling studio. In between each workshop, instructors were encouraged to practice using the motivation strategies in their regular exercise classes and in the following workshops discussed any challenges experienced.

Instructors were provided with a training resource pack that included copies of the PowerPoint slides and educational materials covered in the workshops, rich narrative descriptions of each of the motivation strategies, personal action planning sheets, and self-reflection diaries. Instructors were also invited to join a private Facebook page and discussion forum which was used to share additional resources (e.g., video clips), information (e.g., further ideas regarding how the strategies could be implemented), support (e.g., responses to questions and feedback on how to manage difficulties faced by the instructors), and discussion (e.g., regarding their experiences of putting the strategies into practice). Additional phone and email support from the research team was also available.

Contemporary behavior change techniques were embedded within the training program (e.g., barrier identification, prompt practice, performance feedback, self-monitoring, and action planning) to aid instructors in effectively integrating the training with their own instruction style. Instructors who were unable to attend any of the workshops in person were offered the opportunity to watch a recording of the missed session online. For further details on the intervention protocol, see Hancox et al. (2015).

Major Findings (see Hancox, Quested, et al., 2018, and Ntoumanis et al., 2017, for more details)

1. ***The training led to increases in perceived use of a more motivationally adaptive communication style by instructors***

- Exercisers reported increases in perceptions of adaptive instructor behaviours (more autonomy support and interpersonal involvement) and a decrease in instructors controlling behaviours.
- Instructors' reports of their own motivational communication style suggested changes in the right direction (e.g., increase in autonomy support and decrease in control), however, these differences were not statistically significant.

2. ***The training led to increases in instructor and exerciser need satisfaction but no statistically significant changes in self-determined motivation***

- Instructors reported higher levels of psychological need satisfaction (increased autonomy and relatedness) when delivering group exercise classes after receiving SDT-based training.
- Exercisers also reported higher levels of psychological need satisfaction (increased autonomy and relatedness) and stronger intentions to continue participation.
- No statistically significant changes in self-determined motivation were observed in instructors or exercisers.

3. ***The training program was considered feasible and acceptable to instructors***

Recruitment and retention to the training program was good with 51% of the instructors who were approached agreeing to take part and a 96% retention rate (see Hancox, ThØgersen-Ntoumani, et al., 2018 for further details). The training was positively received by the instructors, as represented in the quotes that follow (note, pseudonyms have been used throughout). They reported that the training was relevant and that it challenged their current conceptions of motivationally adaptive teaching practices: "through the training, I was sort of learning how the supportive strategies work. It sort of puts the workout into the participant, rather than just being like the drill sergeant. Um … so definitely understanding that component made a big difference" (Natasha, cycling class instructor). Instructors described key strengths of the training program to include the multiple workshops that enabled instructors to practice putting the strategies into action between workshops, social support from the trainers and other instructors, a mix of theory and practical strategies and helpful resources (e.g., videos, handouts, and Facebook group). Instructors also expressed their belief in the value and transferability of the training for other group exercise settings: "I think it translates really well. I teach other programs and I've thought about how I could alter those teaching methods, you know, because the strategies are quite broad, so could easily be implemented across other programs" (Janine, cycling class instructor).

4. ***Barriers and facilitators to implementing adaptive motivational exercise instruction***

Instructors described barriers and facilitators that they experienced when putting the motivational strategies into practice. Facilitators included features of the training and of their experiences when instructing that made it easier for them to use more adaptive motivational strategies. These included:

- Establishing a connection with exercisers: Instructors felt that by making themselves more available to talk to exercisers and proactively engaging in more meaningful conversations, other strategies (e.g., encouraging questions and feedback from exercisers about their goals, problems

or preferences) were more effective. For example, they reported that exercisers became more willing to ask questions and provide input and feedback.
- Understanding SDT: Instructors reported that understanding how and why the strategies worked helped them to implement the strategies in a motivationally supportive way.

The instructors also raised several issues that they felt acted as barriers to their effective behavior change. These included:
- The structured nature of the group exercise class: The strict format for LMI group cycling classes (i.e., delivering a set routine to a continuous soundtrack, whilst demonstrating the exercises on a bike at the front of the class) limited instructors' ability to listen, advise and relate with exercisers on an individual basis during class. Most instructors reported overcoming this challenge by spending more time interacting one-to-one with exercisers before and after classes.
- Initiating meaningful one-to-one conversations: Some instructors were apprehensive at first about initiating one-to-one conversations but reported that it became easier with practice.
- Phrasing instructions in a need supportive way: To deliver the strategies in a need supportive way, instructors had to change what they said and how they said it but reported finding it difficult to come up with phrases that worked for them. For example, instructors were worried that providing choice might lead to exercisers taking the easier options and not being sufficiently challenged. Group discussions within the training sessions helped instructors identify phrases that encompassed choice but still promoted challenge (e.g., if you want more of a challenge, accelerate to find the beat).
- Breaking old habits: Instructors reflected that they had been in the habit of using certain phrases when instructing, such as commands and directives:

  > We have been very much taught to use that type of language– "It should feel like this, this next gear is a must do". It took me a long time to get out of, because it just slipped out. It's just habit. (Wendy, cycling class instructor).

  Instructors explained that with time and practice they were able to break old habits. One instructor described that planning when and how they were going to incorporate the strategies into their classes helped, "I think scripting what I was going to say in my action plan was key." (Wendy, cycling class instructor)

Strengths of the Project

The findings contribute to the existing evidence with regard to the benefits of implementing SDT-based interventions (e.g., Edmunds et al., 2008; Fortier et al., 2007) in exercise settings with non-clinical populations. This is the first study in the group exercise domain which shows that SDT-based communication training can lead to both increases in perceptions of adaptive instructor behaviors and decreases in instructors' use of controlling motivation strategies. Furthermore, the findings suggest that SDT-based training programs can positively impact exercise instructors' satisfaction at work, with instructors reporting higher levels of autonomy (e.g., a sense of freedom and choice in how they deliver workouts) and relatedness (e.g., feeling valued and connected with their exercisers) satisfaction. The training was considered feasible and acceptable despite that fact that it challenged instructors' current motivational practices. The training was viewed as valuable and relevant both within group cycling classes and within other group exercise settings. Thus, the development of instructor training programs that pull from contemporary theories of motivation, such as SDT, could be an important step to address the current gap in instructor training provision.

Limitations of the Study

A number of methodological challenges were identified. Firstly, with regard to instructors' and exercisers' motivational regulations, baseline scores were high (autonomous motivation) or low (controlled motivation and amotivation), leaving little room for improvement, which may explain the lack of significant changes in self-determined motivation. Future work should consider recruiting exercisers and instructors with less adaptive motivation profiles. A further limitation of the study was that, although instructors were able to catch-up on missed training sessions online, there was no objective measure of usage of training material; we had to rely on self-reports from instructors as to whether they had watched the video or not. Future research should address this issue by developing or using tools to monitor engagement in online training activities.

Practical Application #2: Application of Self-Determination Theory in the Context of Group Walking in Retirement Villages

Rationale for the Project

It has been predicted that by the year 2050, approximately 20% of the global population will be aged 60 years or older (United Nations, 2019). Aging is linked to a higher risk of physical decline and chronic illness, but regular physical activity can reduce such risks (Holme & Anderssen, 2015; Windle et al., 2010). To obtain health benefits, it has been recommended that older adults engage in at least 150 minutes of physical activity a week, which is equivalent to walking for 30 minutes, five times a week (United Nations, 2019; WHO, 2020). However, the majority of older adults are insufficiently physically active to obtain health benefits and are putting themselves at an increased risk for premature mortality, chronic illness and reliance on health care systems (Guthold et al., 2018; Kalisch, 2019).

Retirement villages offer independent housing for retirees aged 55 and over and provide facilities that promote active and healthy aging with others. However, many residents lack the motivation or confidence to take part in physical activity opportunities offered in the retirement villages (Thøgersen-Ntoumani et al., 2017). Research suggests that older adults benefit from social support and prefer exercising with similar-aged peers (Beauchamp et al., 2018; Smith et al., 2017). Peers, that is individuals who share similar characteristics such as age and health, have been found to be just as effective as professionals at leading physical activity programs in the general population (Martin Ginis et al., 2013; Hulteen et al., 2019). Due to sharing similar experiences, older peers may find it easier to show empathy for age-related barriers, as compared to an outsider (Burton et al., 2017).

Peer-led walking groups can offer a cost-effective and attractive way of promoting physical activity in retirement villages (Thøgersen-Ntoumani et al., 2017; Thøgersen-Ntoumani et al., 2019). Walking with a group is an effective way of increasing physical activity and has been linked to improved health outcomes in older adults (Hanson & Jones, 2015; Meads & Exley, 2018; Kritz et al., 2020c). Physically inactive older adults perceive it important for a walk leader to be motivating (Kritz et al., 2020a). From the perspective of SDT, a walk leader who is need supportive may promote autonomous motivation for walking in group members (Ryan et al., 2017).

As demonstrated in Practical Application 1, authority figures (e.g., fitness instructors) can be trained in providing need support to others and thereby promote autonomous motivation, psychological well-being and physical activity in others (Hancox et al., 2018; Ntoumanis et al., 2020; Ntoumanis et al., 2018). However, it is unknown whether it is *feasible* and *effective* to train non-experts, such as older peer walk leaders, in providing need support to others. The aim of the Residents in Action Trial (RiAT) study was, therefore, to examine the acceptability, feasibility, and implementation of a 16-week peer-led walking intervention that is led by older peer walk leaders, who were trained in need supportive communication strategies. The intervention was designed to promote autonomous motivation to be physically active, as a means to increase walking, reduce sitting and improve health and well-being in physically inactive older adults residing in retirement villages in Western Australia.

More specifically the RiAT study explored:

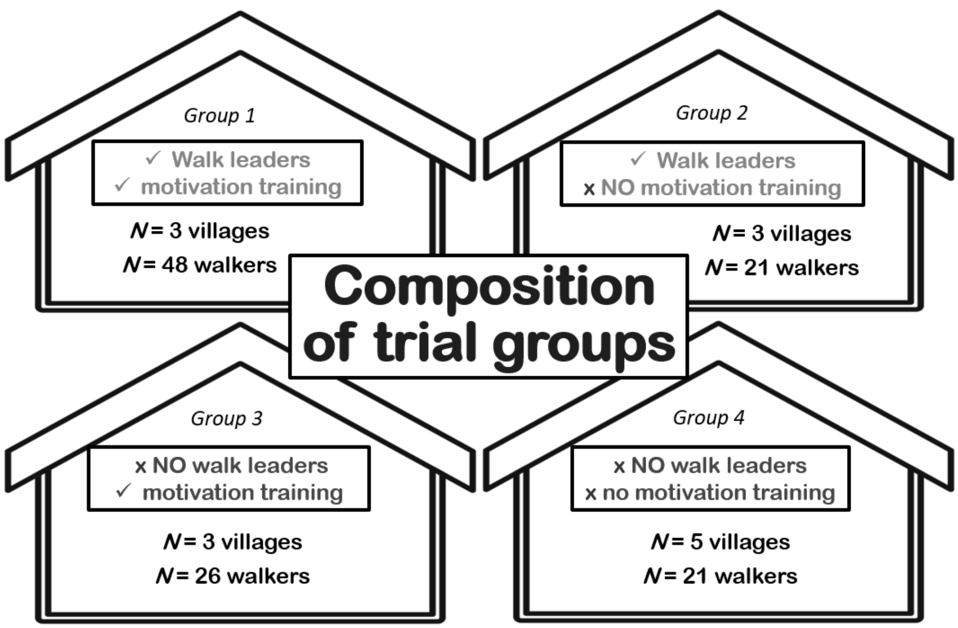
- Whether the program led to walkers perceiving peer walk leaders to adopt a motivationally adaptive communication style, and whether such strategies were perceived as useful by leaders.
- Whether the program led to increases in physical activity, reductions in sitting, and health and well-being outcomes in walkers.
- Whether the RIAT intervention program was feasible and acceptable to older peer walk leaders.
- Factors that fostered motivation to persist as an older peer walk leader and their effectiveness as a walk leader.

How the Study was Conducted

Purposive sampling was used to recruit 116 insufficiently physically active retirement village residents (92% female) who took part as walkers (mean age = 78.37 years, *SD* = 8.30, 92% female), 12 physically active residents who volunteered as walk leaders and three retirement village managers. The trial lasted 16 weeks and was conducted in 14 retirement villages in Western Australia. Each village was allocated to one of four different treatment conditions, which are illustrated in Figure 3.3.

Figure 3.3

An Overview of the Different Treatment Conditions as Part of the Clustered Quasi-Experimental Design



Note. Walk leaders in groups 1 and 2 also received walk leader training

Mixed-methods (i.e., a combination of quantitative and qualitative methods) were used to examine the acceptability, implementation, and efficacy of the 16-week walking intervention and factors affecting the effectiveness and persistence as a volunteer walk leader. Data were obtained from accelerometers (ActivPals worn for seven days), questionnaires, semi-structured interviews, and participant logbooks. Data were collected at pre-intervention, post-intervention (i.e., immediately after the 16-week intervention) and at a 6-months follow up.

Intervention Format and Content

During an initial 2-hour workshop, walk leaders in Groups 1 and 2 (see Figure 3.3) received general information about the volunteering role (e.g., the benefits of walking, of reducing sitting, physical activity and sedentary behavior recommendations, how to lead group walks in a safe manner, key tasks of the walk leader, and what to do in case of emergencies), to prepare them for their role as a peer walk leader. The walk leader role entailed leading a group of new walkers (i.e., physically inactive residents), three times a week for 10 of the 16 weeks. All prospective walk leaders were provided with a training folder that included all educational materials covered in the workshop, self-reflection diaries and maps with details on walkable walking routes around their villages.

Walk leaders in Group 1 (see Figure 3.3) additionally received motivation skills training informed by SDT, delivered across two workshops. The motivation skills training aimed to teach walk leaders how to use motivationally adaptive strategies and avoid motivationally maladaptive strategies in their role as a walk leader. The training was developed and adapted to a walking context and was informed by previous research and interviews (Thøgersen-Ntoumani et al., 2017). In the first session, walk leaders were introduced to the basic principles of SDT and asked to engage in practical exercises to help them understand how to support other residents' autonomous motivation for walking and for reducing sitting behaviors. Examples of strategies included encouraging participant involvement and opinions in making choices (e.g., walking routes), the use of open-ended questions, and providing competence building feedback. To support walk leaders with implementing the motivational principles during their walks, their training included ten need supportive themes. Two themes were about providing relatedness-support: Getting to know the walkers and helping each walker feel like an important member of the group. Five themes related to providing autonomy support (e.g., helping to make walking more enjoyable, providing choice to walkers regarding their walking). Three themes related to providing competence support; For example, helping walkers feel successful at walking, celebrating walker success. Walk leaders were asked to focus on one specific theme each week of the program. In the first workshop, walk leaders were encouraged to apply the learned motivation skills in their walking groups. During a second workshop, which took place in week 2 of the program when they had had some experience of leading the groups, walk leaders were encouraged to reflect on their experiences, discuss any problems they encountered, and how to deal with them.

Walkers in all groups were offered a workshop and received a folder providing them with general information about walking (i.e., physical activity recommendations, the benefits of walking, suitable walking routes). Walkers in the intervention arm (Groups 1 and 3) also received motivation training based on SDT principles (Thøgersen-Ntoumani et al., 2017). Motivation training was delivered as a 2-hour workshop at baseline and included walkers reflecting on the importance of walking and how it aligns with their values and being taught behavior change techniques (e.g., implementation intentions, self-monitoring, and goal setting) to support motivation. For example, implementation intentions were taught by asking walkers to reflect on potential barriers to walking and reducing sitting time and plans on how to overcome them. Walkers were also encouraged to self-monitor their behavior (i.e., using log sheets and tracking step counts), learned goal-setting principles, and were taught about relapse prevention. Walk leaders and walkers who could not attend the face-to-face training received a DVD with a recording of the missed workshop. For further details on the intervention, see Thøgersen et al., (2019).

Major Findings

1. ***Walkers led by a motivation-trained leader increased their physical activity but did not improve mental health and well-being***

The walkers with motivation-trained walk leaders increased their daily steps by 989 steps per day and they significantly increased by 12 minutes per day the time spent in stepping activities. However, there were no statistically significant changes in mental health and well-being outcomes as a result of the intervention, which was in part attributed to low statistical power (i.e., insufficient number of participants; Thøgersen-Ntoumani et al., 2019).

2. ***Walking with others at least once a week was associated with better outcomes as compared to walking alone***

Further analyses showed that those who walked with others at least once a week improved their autonomous motivation for walking, confidence to walk, and physical activity levels and reduced their levels of body fat more than those who only walked alone. See Kritz et al., (2020c) for more details**.**

3. ***Supportive interactions were perceived as important***

Among those who took part, the program was perceived as beneficial in regard to experiencing relatedness with other residents and the benefits of social support were highlighted. Supportive interactions among peers were perceived as important for determining their motivation to walk. For example, two of the walkers stated "I just need encouragement to keep going ... I enjoyed the company. I felt good about it" (Henry, age 69, walker).

> We were doing it in a team thing. I made sure that I'd be checking up on the others. "Are you going to walk today? Are we going to walk today?" Or if they are not, I'd say "Well I'm still going to walk". (Sally, age 80, walker)

Similarly, it became apparent that competence-supportive behaviours led to positive psychological and behavioural outcomes. For example, a walk leader explains:

> I think, [name of walker], when she first started, she sort of lagged behind a bit because she is used to walking at a very slow pace ... but she picked herself up ... I walked with her the other day, and she said "Oh, I'm walking so much faster". So, she felt very good about herself. You know she feels that she really achieved. (Val, 70, walk leader)

Examples of useful autonomy-supportive strategies pertained to the walk leader providing walkers with choice regarding their walking and opportunities for feedback. See Thøgersen-Ntoumani et al. (2019) for more details.

4. ***Volunteer motivation, volunteer attributes and need satisfaction determined the persistence and effectiveness of volunteer walk leaders***

Retaining older volunteer walk leaders was challenging. Thirty-six residents expressed interest in taking on the walk leader role and of these, 11 dropped out of the program and 17 became walkers. A total of eight volunteers (*n* = 7, female) completed the walk leader role, which corresponded to only 22% of those showing initial interest. Volunteers who persisted as a walk leader were physically active residents, aged 70–83 years old, who were satisfied with the training they received (mean satisfaction score 5.74 out of a possible 7, *SD* = 1.03) and reported moderate perceptions of effectiveness in their role. Most enjoyed the role and were relatively confident as a walk leader.

Further analyses revealed that volunteer motivation, volunteer attributes and need satisfaction of volunteers were important for volunteer persistence (Kritz et al., 2020b). Walk leaders who dropped out before the completion of the program described primarily controlled forms of motivation to volunteer, and they did not receive the motivation training. Other reasons for dropping out as a volunteer included declining health and competing commitments. Autonomous motivation facilitated effective coping strategies and volunteer satisfaction. Psychological need satisfaction, enjoying the role and the desire to help (i.e., altruism) helped walk leaders to remain in their role. Experiencing relatedness with walkers, perceiving autonomy as a leader, and feeling successful at helping walkers was important for persisting as a volunteer. Walk leaders who continued their role after the program indicated strong social confidence, compassion, perceived role flexibility, were optimistic, were effective at helping inexperienced walkers, and had completed motivation training (for further details please see Kritz et al., 2020b). When asked about attributes of an effective walk leader, inexperienced walkers emphasized the importance of an entertaining, optimistic, and compassionate walk leader. For further details please see Kritz et al., 2020a.

5. ***Acceptability: Can older peers be recruited as walk leaders and trained in need supportive strategies?***

Walk leaders who persisted in their role reported using some of the taught motivational strategies. For example, at the post-intervention interview one walk leader noted that the motivational strategies were useful, but not used consistently, “I took a little bit on board, I wouldn’t say I used them all the time but when I started, I did” (Anna, age 74, walk leader, Group 1). The interviews with walkers revealed that the walk leaders had used the taught motivational strategies, in particular those pertaining to increasing feelings of autonomy (e.g., providing walkers with choice and eliciting walker feedback) and relatedness (e.g., getting to know walkers and helping them feel at ease). For example, walker Beatrice commented, “I just noticed that she [walk leader] walked with a few people just to socialise” (Beatrice, age 76, walker). One of the walkers whose group leader had received the motivational training explained that, “We had to more or less [walk] partly indoors and then a few times we went around but still in the village, just walking around the streets here where they could sit if they needed to sit” (Anna, age 74). For further details please see Thøgersen-Ntoumani et al. (2019).

Strengths of the Study

The study advances existing walk leader and SDT research by being the first to evaluate the feasibility of training older peer walk leaders in need supportive strategies. An important strength of the study is that it provides comprehensive (qualitative and quantitative) understanding on the acceptability, feasibility, and efficacy of using motivation training to help older volunteers become “motivating” walk leaders (Beauchamp et al., 2007; Kritz et al., 2020a). Further analyses highlight the importance of promoting walking with others as compared to alone. The difficulties of recruiting older volunteers in such settings are emphasized. Additional analyses suggest that the quality of training and volunteer attributes might affect volunteer motivation, persistence, and effectiveness as a walk leader. These findings can inform future peer-led intervention designs and how older walk leaders can be selected, trained and supported.

Limitations of the Study

Limitations include a high number of individuals who self-reported being physically inactive at baseline but who were, in fact, physically active as determined by accelerometer devices. It suggests a need for future researchers to examine additional efficient means of attracting physically inactive older adults to peer-led walking programs. In the future, researchers could also examine what are the most effective strategies to recruit and retain walk leader volunteers. Finally, interventions could examine the feasibility and effects of smaller groups/walking dyads to address the challenge of dealing with diverse abilities within the same group (Carr et al., 2019).

Conclusions and Future Research Directions

There is little doubt that motivation can be highly influential on the degree to which individuals are physically active, as well as the extent to which they stay involved in structured programs and experience physical and mental health benefits. Critically, there is now abundant evidence that significant others can play a role in helping to support autonomous motives to be active, which in turn lead to more sustained and enjoyable exercise and physical activity experiences. The two studies described in this chapter illustrate how innovative approaches to support motivation can be employed to reap the aforementioned benefits. In the project in group cycling settings, it was exercise instructors who were the key social agent. In the work undertaken in retirement villages, physically active peers were able to provide motivationally supportive leadership, once they had received appropriate training. In this chapter we illustrated some of the techniques that can be used to upskill social agents in creating an adaptive motivational atmosphere. These approaches could be employed across a range of settings. This chapter has also outlined some of the challenges in undertaking research to promote more adaptive motivational climates when trying to promote structured and unstructured physical activity, which may also be informative for future research. For example, exercise instructors' comments about the challenges of trying to create a more adaptive motivational atmosphere (e.g., how to break old habits and develop new ones) could be included as key discussion topics within future training workshops, and activities (e.g., brainstorming need supportive phrases, action planning) and resources (e.g., provision of context-specific examples of what to say and how to say it) designed to support behavior change. The instructors also indicated the importance and usefulness of motivation strategies which help establish a connection with exercisers (e.g., finding opportunities to interact with all exercisers and taking time to listen and be responsive to exercisers' needs). As the world continues to battle the pandemic of physical *in*activity, innovative approaches to support motivation, via interventions with peers, instructors and other social agents, will have a critical role to play.

Learning Exercises

1. What is meant by "quality" motivation, and when is someone more likely to experience it?
2. How does self-determination theory distinguish itself (i.e., what sets this theory apart) from other theories of behaviour change covered in the book?
3. Discuss some potential factors, at the personal or contextual level, that might prevent exercise instructors from (fully) using the LARS strategies.
4. Discuss some potential factors, at the personal or contextual level, that might prompt exercise instructors to use the PEAS strategies.
5. How could you adapt the motivational strategies outlined in the chapter to office workers who are insufficiently physically active and living with overweight or obesity, taking into consideration the time constraints they are likely to have?
6. You are being asked to use the motivational strategies outlined in the chapter to lead a walking group of physically inactive, similar aged peers. How could you adapt the strategies to make them relevant to your peer group? What might be challenges when using each of the strategies? What could you do to overcome these challenges?
7. What are some of the challenges that might be faced when doing research to promote more adaptive motivational styles? How might they be overcome?

Further Reading

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Chapter 4
Exercise Behavior Change Revisited: Affective-Reflective Theory

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Chapter Overview

Meta-analyses show that theory-based interventions to increase physical activity behavior yield small effect sizes. One possible reason for this is that theories of behavior change that have been favored in exercise psychology over the past decades have overemphasized the role of forethought and controlled rational reflection. In contrast, the importance of situated affective reactions that cannot always be "thought away" by the individual has been underestimated. The affective-reflective theory (ART) of physical inactivity and exercise is a new theory that addresses this imbalance. The ART assumes that exercise-related stimuli (e.g., the thought of additional physical effort or a friend's reminder to go running) are quickly and involuntarily "valuated" before any reflective thought. This automatic affective valuation manifests as a pleasant or unpleasant feeling, which comes inherently imbued with an approach or avoidance impulse. Depending on the self-control a person is willing and able to apply in a situation, more reflective consideration about a possible change in behavior may follow. Reflective consideration can counteract or strengthen the initial impulse and lead to an intention to change. In this chapter, we explain why the ART is a fundamentally novel and different theory of physical activity behavior change. In the process, readers will also gain insights into the mechanisms of scientific (r)evolutions.

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Facts First

To understand the need for a new theory of exercise and physical inactivity, it is first useful to critically appraise the theories of behavior change that have been used to study these behaviors in exercise psychology over the past three decades. First, we assess the results of intervention studies. Then we turn to the theories themselves (for more discussion on theories used to explain and change physical activity and exercise behavior, see Chapter 2, Rebar et al., 2021; and Chapter 5, Delli Paoli, 2021).

Intervention Studies

A few years ago, a meta-analysis[1] summarized and statistically re-evaluated the results of 82 randomized controlled trials[2] (RCTs) that tested the efficacy of theory-based interventions for increasing physical activity (PA) in adults (Gourlan et al., 2016). The authors of the meta-analysis identified five psychological theories on which interventions were based, either exclusively or in combination. Four of the five theories are summarized in Table 4.1 (for brevity, we have omitted protection motivation theory (PMT), which was used in only one RCT).

Table 4.1
Theories of Behavior Change Used in PA Intervention Studies

Theories	Synopsis of the theory
Social cognitive theory (SCT; Bandura, 1986)	By observing others, how they behave within a social context and which experiences they create, the individual learns about the consequences of new behaviors. *Outcome expectations*, *social-structural factors* (facilitators and impediments), and the belief that one is capable of executing the behavioral steps necessary to achieve a goal (*self-efficacy*) can lead to behavioral *goals* that are then pursued by the individual.
Theory of planned behavior (TPB; Ajzen, 1991)	Behavioral beliefs form an *attitude* towards a behavior, normative beliefs result in *subjective norms*, and control beliefs determine one's *perceived behavioral control* over perceived barriers. These three interdependent elements determine whether an *intention* to change behavior is formed, which, if strong enough, is theorized to influence behavior.

[1] A meta-analysis is a quantitative synthesis of past studies, integrating the results from (ideally, all) empirical studies on a given subject. One of the criticisms against meta-analyses is that they may aggregate results from both well conducted and poorly conducted studies (e.g., Borenstein et al. 2009).
[2] In RCTs, study participants are randomly assigned to at least one treatment group and a comparison or control group. An outcome variable under investigation (e.g., PA) is assessed before and after a treatment period (e.g., an activity-promotion program in the intervention group vs. a comparison treatment in the control group), to determine whether it changed to the same or a different extent across the different groups. If the study was conducted well and values of the outcome variable in the two groups are found to differ significantly, it is reasonable to conclude that any differential change was due to the treatment. Researchers consider RCTs to be the most powerful research design for investigating intervention effects (Bickman & Reich, 2015).

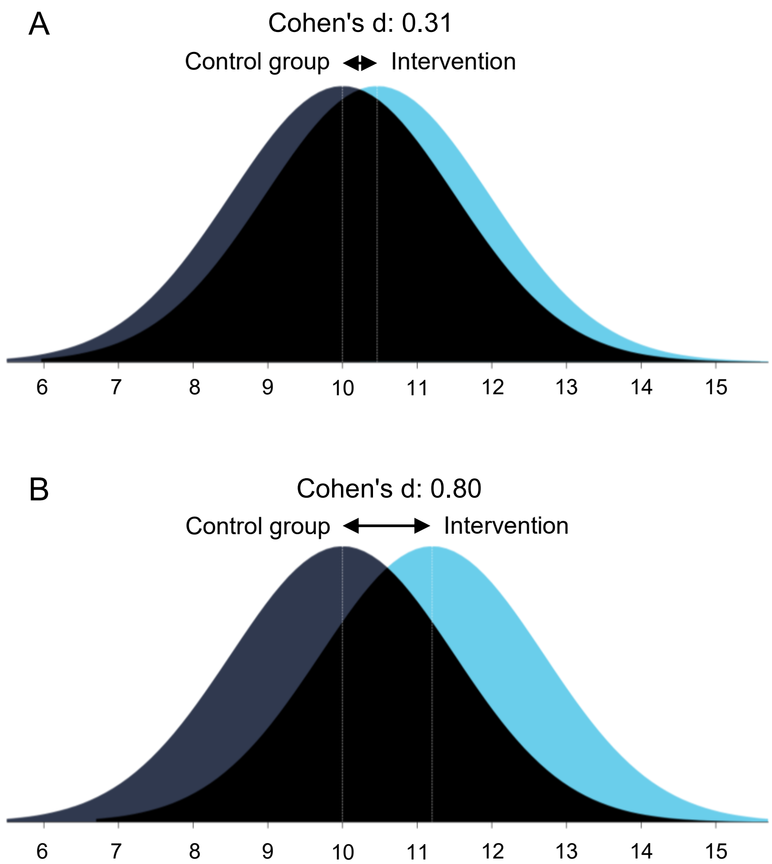
Table 4.1 (continued)

Self-determination theory (SDT; Deci & Ryan, 1985)	Self-determination theory consists of several mini-theories. Motivation is theorized to be most effective when it is intrinsic (i.e., when a behavior is performed for its own sake; *cognitive evaluation theory*). When behavior is externally regulated, it can still be increasingly aligned with oneself (*organismic integration theory*). If behavior is perceived as supporting the basic psychological needs for autonomy, competence, and relatedness, then well-being and general functioning are optimized (*basic psychological needs theory*). In addition, interindividual differences are assumed in people's tendencies to appreciate autonomy, to focus on outcomes (such as rewards, gains, and approval), and to worry about their competence (*causality orientations theory*). The SDT posits that pursuing extrinsic goals leads to less wellness than pursuing intrinsic goals (*goal contents theory*), and that close personal relationships are essential for adjustment and well-being (*relationships motivation theory*).
Transtheoretical model (TTM; Prochaska & DiClemente, 1982)	The TTM integrates the functional elements of diverse previous theories. According to it, most characteristically, behavior change can be regarded as proceeding across discrete stages of change, namely *precontemplation*, *contemplation*, *preparation*, *action, and maintenance* (*relapse* is sometimes included as an additional stage). The model defines *processes of change* that are useful for facilitating stage progression (e.g., *consciousness raising* from precontemplation to contemplation; *stimulus control* from action to maintenance). Stage progression is presumed to be accompanied by changes in subjective beliefs, e.g., the *pros* and *cons* of behavior change *(decisional balance*) and *self-efficacy*.

Note. According to Gourlan et al. (2016), 31 of the analyzed interventions referred to the TTM, 16 to SCT, 8 to TPB, 5 to SDT, only 1 to protection motivation theory (Rogers, 1983; not listed in the table), and 21 to combinations of these five theories.

The results of the meta-analysis (Gourlan et al., 2016) indicated a statistically significant difference in PA behavior (self-reported PA, device-measured PA, or a combination of both) in those who participated in a theory-based intervention (n = 10,574 individuals) compared to those who did not (n = 8,783 individuals). The effect size of this difference was quantified as falling in the range between d = 0.24 and d = 0.37 (95% confidence interval). This is typically characterized as a "small" to "medium" effect ($0.2 < d < 0.5$), according to convention (Cohen, 1988). Let's illustrate how small such an effect is.

Figure 4.1
Graphical Display of a Statistically Small (Part A) and a Large Effect Size (Part B)



Note. Standardized mean differences (*d*) are referred to as small (*d* = 0.20), medium (*d* = 0.50) and large (*d* = 0.80) effect sizes (Cohen, 1988). The *d* = 0.31 in Part A is taken from the results of the meta-analysis on the efficacy of theory-based PA interventions (Gourlan et al., 2016). For a more detailed explanation, see the body of the text. Source: https://rpsychologist.com/d3/cohend/ (Magnusson, 2020).

Figure 4.1, part A shows two overlapping distributions[3] with mean values differing by a "small" to "medium" effect size of *d* = 0.31 (i.e., the mean effect size for theory-based PA interventions, as identified by Gourlan et al., 2016).

The two distributions have 87.7% overlap, which gives a 58.7% chance that a study participant picked at random from the intervention group (the distribution presented in light blue) will have a higher score (e.g., PA level) than a person picked at random from the control group (i.e., "probability of superiority"). In other words, there isn't much more than a fifty-fifty chance (similar to a coin toss) that

[3] Statisticians like to think of measured values (e.g., exercise minutes per week) in samples of study participants as being distributed in such a way that extreme values are rare and mid-range values are much more frequent (as in a Gaussian "normal distribution").

the intervention will change behavior at the level of a single individual.[4] By comparison, Figure 4.1, part B illustrates two distributions that differ by a conventionally defined "large" effect size (i.e., standardized mean difference of d = 0.80). With a large effect, the probability of superiority increases to 71.4%.

In simpler terms, according to the results of the meta-analysis on the efficacy of theory-based PA interventions (Gourlan et al., 2016), if we randomly selected one of the 10,574 study participants who received a theory-based intervention, there is a less than 60% probability that this person would be more physically active than someone randomly selected from the 8,783 study participants who did not receive an intervention. Arguably, most exercise practitioners would consider this success rate to be discouragingly small for practical purposes.

Other interesting meta-analytic findings on the efficacy of theory-based PA interventions include the following. The success rates of interventions differed little, regardless of the theory that was used as their basis (Gourlan et al., 2016). Effect sizes are usually small across different meta-analyses (e.g., Compernolle et al., 2019; Grimmett et al., 2019; Ntoumanis et al., 2020; Romain et al. 2018). Moreover, there is evidence of publication bias[5] in this research field (Gourlan et al., 2016). Studies of lower methodological quality tend to produce larger effect sizes than the (rarer) high-quality studies (Bernard et al., 2017). A meta-analysis that included not only RCTs but also correlational studies reported slightly higher, but still small, effect sizes (McEwan et al., 2019); importantly, it also showed that theory-based interventions (148 studies, d = 0.48) and interventions not explicitly based on a theory (77 studies, d = 0.37) did not differ substantially in terms of their efficacy, as long as at least three behavior-change techniques were involved (e.g., social support, goals and planning, rewards and threats; Michie et al., 2013). Other meta-analyses have arrived at similar conclusions (e.g., Howlett et al., 2019; Rhodes et al., 2020).

In a Nutshell

Although authors of meta-analyses have concluded that PA interventions are effective (i.e., their efficacy, compared to control groups, is significantly different from zero), the practical meaningfulness of these results is questionable. A "small" effect is of limited practical relevance, especially when considering that effect sizes may be overestimated due to various methodological biases. Recent research has shown that basing an intervention on one of the theories discussed above does not meaningfully improve intervention effectiveness.

Explanation of Behavior (Theory Testing)

Numerous reviews on the theories of PA and exercise behavior change have been written, with almost identical conclusions (e.g., Buchan et al., 2012; Weinberg, 2018). One of the most recent review articles provided an historical and critical summary of individual theories and broad theoretical frameworks that have been used most frequently in exercise psychology over the past decades (Rhodes et al., 2019).

According to this review, SCT and TPB are important examples of the social cognitive framework (the TTM and PMT can also be classified within this broad theoretical framework). The reviewers

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[4] We refer here to the so called "common language effect size" (McGraw & Wong, 1992) and its two basic assumptions: (a) that the distributions of the intervention and control groups will be normal, and (b) that the two distributions will have equal variances.

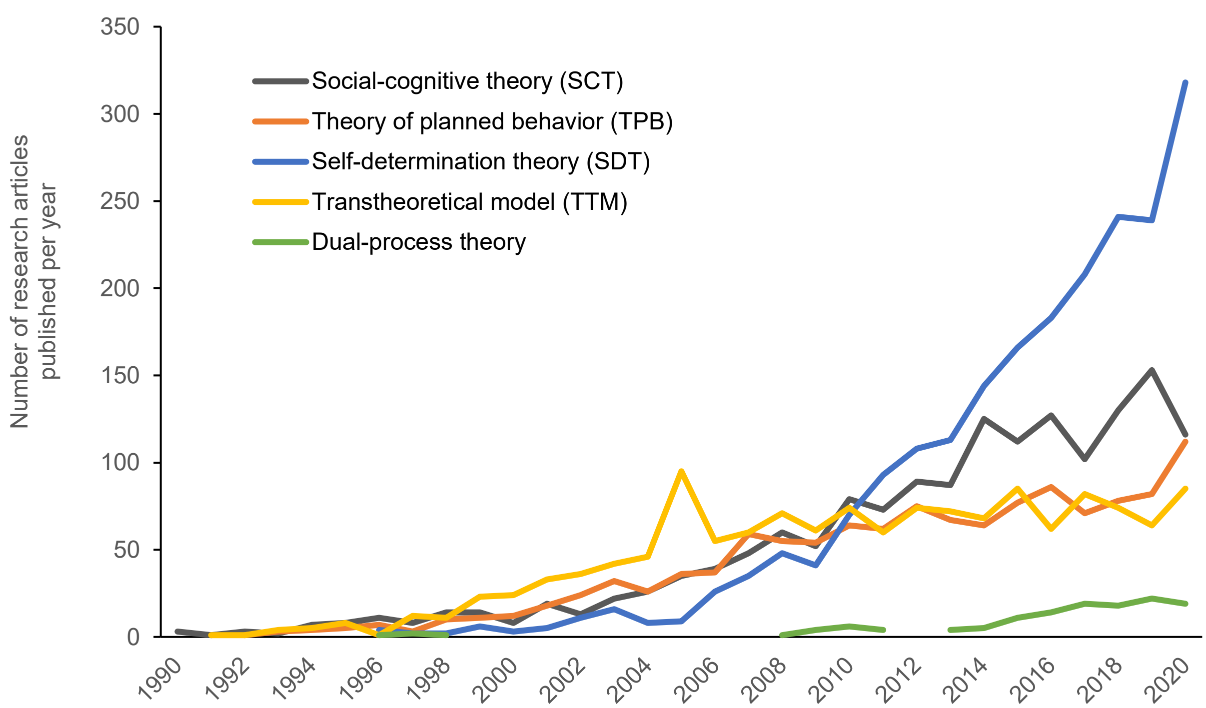
[5] Publication bias occurs when studies with statistically significant results are more likely to appear in the published literature, whereas studies with undesirable or nonsignificant findings tend to remain unpublished. This tendency leads to an overestimation of the apparent efficacy of interventions, including an overestimation of the efficacy of theory-based PA interventions in this case (Schäfer & Schwarz, 2019).

characterized it as "the dominant framework for understanding physical activity" (Rhodes et al., 2019, p. 100). Theories within this framework are characterized by two common assumptions, namely (a) that influences from the social environment shape our views and how we may behave, and (b) that people use their expectations about the future outcomes of their actions and inactions as a basis for directing their behavior. The SDT was highlighted by the reviewers as a theory from the humanistic/organismic framework that has seen "a surge in research in the last decade" (p. 100). This theory emphasizes a view of human beings that is about realizing potential, personal growth, and development. Rhodes et al. (2019) further referred to dual-process theories as "the most recent and understudied framework" (p. 100). According to theories classified under this framework, behavior is influenced by deliberate thinking on the one hand, and more automatic mental phenomena on the other (Evans & Stanovich, 2013).[6] Theories from this framework have not been used as the basis of interventions in exercise psychology so far.

That there are, in fact, only a handful of frequently used theories in exercise psychology can also be gleaned from a quick search in the Web of Science database.[7] Figure 4.2 illustrates how often the frameworks and theories have been cited in research publications over the past three decades (from 1990 to 2020). The large recent increase of interest in the SDT is obvious, and so is the even more recent interest in dual-process theories.

Figure 4.2

Growth in the Popularity of Theories of Behavior Change in Research Related to PA and Exercise



[6] In addition, there is the socioecological framework (Rhodes et al., 2019). Due to emphasizing mostly environmental and policy factors, this framework falls largely outside the psychological perspective discussed here.

[7] The Web of Science is a database whose scope is limited only to approximately 12,000 highest-quality scientific journals, according to the judgment of a selection committee.

Let us now examine the empirical support for these theories within exercise psychology by focusing on meta-analyses of (cross-sectional and prospective) correlational studies (rather than interventions). With regard to the TPB, it can be stated that *attitude* and *perceived behavioral control* account for roughly 30% of the variance in behavioral *intention* (with a modest and typically nonsignificant contribution of *subjective social norms*); *intention* is a significant predictor of *behavior* and has been estimated to account for approximately 20% of the variance in self-reported PA (Downs & Hausenblas, 2005). With the variables defined in the SCT (especially *self-efficacy* and *goals*), the portion of accounted variance in behavior reaches 31% (Young et al., 2014). From meta-analyses on SDT, it can be concluded that effect sizes are slightly higher. Results suggest that the correlation between self-determined motivation and PA behavior can range between r = .30 and r = .45 (Hagger & Chatzisarantis, 2009; Vasconcellos et al., 2020, for a more recent study on adaptive and maladaptive outcomes in physical education). Comparable correlations have been reported from the synthesis of study results based on predictions of the TTM. For example, later *stages of change* seem to be associated with higher levels of PA, changes in *self-efficacy* are moderately consistent with the TTM's predictions, stage progression from *contemplation* on is associated with small increases in perceived *pros* and large decreases in perceived *cons*, and behavioral *processes of change* peak from *precontemplation* to *contemplation* and from *preparation* to *action* (Marshall & Biddle, 2001). Meta-analyses on dual-process theories do not yet exist.[8]

Notice that, while in the earlier section that referred to meta-analyses quantifying the effect size associated with theory-based interventions compared to control, the effect size was Cohen's *d,* which represents the standardized mean difference in the outcome variable (e.g., PA) between the intervention and control groups. In contrast, in meta-analyses that examine relations between variables, the effect sizes used are the "percentage of accounted variance" (r^2) and the correlation coefficient (r). While keeping in mind that randomized controlled trials of interventions can be used to draw inferences about causation whereas correlational studies cannot, the different indices of effect size (d, percentage of accounted variance, and the correlation coefficient) can be converted to each other for comparison purposes. A conventionally large effect size of d = 0.80 can be considered analogous to 26% of accounted variance; correlation coefficients of r = .30 are characterized as medium, while those of r = .50 are described as large (Cohen, 1988). Thus, it seems that correlational empirical evidence obtained so far is consistent with the postulates of the various theories.

That said, there are again good reasons to look beyond statistics when trying to understand why these few theories have been preferred over others. First, it should be noted that a common thread among all of the above-mentioned meta-analyses is the generally poor methodologies of most of the included original studies; again, higher methodological quality is typically associated with lower effect sizes (e.g., Hagger & Chatzisarantis, 2009). Secondly, specifically regarding the meta-analyses summarizing the results of correlational studies, it is important to place these results in the context of a crucial methodological pitfall. When two variables are measured from the same source (e.g., only the respondents themselves), via the same response channel, such as questionnaires (e.g., attitude and intention, or autonomous motivation and behavior), at the same physical location, and at the same time (e.g., back-to-back, as part of the same battery of measures), their intercorrelations tend to be inflated by so-called "common method bias" (Armitage & Conner, 2001; Podsakoff et al., 2003). This means that part of the apparent intercorrelation between variables reflects not overlap between the constructs per se but rather the commonality of the measurement methods. Remarkably, despite this known source of bias, most exercise psychology studies measure not only psychological variables, but also PA and

[8] However, the association between automatic evaluations towards PA and PA behavior (i.e., the contribution of one of the two classes of processes postulated within dual-process theories) has been analyzed. Researchers have found a "small" effect size (Chevance et al., 2019).

exercise behavior using questionnaires. Thirdly, recent analysis shows that the medium and large effect sizes reported in many psychological studies must be evaluated with utmost caution when the studies in question were not preregistered (i.e., if the researchers did not detail their intended research aims, hypotheses, and methods prior to conducting their study, by entering this information in a published "protocol" paper, a public registry, or both). A recent analysis revealed that in preregistered psychological studies, effect sizes often appear greatly reduced or even halved (Schäfer & Schwarz, 2019). In exercise psychology, preregistration has been extremely rare until recently.

In a Nutshell

SDT and SCT are the most commonly used theories in studies that have attempted to predict or change PA and exercise behavior. The number of publications from studies conducted on the basis of these theories is still growing steadily. Results from these studies have been generally congruent for decades: the psychological variables postulated in these theories are correlated with PA and exercise with medium effect sizes (albeit with the caveat that these effect sizes may be inflated).

So, Where is the Problem?

The problem is that researchers in exercise psychology continue to focus on only a handful of theories, producing consistently similar results, although it is known from meta-analyses that these theories are of very limited practical value as the basis of behavior-change interventions. We believe that, half-a-century after the advent of the field of exercise psychology, it is counterproductive to gloss over this fact or to reframe PA interventions as being "effective" solely because they are significantly different from zero, and insist that they have the potential for meaningful long-term population-level changes in PA and health on a global scale (sentences to this effect can be found in *all* of the meta-analyses summarized here). This approach is counterproductive because, while accepting the current situation as the unavoidable status quo, the number of people who live with reduced quality of life, disability, and shortened lifespans due to physical inactivity continues to increase (Guthold et al., 2018).

The alternative approach we advocate is to fundamentally question the established theoretical foundations of exercise psychology. While providing part of the answer, the few popular theories clearly do not suffice to adequately explain the reasons for physical inactivity and behavior change. They offer only a partial answer regarding what needs to be done in practice to produce meaningful and sustained behavior change.

Ok, New Theories. Or Is that Difficult?

According to the philosopher of science Thomas Kuhn, the development of science can be described as a recurring sequence that unfolds from a phase of so-called *normal science* into a phase of *extraordinary science* (i.e., a novel conceptual or methodological approach, leading to new insights into the phenomena being investigated) into a phase of new normal science (Kuhn, 1962/1996). Times of normal science produce research "firmly based upon one or more past scientific achievements, achievements that some particular scientific community acknowledges for a time as supplying the foundation for its further practice" (p. 10). A *crisis* occurs when existing theories and scientific practices fail to solve the problems that have been defined by these theories and these scientific practices. When a growing number of scientists acknowledge that existing theories provide a poor fit to empirical observations, this marks the beginning of the transition from normal to extraordinary science. While scientific progress during normal phases is entirely possible and can result in evolutionary advances, crises and extraordinary phases can lead to leaps in knowledge that have been characterized as *scientific revolutions*. It is difficult to achieve this kind of progress, however, because one characteristic of normal science is that it tends to be highly resistant to change.

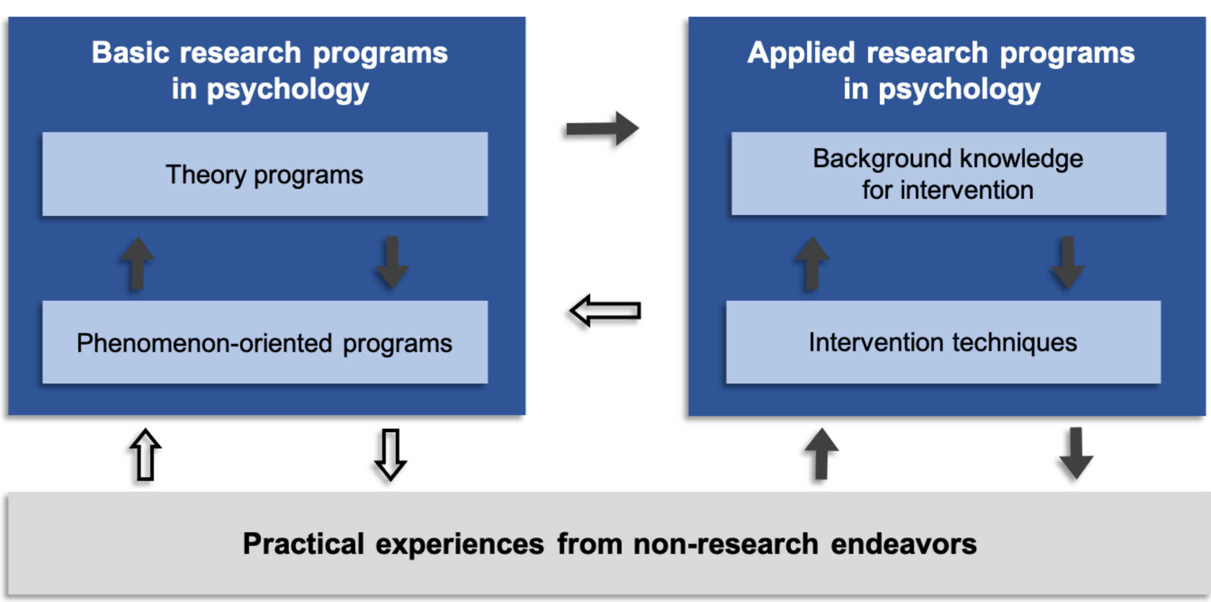
We claim that exercise psychology today is in a phase of normal science, with clear emerging signs of a crisis, both with regard to theories (Ekkekakis, 2017) and with regard to research practices (Caldwell et al., 2020). While change is afoot and the crisis is brewing, a *scientific revolution* in a Kuhnian sense is still at an early stage and gaining momentum.

We have already explained in various texts that the continuing insistence on the social cognitive and the humanistic/organismic frameworks (see Figure 4.2) entails a limiting, narrow cognitivist perspective on PA and exercise behavior change (e.g., Brand & Cheval, 2019; Ekkekakis et al., 2019; Ekkekakis & Brand, 2021). In particular, we have argued that the contribution of affective processes has been trivialized or marginalized (e.g., Ekkekakis et al., 2018; Ekkekakis & Brand, 2019). These two points will be reiterated as part of our description of the affective-reflective theory (ART) later in this chapter. Before we do this, however, we will focus on two other points. First, we will highlight the common misconception that results from studies testing theories are directly useful for informing interventions. Second, we will point to a very unfavorable development in the practice of research as a reason why it is so difficult for theories outside of the current conceptual "mainstream" to appear on the research community's radar.

Research Programs and Types of Knowledge Generated

According to the epistemology of science, there are different ways of doing research (Bunge, 1983; Lakatos, 1978). Psychology was described as a discipline in research programs that can be characterized by how the psychologists involved would usually direct their research (Figure 4.3; Herrmann, 1994). Those interested in psychological *basic research programs* aim to explain, understand, and conceptualize reality as accurately as possible (e.g., decipher the mechanisms governing human thinking or motivation). Psychologists who involve themselves in *applied research programs* instead aim to provide practitioners with background knowledge about why things are the way they are, and how they may intervene to bring about positive change (e.g., treat a disorder or motivate people to be more physically active).

Figure 4.3
Research Programs and How They Relate to Each Other



Note. Black arrows represent greater impact.

Within basic research programs, theory programs can be distinguished from more phenomenon-oriented programs. *Theory programs* are aimed to test the validity of a theory. Researchers immersed in this kind of research tend to look for domains in which a defined explanation (theory) can be applied and tested. Researchers immersed in *phenomenon-oriented programs,* on the other hand, tend to follow research questions such as "What should a theory postulate in order to explain the problem of interest as thoroughly as possible?" Research of this kind focuses on phenomena for which there is presently no adequate theoretical explanation.

In applied research programs, studies are designed to yield a foundation for action. Where one type of applied program primarily aims to provide *background knowledge for interventions* ("What should you know to better understand what needs to be done in practice?"), another type, which can be described as *action programs,* tests the intervention techniques themselves ("In order to achieve the result 'x', do 'y' because that is more effective than doing 'z'"). Both forms of applied research can relate to theory, of course. But, unlike basic research, in both types of applied research, the explanation for why something works is less important than the feasibility and efficacy of the solution.

Now, why is it important to know about these distinctions? The reason is that knowledge generated from basic research programs that study the relationships between variables in theories is not sufficient for the scientific substantiation of interventions. This is the kind of knowledge that the vast majority of exercise psychology studies have accumulated thus far, however. What is now required is direct evidence from applied research programs consisting of studies that test the effectiveness of intervention techniques derived from variables defined in the theories.[9] Knowing that two variables are correlated or make a difference in reality does not automatically imply evidence about the means of changing these variables.

In a Nutshell

Although exercise psychology aims to be an applied research discipline, most of its empirical studies have been designed (perhaps unwittingly) as basic research aimed to test relations between variables, as defined in theories. The mantra-like assertion (which can be found in all meta-analyses cited earlier) that empirical evidence on the relations between theoretically defined concepts ensures that actions derived from them will be effective is, in fact, baseless. This is exactly what recent research from applied intervention programs shows. According to meta-analytic findings, whether one of the described mainstream theories is used as a basis makes no difference in the effectiveness of interventions (e.g., McEwan et al., 2019). Reasons that may, at least in part, explain why the handful of theories that have been found to be generally insufficient to achieve meaningful and sustained PA behavior change still dominate the research literature are described in the next section.

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[9] The logical proof behind this claim may be more than what you need to know. Nevertheless, it is still cool to know it, and it can certainly impress your professor: Basic research programs and applied background knowledge programs aim to develop and test nomological statements of the form "if x, then y". For example, with regard to an evidence-based claim of SDT, if there is autonomous motivation (x), then there will be exercising (y). Nomological statements only hint at eventual actions and consequences. Actions have to meet additional conditions for the anticipated consequence to occur: actions must represent operationalizations (x*) of x, and actions x* must cause the effect y. Furthermore, y must be operationalized (y*). Nomopragmatic statements of the form "if x* is done, then y* occurs" are closer to application than nomological statements. However, a nomopragmatic statement never excludes the possibility that there are other actions with which y* can be achieved, in the same way or even better (e.g., "if x° is done, then y* occurs"). This means, that from "if x* is done, then y* occurs," it can only be concluded that "x* is one possible way of reaching y*." Empirical studies that examine nomological statements in no way provide the scientific evidence that interventions derived from them will be effective.

Publish or Perish

An increasing number of research articles are being published worldwide each year. Researchers have never before been under so much pressure to demonstrate and continuously prove their talent and performance through publications, with career preservation and advancement dependent upon it (Grimes et al., 2018). According to another quick search of the Web of Science database, the number of published articles per year worldwide first exceeded 1 million in 1991. In the year 2008, the 2 million mark was passed, and in 2016, there were 3 million published research articles per year. Exercise psychology has not escaped this trend. As depicted in Figure 4.2, the number of published articles on exercise and PA motivation has increased exponentially since about 2000. This may be related to the fact that the topic has become increasingly important over the past several years (precisely because of growing societal pressure to develop interventions to effectively promote PA and exercise; Guthold et al., 2018). Another possible reason is that the number of exercise psychologists in academia, who have to publish in order to promote their careers, has increased in a similar way. The problems emanating from this publish-or-perish culture are well described (e.g., Everett & Earp, 2015; Lilienfeld, 2017; Zou et al., 2018).

The remarkable increase in the volume of the research output in exercise psychology should not be interpreted as an indication that most studies are of low quality. Instead, we believe that there are now enough studies demonstrating that the correlations between variables defined in SCT, TPB, SDT, etc. are significantly different from zero, and that study participants with higher values do tend to exhibit more PA.

From our point of view, one reason why researchers have continued to conduct correlational studies in large numbers for too long is that doing intervention studies instead is expensive and time-consuming: intervention content must be defined (and manualized), then delivered by practitioners (researchers are generally trained for different things), and then the possible effects must be monitored over months and years (at least when it comes to providing evidence for sustained behavior change). How much easier (and more rational in terms of promoting one's career) is it to only ask study participants to complete some questionnaires or tests for a few minutes! Researchers are incentivized to do what "works," especially in times of normal science (see above).

In a Nutshell

The increasing number of studies supporting a handful of theories is probably due to the fact that researchers are required to publish a lot in order to meet the constantly increasing (and often outrageous) performance expectations of modern-day academia. It seems quite rational that, under these circumstances, researchers tend to focus on studies that are "quick and easy" to implement and produce articles that can be published just as quickly and easily thanks to the predictably positive results.

Interim Conclusion: Yes, It Is Difficult Indeed.

It is not easy to understand why the few theories of behavior change that are currently preferred in exercise psychology, despite meta-analyses having shown that they are of limited value as the basis of interventions, continue to be the focus of most studies. We interpret this as a sign of exercise psychology being in a state of Kuhnian crisis, perhaps approaching the farewell of a phase of normal science (Kuhn 1962/1996). Only in this way[10] can we rationalize why the same handful of theories continue to be emphasized in review articles and textbooks, leading to assertions that these few theories should be used as the foundation of public-health intervention programs. As we

[10] In addition, fundamental cognitive effects also contribute to the situation (e.g., confirmation bias, or the tendency to interpret new evidence as confirmation of one's existing theories or beliefs).

emphasized, such assertions disregard fundamental epistemological principles (recall that knowledge from theory testing in basic research programs cannot be assumed to entail that interventions would be effective).

In such times, with exercise psychology in crisis, it is not easy to convince researchers that it might be necessary to look beyond the well-known "successful" theories (in the paradoxical sense described above) and to seek new ones that offer a broader perspective. Nevertheless, here we present our alternative view. The affective-reflective theory (ART), published only a few years ago (Brand & Ekkekakis, 2018), is already receiving some attention according to citation numbers.[11]

Affective-Reflective Theory of Physical Inactivity and Exercise

Although we strongly believe in an evidence-based science, we also know that high-quality empirical research can only arise from solid theoretical groundwork (e.g., Borghi & Fini 2019; Toomela, 2010). Therefore, in this section of our chapter, we will focus on theory. We will present the affective-reflective theory (ART), without detailing all the empirical studies that led to its development. We will also summarize the nomological network and paradigmatic roots of the key components of the theory, again focusing only on their most essential features. More detailed descriptions are presented in other texts (Brand & Ekkekakis, 2018; Brand & Gutmann, 2020; Ekkekakis et al., 2020; Ekkekakis & Brand, 2021; Ekkekakis & Brand, 2019).

Fundamental Features

We will summarize three fundamental conceptual underpinnings of the ART: (a) core affect and automaticity, (b) dual-process theory, and (c) considerations about the phenomenological uniqueness of the exercise experience. For more discussion on core affect, see Chapter 12; Zenko & Ladwig, 2021).

Core Affect and Automaticity

Many ideas in the ART center around the concept of *core affect,* namely a neurophysiological state that is consciously accessible at any time as a simple nonreflective feeling (e.g., Ekkekakis, 2013). It can be subjectively described, operationalized, and measured in terms of two orthogonal and bipolar dimensions: *pleasure vs. displeasure* (affective valence) and *high arousal vs. low arousal* (Russel & Feldman Barrett, 1999). Core affect is a constant component of consciousness and can oscillate (becoming more pleasant or more unpleasant) in response to changes in the internal and external environment. Some of these pleasant and unpleasant oscillations may occur automatically, in the sense that they do not require an antecedent cognitive appraisal (e.g., the immediate displeasure associated with pain) and, in some cases, cannot be intentionally changed or controlled at the moment when they occur (Bargh, 1994).[12] While some degree of stimulus processing (no matter how fast or rudimentary) is always required, by definition, core affect is a conscious, lived experience. While core affect is always accessible to conscious awareness (e.g., if we deliberately turn our attention to how we feel at any moment) changes in core affect, provided that they are large enough, may also force a shift of attentional focus (e.g., the sudden shift of attention in response to a loud noise nearby).

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[11] If researchers cite their colleagues' publications, this may imply that they considered material in these texts to be useful or valuable. Citations may reflect—with significant limitations—aspects of scientific impact and relevance. But there is no evidence that citations reflect other important dimensions of research quality (e.g., plausibility and soundness, scientific and societal value, originality; Aksnes et al., 2019).

[12] Reviewers concluded that many psychological processes must not be misconceived as being *either* automatic *or* controlled (Bargh, 1994). Instead, the extent to which the process is unintentional, occurs outside awareness, is uncontrollable and is efficient in its use of attentional resources, defines the degree to which it should be considered to be *more or less* automatic.

All the psychological theories highlighted in the first part of this chapter emphasize the importance of reflection and rationality in achieving behavior change. Possible effects of core affective states that occur automatically remained unconsidered (at best, their role was considered as being indirect, as in affective states biasing reflective cognition; see Table 4.1).

In a sense, the few cognitivist theories that have been considered in exercise psychology prescribe how the physically inactive individual should think about the behavior, in order for behavior change to be achieved. For example, these theories imply that practitioners should facilitate the development of positive outcome expectations (SCT and TTM). Individuals are supposed to gain confidence in their ability to succeed, even in the face of difficulties (SCT and TTM), learn that there are good reasons for a positive attitude toward the new behavior (TPB), or recognize and accept that the behavior can align with one's personal values and goals (SDT). So, from the perspective of these cognitivist theories, behavior change should follow naturally from rationally reflecting on the positive outcomes that may occur in the future.

The ART of physical inactivity and exercise is different. Here, the personal experiences with exercise the individual has had in the past are especially important. More precisely, the theory is about the core affective feelings (such as pleasure and displeasure) that the individual had experienced during previous episodes of exercise, which are automatically re-actualized (summarily, as a core affective state) in the moment individuals are presented with an opportunity to be physically active. This automatic core affective feeling is immediate and influences all further processes. It can color subsequent mental reflection, you can try to suppress it or let it carry you, and it can translate directly into a behavioral impulse. The ART is about affect that occurs automatically.

Dual-Process Theory and Core Affect

The dual-process framework is historically a brainchild of cognitive psychology. It is rooted in early experimental findings, which showed, for example, that the justifications declared by participants as reasons for their behavior in an experiment did not match their actual behavioral responses (Wason & Evans, 1975). This led to the psychological theory that there might be a duality of social information processing: one type that is independent of active deliberation, which would influence behavior primarily when the individual acts quickly and spontaneously, and a second type that directs behavior through active deliberation (e.g., Evans, 1989). According to more recent terminology, some authors assume fast and automatic processes that deliver a default response (so-called "Type-1" processes) and controlled higher-order reasoning processes (so called "Type-2" processes; Evans & Stanovich, 2013).

On the other hand, there is also a *unimodel* view (e.g., Kruglanski & Gigerenzer, 2011), according to which the nature of the task (e.g., behaving under imposed time pressure) and working memory capacity (e.g., if one is tired and unable to concentrate) determines the rules by which information is processed within one and the same cognitive system. Depending on these two factors (nature of the task and working memory capacity), information may be processed in more detail or mental shortcuts may be followed that ignore parts of the information. One of several proposed shortcuts is the *affect heuristic*. According to this idea, "representations of objects and events in people's minds are tagged to varying degrees with affect" (Slovic et al., 2002, p. 400). Instead of making the mental effort to deliberate (or when the information is too complicated or voluminous), it is often easier and faster to simply rely on the affective tags recalled by the situation: pleasant tags attract, appeal, or entice (approach tendency), whereas negative tags deter, repel, or repulse (avoidance tendency).

Although the ART focuses on affect and aspects of it might be sufficiently addressed in the unimodel view, it is a genuine dual-process theory. We will explain this with regard to the notion of a *conflict* between Type-1 and Type-2 processes inherent in the ART (see below for more on this point). In this context, it is critical to recognize that the ART, unlike other dual-process theories, fundamentally refers to the mental and somatic phenomena related to PA and exercise, and not only to the processes of judgment and decision making in general.

The ART follows a line of theorizing introduced by early social psychologist Kurt Lewin, who contributed an idea that lost its prominence after the rise of cognitivism. His theory explained behavioral changes as a consequence of a disturbed equilibrium of *driving forces* and *restraining forces* in the psychological field of the individual (Lewin 1943, 1951). When possibilities for a behavioral shift emerge, forces can arise that drive you toward this shift. At the same time, other forces may hold you back, keeping you idle at your current state. This creates tension (i.e., conflict) that may continue until one of the two opposing forces prevails.

From the unimodel perspective, the notion of opposing forces is obsolete. It appears in rudimentary form in the social-cognitive construct of outcome expectations (Bandura, 1986) that implies a consideration of possible pros and cons of alternative behavioral options. However, it is most apparent in dual-process theories of social cognition, where the Type-1 and the Type-2 processes are seen as being in competition for control over behavior (e.g., Strack & Deutsch, 2004). In the ART, it is assumed that conflict may arise between a fundamentally affective Type-1 process and all rational considerations that may occur in Type-2 processes (Figure 4.4).

Figure 4.4

Illustrating of Negative Core Affective Feelings as a Restraining Force

Note. According to the ART, negative core affective feelings (e.g., "Exercise feels unpleasant") may present a restraining force to rational reflection about, for example, the benefits of exercise (e.g., "I know exercise is healthy"). Image of boxing gloves courtesy of [royalty-free photo from Pickpik.]

The ART fundamentally differs from other dual-process models (e.g., Strack & Deutsch, 2004; Conroy & Berry, 2017) in regard to how affect is conceptualized. In the field of social cognition, various authors have pointed out that fundamentally cognitive Type-1 processes may be affectively tinged or colored in certain ways (e.g., Strack & Deutsch, 2004). The concept of a "gut feeling" as a process output is also invoked extensively in the unimodel view (Gigerenzer, 2007). However, and this is the crux, gut feeling in all these earlier psychological works is used as a label for an otherwise ill-defined mental state. This is different in the ART. Here, the possible Type-1 restraining force is explicitly specified as a distinct core affective state. Let us explain.

Core affect is the experiential substrate of an organism's neurophysiological and somatovisceral state. In this regard, core affective feelings give us summaries about the condition of the body (e.g., the perturbation or satisfaction of homeostatic needs). Although it is difficult from a neuroscientific point of view to anatomically and functionally separate the cognitive from the affective in the brain, people experience core affective feelings as phenomenologically distinct from thoughts (Duncan & Feldman Barrett, 2007). In some of the frameworks discussed above, the affective gut feeling is often reduced to its cognitive reflection (e.g., as if asking oneself "how do I feel?", thus turning feeling into another piece of information subject to reflection). This is consistent with the mainstream in general cognitive psychology, which aims to explain all behavioral domains in terms of cognitive processes.[13] Nevertheless, it is problematic with regard to the explanation of physical inactivity (i.e., avoidance of PA and exercise) and the resulting recommendations for intervention.

As appropriate and useful as previous dual-process theories (e.g., Chaiken & Trope, 1999) and unimodel theories of social cognition (e.g., Gigerenzer & Gaissmaier, 2011) may have been to explain, for example, racist behavior or expert judgment and decision making, behaviors like these feel—in a somatic sense—very different compared to physical exercise. The feature of the ART that distinguishes it from other dual-process theories (e.g., Strack & Deutsch, 2004; Gawronski & Bodenhausen, 2006; as well as Conroy & Berry, 2017) is that it incorporates an explicitly hedonic perspective (Ekkekakis & Zenko, 2016) within the dual-process framework, by emphasizing the significance of exercise-related core affect as the core feature of its Type-1 process.

The Exercise Experience

In contrast to other theories in the beginning of the chapter, the ART explicitly and exclusively refers to one specific behavioral domain, namely physical inactivity and exercise. But wait, is that two or just one? Let us explain.

From a public health perspective, it is important to distinguish behaviors like taking the stairs and walking for transportation (i.e., PA) from going to the gym and jogging (i.e., exercise). After all, the former may be easier to integrate into one's daily routine and can be achieved incidentally, whereas the latter usually needs to be planned, often requires extra time, and may, therefore, be more difficult to adopt as an element of one's lifestyle. However, both will trigger similar physiological adaptations in the body, and both can accrue important health benefits. For people who have been physically inactive for years and are perhaps overweight, climbing stairs may cause as much sweating and heavy breathing as running would for a trained exerciser. We all understand this, as part of our everyday experiences: the more intense a PA is, the stronger the cardiovascular response will be.

Let us then relate this to the question of how PA, namely the physiological state aroused by it, feels. Exercise psychology studies provide evidence-based answers to this question (see Ekkekakis & Brand, 2019). During PA or exercise performed at moderate intensity, most people report that they feel increased pleasure (i.e., pleasant core affect). Heavy intensity, which is challenging though not yet overwhelming, triggers feelings of reduced pleasure especially in the untrained, whereas more experienced exercisers may still report rising pleasure. Feelings of reduced pleasure or even rising displeasure prevail under severe intensity. After a bout of strenuous exercise has ended, most people report a positive *affective rebound* (e.g., think of the rush of pleasure one feels within minutes after a strenuous bout has ended and the cool-down has begun). Some people may be (rightly) proud of having made it through the bout, even though the activity was exhausting, whereas others will be just relieved that the hard effort is over. Although only a few studies have examined whether feelings during and

[13] In the psychology of judgment and decision making, too, signs are emerging for a paradigmatic shift towards what has been termed *embodied cognition*. A conceptual framework related to the domain of sporting activities has recently been published by Raab (2020).

after PA or exercise influence future PA behavior, it appears that, while the correlation between in-task (i.e., during-exercise) reports of pleasure-vs-displeasure correlate with subsequent PA, the correlation between postexercise affect and future behavior is near-zero (Rhodes & Kates, 2015). A possible explanation for this near-zero correlation may be that ratings of pleasure after bouts of exercise or PA generally tend to be positive (i.e., with limited interindividual variation), concealing whether this positivity reflects a continuation of positive feelings throughout the experience or a postexercise rebound from negativity to positivity.

Furthermore, it is known from anecdotal reports and survey studies that many people who do not like exercise and tend to avoid it report negative past affective experiences, such as those associated with physical education (e.g., Ladwig et al., 2018; Massey et al., 2021), or recall negative affect from previous attempts (e.g., Ekkekakis et al., 2016). What is becoming increasingly clear from these sources is that it is not only the somatic perceptions during exercise (e.g., pain, discomfort, breathlessness, exhaustion) that may be influential for future behavior. Negative memories associated with the social and cultural environment within which exercise experiences are embedded are also important (e.g., embarrassment, humiliation, or feelings of guilt). Both unpleasant somatic experiences and social emotions can make negative feelings reappear at the very thought of doing something similar.

Together, these insights have formed the third fundamental postulate of the ART of physical inactivity and exercise: the ART assumes that individuals often remain in their current state of physical inactivity because of their unpleasant experiences with exercise-related situations in the past. Importantly, exercise-related situations include even those that make you feel "as if" you are exercising (e.g., breathing hard while hurrying up a flight of stairs, or feeling bad because you think you are clumsy). In response to an exercise-related stimulus, these experiences are automatically recalled, and associated sensations may be re-actualized. If this Type-1 process evokes a negative feeling, this can provide a restraining force that opposes any subsequent rational reflection and evaluation (Type-2 process) that might tend to propel the individual to be active.

Photo by RUN 4 FFWPU from Pexels

The ART Process Model

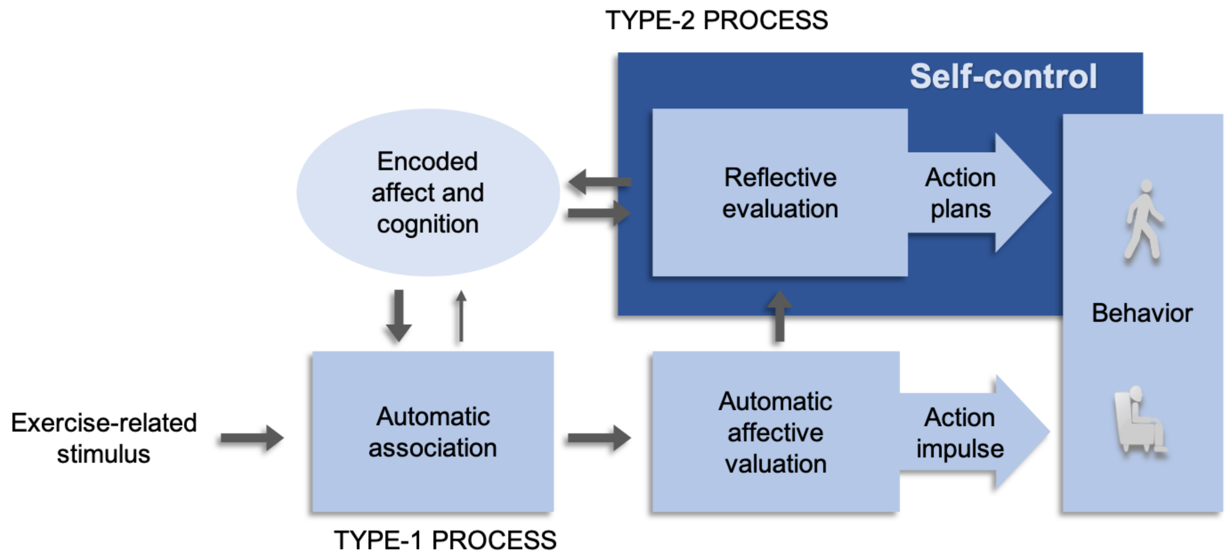
The first step in understanding the ART (Figure 4.5) is to think of a situated process, in which an individual notices an exercise-related stimulus. It is presumed that this typically leads to an immediate psychological response, though only sometimes to an observable change in behavior. Exercise-related stimuli can be external (e.g., someone telling you to get off the couch to go exercise) or internal (e.g., a cyclist thinks about continuing a little while longer). Once noticed, a stimulus will trigger a Type-1 process first.

The Type-1 Process

This Type-1 process involves the activation of *automatic associations*. These can be understood as the individual's spontaneous recollection of situations akin to the behavioral option that was brought to mind by the stimulus. Automatic associations give rise to what has been termed the *affective valuation* of the behavioral option in the ART. The affective valuation is a feeling of pleasure or displeasure, depending on the associations that past exercise-related stimuli have established. This response is conceptualized as a minimal core affective response, inherently imbued with an *approach impulse* if positive affective valence is felt and an *avoidance impulse* if the valuation is negative.

Figure 4.5

Process Model of the Affective-Reflective Theory (ART) of Physical Inactivity and Exercise



Note. Reproduced from Brand, R. & Ekkekakis, P. (2018). Affective-reflective theory of physical inactivity and exercise. *German Journal of Exercise and Sport Research, 48,* 48–58 (2018). https://doi.org/10.1007/s12662-017-0477-9 under a Creative Commons Attribution License (CC BY).

The Type-2 Process

According to the ART, the Type-1 process is followed by more rational consideration only if the person is willing and able to apply cognitive *self-control* (Gillebaart, 2017) for the *reflective evaluation* of the exercise-related stimulus (for more on self-control, see Chapter 22; Englert et al., 2021). This requires the individual to deliberately process and confront the associations, feelings, and the behavioral impulse that accompanied the encounter with the exercise-related stimulus as the result of the preceding Type-1 process. The Type-1 process, therefore, provides an affective default value for the subsequent Type-2 processing. The Type-2 process may include addressing the more complex emotions arising from memories of past experiences, as well as rational thought processes, such as thoughts about the pros and cons of a possible change in behavior, self-efficacy beliefs, or one's personal values as they relate to the situation. The Type-2 process can result in an *action plan* (e.g., an intention to be active) that may either (a) build upon the approach or avoidance impulse generated by the Type-1 process, or (b) lead in the opposite direction. In the latter case (i.e., when the two forces are in conflict), it is again a question of whether a person is willing and able to apply self-control to enforce the decision to change behavior in the rationally preferred way and whether, in the end, the action plan will be carried out or not. This is why the Type-2 process can be seen as the "interventionist" that may or may not devaluate the automatic affective response to the exercise-related stimulus (which also explains why the ART is a default-interventionist model).

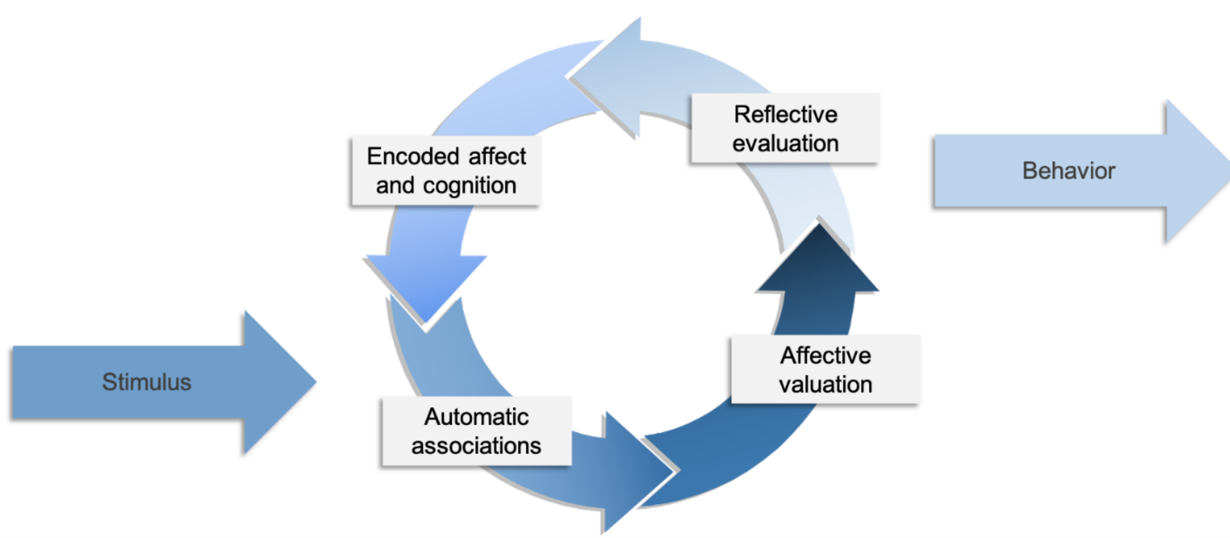
Process Interaction

The linear sequence of processes and elements described above is a useful simplification, intended to facilitate the understanding of the basic assumptions and postulates of the ART and how they can be tested. However, like most models, this likely represents an oversimplification of the psychological processes involved. Perhaps a more realistic approach would be to consider that the two processes are in constant interaction (Figure 4.6).

There may be stimuli for which the automatic affective valuation is so strong that it enters consciousness even without the need to deliberately focus our attention on this response. Often, however, the affective valuation may be more subtle and may only be noticed if one deliberately reflects on a possible behavioral change. Reflecting on the exercise stimulus and actively dealing with the initial feeling will, in turn, influence how one feels. For example, an unpleasant feeling evoked at the idea of having to go for a run might turn into full-blown affective aversion only after the more reflective examination of this behavioral option; this feeling will again be automatically sensed, and will "color" further reflection accordingly. That is why the linear sequence of elements outlined in Figure 4.5 must be understood as a regulatory process loop (as indicated by the arrows in Figure 4.6), which, once the Type-2 process is involved, will come to an end when individuals stop reflecting on whether they want to change their behavior now.

Figure 4.6

Constant Interaction of the Type-1 and the Type-2 Processes in the Affective-Reflective Theory



Learning

Imagine a person who has never (ever!) been physically active (theoretically; this is just a thought experiment). Let's assume that this person encounters, for the first time, an exercise-related stimulus. For example, some friends may ask our novice exerciser, let's call her Claudia, if she would join them for a run. This question would ordinarily trigger automatic associations stemming from past experiences with running or exercise, in general. In our example, however, associations directly related to running cannot arise, because Claudia has not yet had *any* experience with PA. Let us assume that Claudia's automatic affective valuation of that unknown, novel behavior will be positive, perhaps because she knows and likes the individuals asking or has heard in the news that exercise is supposed to make people feel better. So, an immediate approach impulse would follow. Claudia takes the time to reflect on whether she has the time to follow her friends' invitation anyway. Thoughts and feelings are weighed and finally lead to the intention to join in the run. While exercising, Claudia learns a lot. Her friends explain that exercising is healthy. However, running is exhausting and having to breathe so heavily doesn't feel good. To make matters worse, her friends grin about Claudia's puffing red face. In the evening, Claudia thinks that it might not have been worth the effort.

A few days later, Claudia is sitting on the couch and remembers that exercise is said to be healthy. Automatic associations, which are based on encoded affect and thoughts about her first experience with exercising, are triggered immediately.[14] The mere thought of exercise sparks an uneasy feeling (automatic affective valuation), and Claudia literally sinks a little deeper into the couch (the action impulse). She ponders that exercise, although supposed to be healthy, was quite strenuous, and she remembers that the people who saw her last time must have had a great laugh about her silly red face (reflective evaluation). Thinking about it like this, Claudia's memory of it gets worse and worse (encoded affect and cognition). But although something inside her resists (the automatic negative affect, a restraining force), Claudia actively (self-control) decides to get up and go out for one more try.

What do you think? How does this story continue? This example is designed to illustrate a general psychological principle as the central learning mechanism incorporated in the ART. The *law of effect*, whose origin dates to the era of behaviorism (Thorndike, 1911) but remains widely adopted in modern associationist models of thinking and behavior (Mandelbaum, 2020), states that, if a behavior is paired with pleasure, it becomes more likely to be repeated, whereas, if it is paired with displeasure, it becomes more likely to be avoided. This must not be misunderstood as an assertion that people only do what they find pleasant, and always avoid what they find unpleasant (Murphy & Eaves, 2016). Rather, with regard to the ART, our main point is to emphasize that the acceptance or avoidance of exercise routines is primarily the psychological result of repeated physical experiences with exercise and exercise-related behaviors (i.e., experiential learning) and not primarily the result of gaining knowledge, for example, about the benefits of exercise and information about how to change one's own behavior. In other words, affect matters.

The regulatory loop explained above (Figure 4.6), together with the reinforcement mechanism postulated in the law of effect, provide the basis for the (necessary) "learning to like exercise," which is an essential feature of the ART.

Empirical Evidence

The ART was published in 2018, building upon initial empirical findings that made the central postulates of the theory seem not only plausible but justified.[15] Since then, more data have been

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[14] The activation of these associations makes it more likely that they will reappear as soon as Claudia thinks about exercise on another occasion (indicated by the small arrow pointing upwards from automatic associations to encoded affect and cognition in Figure 4.5).

[15] These are presented in the original publication of the ART by Brand and Ekkekakis (2018).

produced. For example, initial studies have assessed the somatic core of the automatic affective valuation of exercise-related stimuli. Heart rate variability may be a useful indicator for this. Studies have shown, for example, that exercisers' and nonexercisers' heart rate variabilities differ significantly during the presentation of exercise-related pictures (Schinkoeth et al., 2019; Schinkoeth & Brand, 2019).

The results of a study using eye-tracking methodology are also interesting (Cheval et al., 2020). Cheval and colleagues (2020) showed that exercise-related stimuli induced an approach impulse (an attentional bias directed at the exercise-related stimulus) only in study participants who reported being regularly physically active.

Moreover, the importance of self-control, namely the theorized "condition" in the ART under which reflective processes are expected to influence behavior more strongly, has been underlined recently in systematic reviews (Audiffren & André, 2019). It has been shown, for example, that improvements to executive function predict PA maintenance after exercise interventions especially when environmental support for PA is low (Best et al., 2014). Executive functions help to convert intentions into physically active behavior, thereby supporting a central claim of the ART (Pfeffer & Strobach, 2017), and arguing in favor of models specifying this role for self-control processes (Strobach et al., 2020). Other authors have illustrated that people are less likely to exercise on days when they feel stressed (Englert & Rummel, 2016).

Furthermore, the authors of a new meta-analysis (Chevance et al., 2019) concluded that the correlation between automatic associations and PA is significant, albeit small. However, the observed small effect size is most likely due to the fact that the authors could only include empirical studies that focused exclusively on the direct relationship between automatic associations and behavior. This approach does not take into account the theorized (in the ART) moderation of this relation by self-control. When self-control is applied effectively, human behavior would be mainly controlled by reflective processes and this would, therefore, attenuate the magnitude of the correlation between automatic processes and behavior. This more complex relationship between automatic processes, self-control, and behavior warrants further research.

Notwithstanding such progress in empirical studies, it is important to note that the ART is still a relatively recent theory. Therefore, further studies are certainly needed. We would like to especially encourage the initiation of applied research programs, to investigate the usefulness of ART-derived intervention elements. In this early phase of research, pilot studies are valuable (e.g., Vazou et al., 2019), as will be more elaborately planned long-term RCTs (e.g., Ladwig et al., 2021).

Conclusion

We have illustrated that the psychologically informed interventions developed and tested over the past several years, which aim to motivate people to be more physically active, and perhaps even exercise, have resulted in generally small and short-lived effects. For exercise psychology, a field of research that has existed for approximately 50 years, this is a disappointing track record; all the more so as the number of published studies in exercise psychology seems to continually increase year by year! One reason for this incongruity could be that the majority of studies published so far were based on a few repeatedly used cognitivist theories. What these theories have in common is that they all rely on the assumption of an omnipotent human rationality and people's (presumably, unlimited) ability to process information as the key to behavior change.

We believe, as we have outlined here, that an attempt should be made to reconsider this difficult problem from the ground up. Alternative theories must be developed, so that innovative approaches to intervention can emerge and be tested.

We have explained our concern that such a transition to new fundamentals (theories) in exercise psychology might not be easy because researchers may be reluctant to accept the reorientation (i.e., run fewer basic research studies based on established mainstream theories) and change the way in which research is done at universities (i.e., conduct more long-term research projects, abolish the excesses of the publish-or-perish mentality in academia).

We have proposed the affective-reflective theory (ART) of physical inactivity and exercise as a new alternative approach. The ART refers fundamentally to people's previous affective experiences during PA and exercise. According to the ART, exercise-related memories and feelings appear automatically at the mere thought of exercise (affective valuation) and can function as a restraining force that makes it difficult for individuals to follow their rational thoughts and action plans. Therefore, when it comes to behavior change, it is important to assure that the prospect of PA or exercise is consistently coupled with pleasant feelings (i.e., positive affective experiences). We hope that researchers pursuing a much-needed breakthrough in exercise psychology will actively engage in the critical testing of this theory in the near future.

Learning Exercises

1. Review what the terms "statistical significance" and "effect size" mean. Why is it important to look at more than just the statistical significance of results when assessing scientific evidence?

2. Describe how the two goals of "truth" and "usefulness" relate to each other in psychological basic research and applied research programs. [For advanced students: Why is it that evidence-based nomological statements from basic research programs cannot be used to derive statements about the effectiveness of interventions?]

3. Why are "leaps of knowledge" rather unlikely during times of "normal science" (Kuhn, 1992/1996)? Can you relate this notion to the current situation in exercise psychology?

4. Recall the early research findings of Wason and Evans (1975) that marked the historical origin of current dual-process theorizing in psychology. What are the implications of those early findings, for example, for the use of self-report methodology (questionnaires and interviews) in today's exercise psychology?

5. How is the "exercise experience" fundamentally different from the experience of, for example, having voted in a presidential election for the first time?

6. According to the affective-reflective theory (ART), the affective valuation of an exercise-related stimulus is part of a type-1 process, which provides the impulse to either avoid or approach exercise or physical activity. What is a *type-1 process*? What is meant by *affective valuation*?

7. Describe how, according to affective-reflective theory (ART), affective valuations are learned. How should exercise-related interventions be designed so that a positive affective valuation of exercise can be learned?

Further Reading

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Chapter 5
Predictors and Correlates of Physical Activity and Sedentary Behavior

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Chapter Overview

Researchers and practitioners all want people to move more and sit less. Predicting human behavior is challenging because of the complex nature of how numerous interconnected factors influence human behavior. This chapter is organized by introducing readers to (a) why predicting physical activity and sedentary behavior is an important research enterprise and adds value to society, (b) understanding what constitutes a psychological predictor from multiple levels of complexity, and (c) issues to consider for the future.

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Why Predict Physical Activity and Sedentary Behavior?

Researchers want to predict physical activity and sedentary behavior to better explain what makes people behave in ways that would improve their quality of life. This health promotion goal is a dominant pursuit in physical activity research and for good reason. There is well established scientific evidence that physical activity is associated with a wide range of health benefits (U.S. Department of Health and Human Services, 2018). Almost everyone can benefit their health from engaging in regular physical activity. Importantly, physical activity can be used as a preventative strategy to reduce the risk of chronic disease or therapeutic strategy to help individuals mitigate or reverse the detrimental effects of disease and disorders (Singh, 2002).

When viewing physical activity as a preventative strategy, getting enough physical activity can help prevent 6% to 10% of major non-communicable diseases and save millions of lives per year (Lee et al., 2012; U.S. Department of Health and Human Services, 2018). Physical activity is useful as both a primary and secondary preventative strategy for reducing the risk of cardiovascular disease, diabetes, specific cancers, obesity, hypertension, bone diseases, and depression (Warburton et al., 2006). As a therapeutic strategy, regular physical activity is also beneficial to help improve sleep and mood as well as reduce anxiety, depression, and stress (Sharma et al., 2006).

Physical activity is also beneficial for improving brain health and performance (Hillman et al., 2008). This has important implications for the academic performance of young people, the cognitive functioning of older adults, and helping special populations who experience challenges with cognitive functioning (Pontifex et al., 2014).

The health promotion, disease prevention, therapeutic benefits, and positive psychological effects of physical activity provide substantive justifications for the reason why predicting physical activity is important. Predicting sedentary behavior follows the same health promotion goal. Research shows that television viewing and screen time are associated with all-cause mortality, childhood obesity, increased blood pressure and total cholesterol, decrease self-esteem, social behavior problems, poorer physical fitness, and lower academic achievement (Rezende et al., 2014). Therefore, once researchers explain the predictors of physical activity and sedentary behavior, the next step is to design interventions targeting these factors in populations that would benefit from increasing physical activity and reducing sedentary behavior. Successful interventions can lead to higher-quality public health recommendations and policy changes to help improve quality of life. Ultimately, the goal is to increase population-level physical activity participation and reduce sedentary behavior.

Approaches to Predicting

Predicting physical activity and sedentary behavior relies on two approaches: explaining what factors cause people to behave and what factors are associated with behavior. The first approach often identifies these factors as determinants of physical activity and sedentary behavior. A useful place to start identifying what factors cause people to be physically active or sedentary is to start with a relevant theory and previous empirical evidence. A theory helps specify what factors lead to changes in behavior, how those factors are organized, and shows causal hypotheses between predictors and outcomes. A theory is useful when researchers are interested in designing interventions or making public health recommendations to increase physical activity or reduce sedentary time. The overarching goal with the explanation approach is to effectively explain how and why people behave.

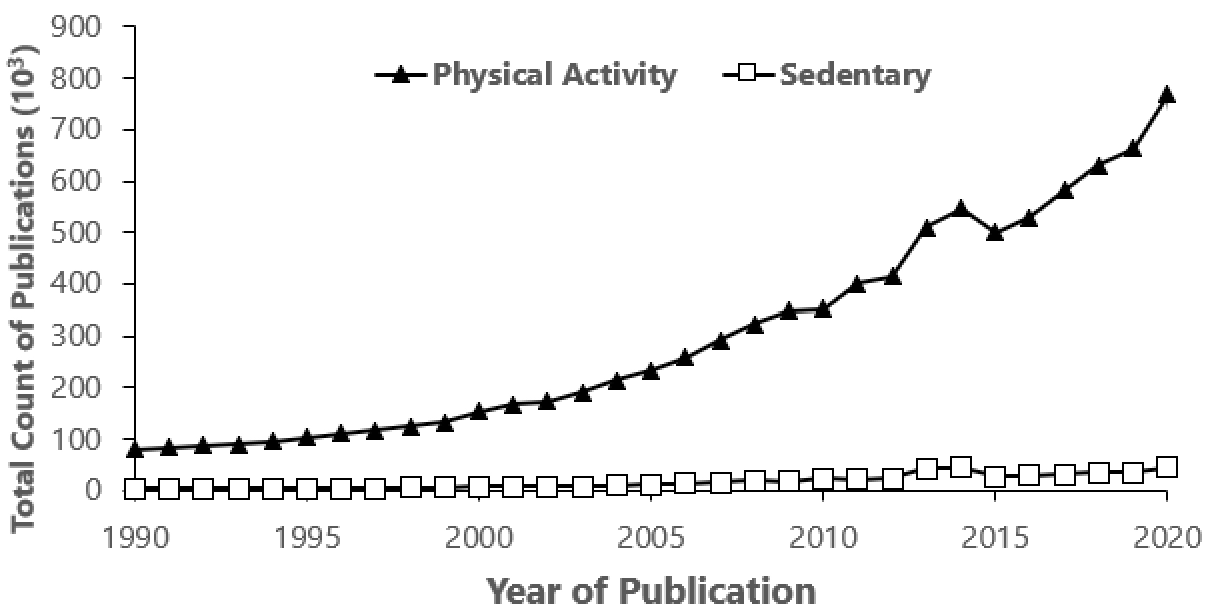
The second approach tries to accurately as possible predict behavior and is not necessarily interested in cause and effect or theory to specify what factors lead to behavior. This approach often identifies these factors as correlates of physical activity and sedentary behavior. For example, a researcher may be interested in predicting sedentary behavior among high-school teenagers. This researcher may collect data on numerous factors that may be associated with sedentary behavior to try to accurately predict it. This approach may help identify what factors such as television viewing and individual characteristics are associated with sedentary behavior. From this perspective, television viewing is related to sedentary behavior, but one does not cause the other. This second approach is also useful for identifying more distally related or background factors beyond what is specified in a theory. The same researcher may also be interested in learning more about how watching television differs among different ethnicities and socioeconomic classes. For example, research shows that British Black 11–12-year-old students were more sedentary than their White peers (Brodersen et al., 2007).

What Counts as Physical Activity and Sedentary Behavior?

The concepts of physical activity and sedentary behavior are distinct. That is, sedentary behavior is different than not getting enough physical activity or being physically inactive. *Physical activity* is any bodily movement produced by the skeletal muscles that results in energy expenditure (Caspersen et al., 1985). *Sedentary behavior* is any waking behavior characterized by an energy expenditure ≤1.5 metabolic equivalents (METs), while in a sitting, reclining or lying posture (Tremblay et al., 2017). Over the past 30 years, researchers have mentioned physical activity more times than sedentary behavior (see Figure 5.1). One result of these publication trends is that researchers and health professionals know more about the health enhancing effects of physical activity than the detriments of sedentary behavior. This has led to more fine-tuned and specific public health recommendations for what counts as being physically active than for reducing sedentary behavior**.** Although the research on the predictors of sedentary behavior is rapidly increasing, predictors of physical activity dominate the extant literature base.

Figure 5.1

Number of Publications Containing "Physical Activity" vs. "Sedentary"



Note: The number of publications containing "physical activity" has outpaced the number of publications containing "sedentary" by an average of 21:1 over the past 30 years. Data from https://app.dimensions.ai.

Predicting Physical Activity

Theories are useful to select factors that can explain physical activity behavior. Below are several of the major theories used by researchers to study physical activity and sedentary behavior. These theories were chosen due to their predictive utility, practical implications, and empirical support and are not an exhaustive list of the theories used in sport and exercise psychology. The following theories fit within three general categories (see Rhodes et al., 2019 for a more detailed review). The social-cognitive category contains theories that view behavior as a function the beliefs and thoughts of people. This category views decisions to enact behavior as deliberate and intentional. The humanistic or organismic category views behavior as a function of the innate needs of people to grow, develop, and effectively interact with their environment. The third category adds that behavior is a function of both reflective (similar to those of social-cognitive theory) and automatic processes. Automatic processes are rapid and more difficult to be aware of than slower, reflective, more conscious processes. The following theories are presented below in a succinct fashion to offer readers an overview of the main factors of the theory, research support, implications for practice, and challenges.

Theory of Planned Behavior

Intention is the most proximal predictor of physical activity according to the Theory of Planned Behavior (Azjen, 1991). *Intentions* represent when people plan to act and perform a behavior. Intentions are most likely to cause behavior when those intentions are strong and only when they are out of volition of the performer. Intentions are influenced by three predictors: *attitudes*—a valenced (favorable or unfavorable) evaluation about the behavior, *subjective norms*—perceived social influence from others to perform or not perform the behavior, and *perceived behavioral control*—the perception of performing the behavior as easy or difficult (Ajzen & Fishbein, 1980). In addition to predicting intentions, perceived behavioral control can also directly predict behavior when perceptions of control are realistic. When individuals view physical activity as important and believe they are in control of their behavior they will intend to be physically active (Rhodes et al., 2019).

Meta-analytic evidence supports intentions and perceived behavioral control as positive predictors of physical activity (Hagger et al., 2002; McEachan et al., 2011). Attitudes and perceived behavioral control appear as consistent predictors of intentions. The typical effects of attitudes, social norms, and perceived behavioral control on intention to be physically active are of medium magnitude (McEachan et al., 2011). Subjective norms appear as a less consistent predictor of intentions compared to attitudes and perceived behavioral control. The inconsistency of subjective norms may due be to conceptualization and measurement issues (Kim et al., 2019). Subjective norms are more likely to predict intentions when they are measured as observing other important people's behaviors. The inclusion of subjective norms to predict intention to be physically active is complex (Kim et al., 2019). Furthermore, mixed support for the role of subjective norms exists among populations with physical disabilities (Kirk & Haegele, 2019).

In practice, numerous interventions used the theory of planned behavior to affect changes in intentions as well as physical activity behavior (Webb & Sheeran, 2006). Interventions focus on changing the attitudes, subjective norms, or perceptions of control of people to produce stronger intentions to be physically active. Research findings show that even though interventions that can change the intentions of people, this does not always lead to changes in behavior (Chatzisarantis & Hagger, 2005; Webb & Sheeran, 2006). This has led to criticisms of how useful the theory of planned behavior is for changing the physical activity of people (Sniehotta et al., 2014). Although the components of the theory of planned behavior are empirically supported, the application of this theory to improving physical activity behavior is less clear.

Social-Cognitive Theory

A key factor of social-cognitive theory (Bandura, 1997, 2005) that predicts behavior is *self-efficacy*—the degree of confidence to exert control over one's behavior (Bandura, 1997). Self-efficacy is often referred to as a situation-specific form of self-confidence. This theory supports the idea that the more confident people are in their abilities, the more likely they will be physically active. The broader components of social-cognitive theory include knowledge, outcome expectations, perceived facilitators and impediments (see Bandura, 2005). Individuals develop their physical activity efficacy beliefs from four primary sources, namely *past performance accomplishments* (e.g., a runner achieving their personal best in a race), *social persuasion* (e.g., encouragement from a friend to run), *vicarious experiences* (e.g., observing other's compete in races), and *interpretation of physiological and affective states* (e.g., awareness of positive feelings when running; Bandura, 1997). Self-efficacy can influence what behaviors people chose to pursue (i.e., choice), how much effort people put forth in pursuit of their goals (i.e., effort), and the how long people persist despite setbacks or challenges (i.e., persistence). Note that this chapter describes four sources of self-efficacy, but others have conceptualized six sources of self-efficacy (see Chapter 27; Hepler et al., 2021).

People will be more likely to be physically active if they perceive they can be successful at it (Samson & Solmon, 2011). Self-efficacy has shown to be one of the strongest psychological predictors of physical activity (Hu et al., 2007). Successful behavior is likely to increase self-efficacy and increased self-efficacy leads to an increased likelihood of effort and persistence. This represents a cyclical association between self-efficacy and behavior over time (McAuley & Blissmer, 2000). This cycle may be most helpful for people who are physically inactive. An initial successful physical activity experience can have strong effects on self-efficacy and be the impetus for this cyclical association.

Research shows that past performance accomplishments are one of the strongest positive predictors of self-efficacy (Warner et al., 2014). Interventions based on social-cognitive theory should emphasize these mastery experiences to develop self-efficacy. Additionally, interventions can focus on social persuasion through feedback and reinforcement, and vicarious experiences such as modeling proper form and technique, to positively influence self-efficacy beliefs towards physical activity. Social influence appears to be a significant predictor of physical activity behavior across the adult lifespan (De Bourdeaudhuij & Sallis, 2002).

Considerations for Social-Cognitive Theories

The definition and measurement of intentions vary across studies despite being an important predictor of behavior (Rhodes & Rebar, 2017). There exist two distinct concepts of intention: *decisional intention*—decisional direction to enact the behavior or not and *intention strength*—intensity of commitment to enact behavior. Rhodes and Rebar (2017) conclude that intention strength appears to be a better predictor of behavior whereas decisional intentions allow for closer examination of factors leading up to decisions and factors that follow decisions. Future research should make these concepts clearer to readers due to their different empirical and practical implications (see Rhodes & Rebar, 2017).

Despite the relevance of importance of factors in the theory of planned behavior, it has shown limited predictive validity (Sniehotta et al., 2014). When accounting for how much physical activity can be predicted by social-cognitive factors, there generally remains a large proportion of the variance unexplained. This means there are additional factors outside of those used in social-cognitive theories that could enhance the explanation of physical activity behavior.

This chapter introduces the sources of self-efficacy, but readers should be aware that there are more sources of self-efficacy that may contribute to a person's situation specific self-confidence. For example, the tripartite view of self-efficacy beliefs demonstrates that social relationships can meaningfully impact a person's self-efficacy through relation-inferred self-efficacy and other efficacy beliefs (Lent & Lopez, 2002). For instance, a track athlete perceiving her coach to hold favorable views of her sport ability would positively impact the athlete's self-efficacy. Practitioners could leverage relation-inferred self-efficacy by incorporating strategies to enhance the quality of social relationships within physical activity settings.

Self-Determination Theory

The basis of self-determination theory is that people are growth-oriented organisms that behave in ways to grow and develop their skills (Deci & Ryan, 2000; Ryan et al., 2009). Self-determination theory is also discussed in Chapter 2 (Rebar et al., 2021), Chapter 3 (Quested et al., 2021) and Chapter 32 (Kingston et al., 2021). This theory integrates many sub-theories that culminate into identifying the major personal and contextual factors that influence human behavior. The theory has been widely used to study physical activity motivation (Hagger & Chatzisarantis, 2008; Teixeira et al., 2012) and inform interventions to increase physical activity behavior (Ntoumanis et al., 2020). Self-determination theory focuses on three broad types of motivation that occur along a continuum of self-determined behavior. *Self-determined motivation* is the most optimal and highest quality motivation. This type of motivation includes intrinsic and extrinsic reasons tied to enjoyment, interest, and personal values. *Controlled motivation* represents the second type of motivation that includes reasons tied to external pressure and rewards. The third type is *amotivation* that represents the absence of intentions and sense of control to behave. Research generally shows that self-determined motivation is the most adaptive type of motivation for the promotion of physical activity (Hagger & Chatzisarantis, 2008; Teixeira et al., 2012)

For an individual to be optimally motivated, they must perceive fulfillment of three basic needs in a given context (Ryan & Deci, 2000). The *need for autonomy* represents individual authenticity in their behavioral decisions (i.e., sense of personal choice). The *need for competence* represents effective functioning (i.e., sense of ability to bring desired behavioral outcomes). The *need for relatedness* represents the social connectedness to others (i.e., sense that others accept, care for, and value an individual). The degree to which these needs are perceived to be fulfilled impacts self-determined motivation of individuals.

Research findings generally support the tenets of self-determination theory. More self-determined types of motivation are positive predictors of physical activity (Duncan et al., 2010; Standage et al., 2008). Research shows autonomy, relatedness, and competence needs are positive predictors of more self-determined types of motivation in physical activity contexts (Teixeira et al., 2012). Experimental evidence shows supporting the needs of autonomy, competence, and relatedness through need supportive text messaging may lead to greater need fulfillment and increases in moderate intensity physical activity (Kinnafick et al., 2016). Other research has taken a more person-centered approach to self-determination theory because people may hold multiple reasons simultaneously for engaging in physical activity. For example, children who reported primarily a combination of self-determined motives from young childhood to late childhood showed the highest levels of physical activity compared to those holding more controlling motives or amotivation towards physical activity (Emm-Collison et al., 2020).

Self-determination theory has led to many practical implications for interventions based on a substantive body of supporting empirical evidence. Although these interventions may lead to small positive changes in health behaviors including physical activity (Ntoumanis et al., 2020), those wishing to increase physical activity may be best served to implement strategies that fulfill the needs for autonomy, competence and relatedness. This may be most influential by training leaders of physical activity environments such as coaches, trainers, and physical educators for how to support the psychological needs of their participants.

Considerations for Self-Determination Theory

There exist a few challenges with self-determination theory despite its widespread adoption in sport and exercise psychology. One challenge is whether the three basic needs of autonomy, competence, and relatedness are a complete conceptualization of the needs necessary to influence motivation. Preliminary evidence has identified the need for novelty as an additional basic psychological need (González-Cutre et al., 2020). The *need for novelty* is the need to experience something new or differs from experiences of everyday life. The need for novelty may be useful to sustain motivation in physical activity environments to avoid staleness or boredom with repetitive tasks. Understanding the relative contributions of the need for novelty is warranted in future research.

Another consideration for self-determination theory is whether individual characteristics make people sensitive to need fulfillment. For instance, people who are deprived of supportive and positive social relationships in daily life may be more sensitive to the effects of the need for relatedness in physical activity contexts. A related point first formalized by Vallerand (2001) is that basic needs and motivations are classified at three levels of generality: the global, contextual, and situational. According to this perspective, a contextualized need for relatedness should be most strongly related to motivation for a particular behavior within that context (i.e., specificity hypothesis, Vallerand, 2001). For example, an individual who has weak social connections within her family may be more sensitive to the effects of the need for relatedness when she participates in a group-based exercise class. Studying this multilevel influence within and across social complexity may inform researchers and practitioners which individuals may be most receptive to behaviors that fulfill basic needs. Future research would benefit from analyzing the factors of self-determination theory across these levels to obtain a better understanding of individual differences.

Dual-Process Models of Behavior

Dual-process models provide a framework for how two systems influence behavior (Strack & Deutsch, 2004). Dual-process theories are also discussed in Chapter 4 by Brand & Ekkekakis (2021), and Chapter 2 by Rebar et al. (2021). The first system is *reflective* that uses explicit processes through deliberate thought and conscious awareness to influence behavior. Social-cognitive theories fit within this system to study physical activity behavior. The second system is *reflexive*, concerned with sometimes nonconscious, automatic and implicit processes that influence behavior. Such reflexive processes are less studied in physical activity. They may also be best positioned to study sedentary behavior as decisions to be sedentary are less likely to require as much deliberate thought and planning (i.e., reflective processes) as physical activity.

Studying reflexive processes is advancing understanding in physical activity and sedentary behavior research (Bluemke et al., 2010, Rebar et al., 2016). Examples of such reflexive processes include habits (e.g., Rebar et al., 2014), implicit attitudes (e.g., Banting et al., 2009), automatic evaluations (e.g., Conroy & Berry, 2017), and approach-avoidance tendencies (e.g., Zenko & Ekkekakis, 2019a). Sometimes terms such as automatic associations and implicit attitudes are used interchangeably (for a discussion on choice in terminology, see Zenko & Ekkekakis, 2019b). Research shows that reflexive processes uniquely and positively contribute to the prediction of physical activity (Rebar et al., 2016). This research area is still in its infancy but the incorporation of reflexive processes in the prediction of physical activity has provided a more accurate picture of the factors that can determine behavior.

Practical implications of how to intervene on training the reflexive processes of individuals to increase physical activity behavior has received empirical support. Computer-based conditioning tasks may change automatic evaluations of exercise that could result in changes to the choice and duration of physical activity behavior (Antoniewicz & Brand, 2016; Cheval et al., 2016). These computer-based trainings may be especially important for when individuals are restricted from exercise and recreational facilities (i.e., COVID-19 pandemic). Beyond computer-based trainings, in-person interventions that are effective at changing reflexive processes and in turn physical activity behavior are needed. Such interventions outside of laboratory environments may be more easily translated into practice for the public.

Considerations for Dual-Process Models of Behavior

Issues related to inconsistent terminology among reflexive processes and how to measure these processes represent current limitations of dual-process research. Zenko & Ekkekakis (2019a) addressed the issue of measurement by assessing the reliability and validity of nine measures of implicit processes. Results showed that only three of the nine measures showed acceptable reliability and only the approach-avoidance task demonstrated validity, showing significant correlations with self-reported exercise behavior and situated decisions toward exercise (i.e., decisions about exercise when a behavioral alternative is available; Brand & Schweizer, 2015). As this line of research progresses, standardizing the terminology and refining measurement will help research progress and extend understanding of reflexive processes.

Beyond terminology, the reflexive process may be particularly useful to study sedentary behavior. Of the growing body of research studying reflexive processes in sport and exercise psychology, sedentary behavior remains understudied. The nature of sedentary behavior appears to align well with the concept of reflexive process—that sedentary behavior does not require deliberate thought or action. Dual-process models may be especially important to intervene on sedentary habits. Such research may lead to a greater understanding of how sedentary time accrues or how to break habits of extended sedentary time.

Predicting Sedentary Behavior

Ecological Model of Four Domains of Sedentary Behavior

Ecological models help to provide a framework that shows multiple levels of influence on behavior. They are useful to highlight specific contexts or situations in which factors may be most likely to influence human behavior. Ecological models typically organize the levels along intrapersonal, interpersonal, contextual, environmental, and policy levels. Each level has distinct factors that predict sedentary behavior. For example, attitudes, beliefs, and perceptions fit within the intrapersonal level. The interpersonal level includes factors that capture social influence such as a friend suggesting going for a walk or watching a movie. The contextual level includes factors within the immediate surroundings that are likely to influence behavior such as school, work, or home. The environmental level includes factors like the attributes of the built-environment, such as suburban compared to a metropolis, that may influence daily patterns of behavior. These levels are usually nested within each other and when considered together can interact and explain human behavior.

The ecological model of four domains of sedentary behavior (Owen et al., 2011) focuses on factors associated with sedentary behavior among domestic (i.e., household), occupation (i.e., work/school), transport (i.e., walkability, biking, commuting; Figure 5.2), and leisure (i.e., neighborhood and recreational environments). Sedentary behavior may be unavoidable for some individuals as using a private automobile or seated public transport may be the only way to get to their occupation whereas others may be able to walk or bike to work. Moreover, sitting in school or at work is considered a social norm. Identifying the contexts where sedentary behavior is likely to occur and accumulate in time can help guide intervention efforts to break up extended periods of sedentary behavior.

Manini and colleagues (2015) recommend several notable considerations for intervening on sedentary behavior. Sedentary behavior is likely a product of both conscious decision making and automatic responses to environmental cues (e.g., dual-process models). Recommendations include computer-based prompts to stand or move (e.g., smart watches), active workstations such as treadmill desks, allowing employees regular desk breaks, and standing meetings. The efficacy of such interventions to reduce sedentary behavior provides a positive outlook as interventions demonstrate short-term and medium-to-long-term reductions in sedentary behavior (Blackburn, 2020).

Figure 5.2
Neighborhoods with Sidewalks, Bicycle Lanes, Adequate Lighting, and Speed Bumps Can be More Conducive to Transportation-Related Physical Activity

Photo by [RODNAE Productions] from [Pexels]

Correlates of Physical Activity and Sedentary Behavior

Researchers study the correlates of physical activity and sedentary behavior to improve understanding. Studying and exploring what factors are related to these behaviors typically follows a developmental perspective. That is, how do these factors associate with behavior over the lifespan? For example, parental support for physical activity is a positive correlate of physical activity for children and adolescents (Van Der Horst et al., 2007) but would not be as salient to the physical activity of older adults. Studying developmentally appropriate correlates is useful to identify factors beyond what might be specified in a theory, to reevaluate or expand upon existing theories, or to compare the relative strength of associations of many correlates simultaneously. Some of these correlates may be sensitive to intervention or change, such as perceptions of time or outcome expectations. Other correlates may help researchers identify demographic or individual characteristics that may be risk factors for low physical activity or high sedentary behavior. Researchers generally organize these factors into personal, social, or environmental categories.

Personal

Personal-level correlates refer to factors within the individual such as behaviors, perceptions, beliefs, motivations, demographic characteristics, and biological or genetic factors. The association of age with physical activity is inverse (Trost et al., 2002). That is, as individuals become older their physical activity declines. This relationship appears to be different for children where age is positively associated with physical activity then begins to decline around age seven (Farooq et al, 2018). Although this corresponds to the time children enter school, adolescence is widely considered as a period associated with lower physical activity and higher sedentary behavior (Brodersen et al., 2007).

In addition to age-related differences, male sex appears to be consistently positively associated with physical activity across the lifespan (Bauman et al., 2012). Sex and gender differences exist during childhood; however, these differences may obscure subgroups within each sex and gender based on trajectories of physical activity behavior. For instance, when looking at trajectories of physical activity from 7 to 15 years, physical activity appears to decline in all children at a population level, regardless of gender. Despite this decline, there does appear to be a subgroup of boys that remains stable in their physical activity over this developmental period (Farooq et al., 2018). There also appears to be no sedentary behavior differences between boys and girls, but sedentary behavior is positively associated with men in adulthood (Bernaards et al., 2016).

Among psychological correlates, reviews over the past 20 years have analyzed dozens of systematic reviews with upwards of 50 different correlates. Most of this research shows that self-efficacy is a consistent positive correlate of physical activity for children, adolescents, and adults (Bauman et al., 2012; Van Der Horst et al., 2007). Other and less consistent positive correlates of physical activity include intentions to be active for both children and adolescents, whereas perceived competence, outcome expectations, and mastery goal orientations are correlates for adolescents but not children (Sterdt et al., 2014). The evidence for other psychological correlates is mixed depending on the study. For instance, there is mixed support among youth research that viewing physical activity as an enjoyable activity is associated with physical activity behavior (Biddle et al., 2011). Sedentary behavior in adults appears to be positively associated with symptoms of depression, stress, and perceived tiredness, whereas perceived health and benefits of reducing sedentary behavior are negative correlates (O'Donoghue et al., 2016).

Behaviors during childhood and adolescence that are consistently positively associated with physical activity include past physical activity behavior and participation in organized physical activity such as sports (Sterdt et al., 2014). In adults, a history of physical activity participation during adulthood appears to be a consistent behavior correlated with higher physical activity (Bauman et al., 2012) whereas having a sedentary job (i.e., desk jobs) appears to be most strongly associated with sedentary behavior (Bernaards et al., 2016). There exist other behaviors either less consistently or more weakly associated with both physical activity and sedentary behavior that differ among children, adolescents, and adults. These include smoking, snacking on high-calorie foods, and overall physical activity levels.

Social

Social correlates include actual and perceived aspects of relationships with other people such as parents, siblings, peers, coaches/teachers, partners, or group members. Parental encouragement and parental social support are positively associated with physical activity for young people (Biddle et al., 2011). Aspects of sibling relationships for youth appear to also positively correlate with physical activity behavior (see Blazo & Smith, 2017).

Outside of the family context, aspects of peer relationships such as peer acceptance, friendship quality, support, and modeling are associated with physical activity (Smith, 2019). Peers include classmates, friends, and teammates of similar age and developmental status. Friends are especially important social agents in adolescence. In a sample of 372 adolescents, friends social support and friends watching were most strongly correlated with physical activity whereas parental and sibling social support were non-significant correlates (Duncan et al., 2005). Peer relationships may be promising to promote physical activity, however, peers can also undermine physical activity (Smith, 2019). Poor relationships with peers signal that a person is not wanted, disliked, or devalued by others. This can appear as conflict, rejection, exclusion, teasing, or bullying. These experiences are typically unpleasant and can have serious lifelong consequences. For example, Ladwig and colleagues (2018) found that negative memories and experiences (e.g., being chosen last for teams) during childhood physical education were negatively associated with attitudes and intentions about physical activity in adulthood.

Other important social relationships correlated with physical activity include coaches, trainers, partners, and group members. For adults, receiving social support from partners, family members, friends, or a physician appears to be positively correlated with physical activity (Kelly et al., 2016). For older adults, social support remains an important correlate of physical activity and can counteract the effects of loneliness. Social support is positively correlated whereas loneliness is negatively correlated with physical activity among older adults (Lindsay Smith et al., 2017). Along with social support, being physically active in groups that emphasized group cohesion and group-dynamics was more effective at getting participants to adhere to exercise interventions than exercising alone (Burke et al., 2006). Engaging in physical activity with others offers opportunities for socialization that helps fulfill an individual's need to belong. Although it should be noted that not all people may prefer engaging in group-based physical activity. This is particularly relevant for older adults who report preferring group-based physical activity with others similar in age (Beauchamp et al., 2007).

Environmental

The environmental correlates of physical activity and sedentary behavior are characterized by aspects of the context and location. Bauman and colleagues (2012) reviewed correlates of physical activity from an ecological perspective. Walkability, access or proximity to recreation facilities, and other characteristics of the built-environment are among the most consistent correlates related to physical activity for children, whereas land-use mix and residential density are most consistent for adolescents. For adults, walkability and location of recreational facilities were consistent correlates of physical activity with no clear environmental correlates found for older adults. This review demonstrated that characteristics of the environment such as walkability and access to facilities are associated with physical activity behavior. This can have important implications for the development and location of new facilities to promote physical activity behavior.

Another aspect of the environment that can influence physical activity and sedentary behavior is weather. Zheng and colleagues (2021) found that rain is negatively associated with physical activity and positively associated with sedentary behavior, whereas temperature shows the opposite relationship (i.e., positive association with physical activity, negative association with sedentary behavior). Additionally, physical activity appears to vary with changes in seasons such that colder seasons (e.g., winter) are associated with lower physical activity and warmer seasons (e.g., spring and summer) are associated with higher physical activity (Tucker & Gilliland, 2007). These findings may apply to locations that experience weather variation in all four seasons, whereas extreme climates with high humidity and temperatures may show different associations with physical activity and sedentary behavior.

Considerations for Studying Correlates

Studying the factors associated with physical activity and sedentary behavior will benefit from moving beyond cross-sectional research designs (i.e., one point in time) to studying how the association changes over time. This noted, longitudinal designs are more resource demanding than cross-sectional designs, presenting challenges to researchers. Such longitudinal designs can help demonstrate a richer understanding of how associations change or remain stable over time. A twelve-week exercise program provides an illustrative example. In this program, self-efficacy may be the strongest predictor of physical activity in week 1. The strength of self-efficacy may lessen over time and be replaced by social support by week 6. A researcher may find that self-efficacy was most important for initiating the program and as participants affiliated over the course of the program social support became most salient. Thus, such a longitudinal design may offer practical implications for how fitness instructors should structure exercise programs and what to emphasize among participants over time.

Conclusion

Physical inactivity and increased sedentary behavior are global problems that will require innovation along the science to practice continuum. Researchers should be aware that there are numerous factors that can influence human behavior. Those interested in better understanding physical activity and sedentary behavior are best positioned when carefully selecting predictors supported by scientific evidence and demonstrated efficacy to change behavior.

Learning Exercises

1. What is the difference between the two approaches to studying prediction?
2. Why is there more of an abundance of research on predictors of physical activity than predictors of sedentary behavior?
3. In what ways can someone design an intervention to increase the strength of physical activity intentions?
4. What are examples of social persuasion and vicarious experiences that could be used by a personal trainer to influence physical activity self-efficacy?
5. What are examples of coaching behaviors that would satisfy the needs for autonomy, competence, and relatedness?
6. What are some efficacious strategies to reduce sedentary behavior?
7. What factors correlate with both physical activity and sedentary behavior?

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Chapter 6
Personality and Physical Activity

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Chapter Overview

Physical activity levels vary from person to person. Some of this variability comes from demographic differences (gender, age), or environmental differences (access to resources), but much of it goes unexplained. In this chapter, we explore the evidence that personality may influence how active people are. We explore the nature of personality, the relationship it has with physical activity, and the possible reasons or mechanisms underlying those relationships. Personality has been linked to physical activity behavior, as well as to social cognitions specific to physical activity like motivation, intention, and preferences. There is also evidence of shared genetic links between personality and physical activity. Personality has even been shown to predict the relationship between physical activity and common mental health outcomes, like symptoms of anxiety and depression. By the end of this chapter, readers should have a strong understanding of what personality is, how it relates to physical activity, and what are some of the causal mechanisms that might explain this relationship. The reader should also have a good understanding of how they might utilize these relationships in their efforts to help others adopt and maintain an active lifestyle.

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Introduction

Physical activity is often the focus of public health initiatives as physical inactivity is a risk factor for chronic conditions (European Union Sport and Health Working Group, 2008; Haskell et al., 2007; Office of Disease Prevention and Health Promotion, 2017; Rhodes et al., 2017; WHO, 2010, p. 325). In addition to the protective effects of physical activity against physical illnesses, a wide body of evidence supports the benefits of physical activity on mental health and quality of life (Bize et al., 2007; Teychenne et al., 2020). Despite this, very few people engage in recommended levels of physical activity. In fact, less than 20% of US adults and adolescents engage in recommended levels of physical activity (Piercy et al., 2018), a trend observed across developed nations (Guthold et al., 2018; Hallal et al., 2012). A key to developing effective and sustainable physical activity promotion initiatives is an understanding of behavioral antecedents to physical activity, which can range from very narrow personal characteristics of individuals to broad environmental and policy factors (Bauman et al., 2012).

One personal factor that has received much attention and has the potential for broad reaching adaptations to current practice is personality. Understanding how personality and physical activity are related could be of great practical value in explaining systematic variability in physical activity behaviors, as well as the impact of behavioral interventions with respect to population reach and effectiveness. Relationships between personality and physical activity may also explain systematic variability in the affective response to behavioral enactment, self-regulation and adherence, preferences for different types of physical activities, and psychological and physiological outcomes of acute or chronic exercise. The use of an integrative framework of the personality system can inform the adaptation of current practice to account for relevant individual differences which influence the way people respond to exposures relevant to physical activity and exercise promotion (Coulter et al., 2016; Ferguson, 2013; Wilson, 2019). The purpose of this chapter is to provide students and practitioners with an overview of the evidence linking physical activity and personality, and to set the stage for continued work towards personality tailored approaches to exercise programming and physical activity promotion.

What is Personality?

The American Psychological Association defines personality as “individual differences in characteristic patterns of thinking, feeling and behaving” (American Psychological Association, 2020). Overall, personality traits represent enduring and consistent individual differences across the lifespan (McCrae et al., 2000; Roberts et al., 2006).

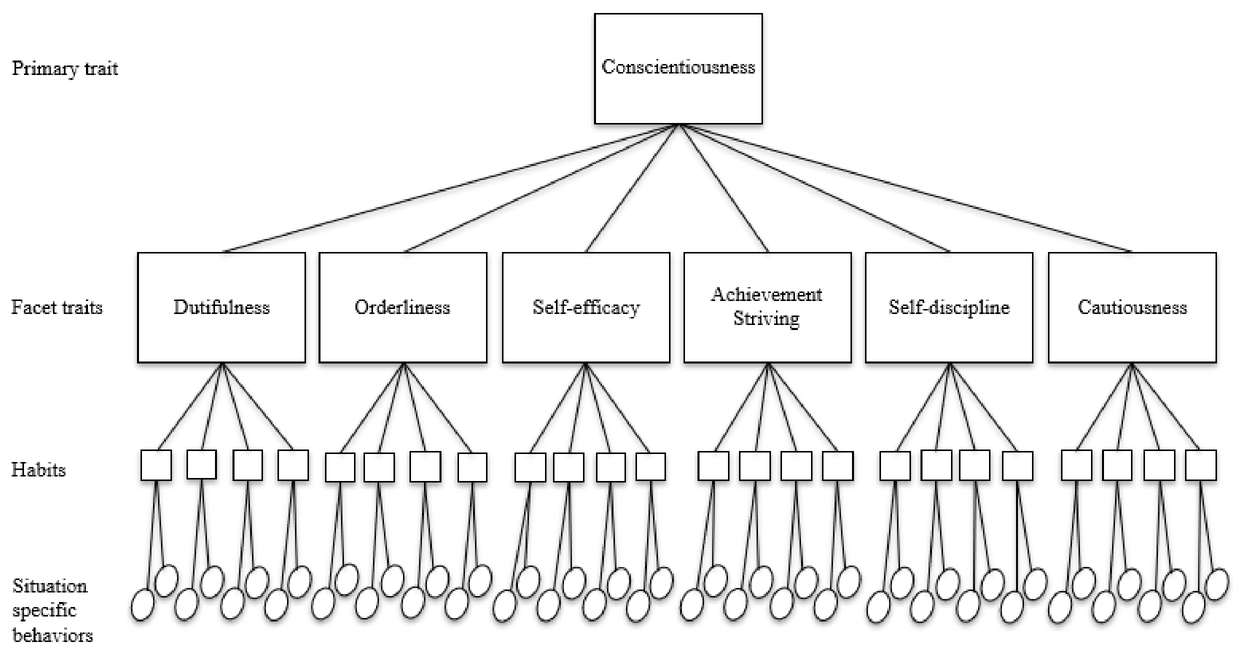
Personality differences originate from fundamental dispositions in early childhood, called temperaments (Rothbart, 2007). These fundamental dispositions influence the way people respond to environmental stimuli emotionally, cognitively, and/or behaviorally. Personality development is a continuous process beginning at an early age (Denissen et al., 2011). While individual expressions of personality are generally considered culturally conditioned manifestations of several factors (Eysenck, 1970; Funder, 2001; McCrae et al., 2000), personality is moderately to highly heritable (Bouchard & Loehlin, 2001; de Moor et al., 2012), suggesting an evolutionary and biological basis (Gray, 1991; Zuckerman, 2005). Biological theories present varying postulates regarding the underlying neurobiology from which personality arises, though none have been universally supported. Common themes that have emerged, however, include individual differences in arousal (tonic neural activity), reactivity (stimulus/response threshold), and self-regulation (recovery from evoked responses; Depue & Collins, 1999; Gray & McNaughton, 2000; Zuckerman, 2005).

Personality theory dates back to the classical theory of the four humours (sanguine, phlegmatic, choleric, and melancholic), put forth by Hippocrates (460 BC) in his treatise “On the Nature of Man”. The ideas put forth were further endorsed by Galen during the second century AD in his famous treatise “On the Natural Faculties”, which preceded his work “On Temperaments” in which he describes an optimal temperament in which all four humours are in balance without any quality being in excess (Stelmack & Stalikas, 1991). The theory of the humours and the resultant fourfold typology of temperament/personality persisted through the middle ages into the Renaissance. With advances in medical science during Medieval times, the physiological models elaborated by Hippocrates were disproven and the psychological postulates were also presumed falsified; ultimately, the theory fell out of favor. Remnants of the fourfold typology were later observed in the writings of Immanuel Kant (1789) and Willhelm Wundt, the “father of psychology” (Stelmack & Stalikas, 1991). The theory put forth a number of ideas that remain important to our current thinking. Specifically, a) the fourfold typology resulted from consistently observed patterns in the person’s emotions and behavior; b) it was linked to human physiology as it was understood at the time; and c) it was related to psychopathology.

Early work in psychology reiterated the notion of personality “types” reflected in the personality types and somatotypes described by Carl Jung and William Sheldon, respectively (Jung, 1923; Sheldon & Stevens, 1942). However, an overwhelming body of factor analytic and psychobiological research has nullified the perspective of personality as “types”. Nevertheless, these theories made important contributions to considerations for personality moving forward. For example, though Sheldon’s theory of somatotypes (i.e. the idea that body types had a causal relationship with personality) has been logically and scientifically refuted (e.g., Hammond, 1957; Lerner, 1969; Slaughter, 1970), significant associations between body type and personality do exist (Sutin & Terracciano, 2016) and highlight relationships between psychological individual differences in health behaviors contributing to body composition and overall health (Ferguson, 2013). Though the work of Carl Jung has received its fair share of criticism, his was the first theory to highlight Extraversion/Introversion as a primary personality factor and his ideas about four functions or modes of operation for personality (i.e. thinking, sensing, intuition, and feeling) persist in popular culture as reflected in the widely used Myers-Briggs type indicator (Barbuto, 1997). Despite the theoretical and scientific advances since these early perspectives, their imprint on contemporary thought is undeniable. Much progress has been made since this early work to understand the structure of human personality and it should go without saying that our current perspectives differ markedly from those in the early 20th century.

Our current view of personality follows a common higher-order trait taxonomy, in which primary traits act as determinants of lower-order sub-traits which are used to describe individuals with greater specificity and detail, but which are also subject to greater influence by external factors (see Figure 6.1). Thus, primary personality traits represent the peak of a conceptual hierarchy, with the most stable, biologically based traits at the top and individual level behaviors at the bottom, with narrow facet traits linking biological individual differences to situation specific individual level behavior. Factor analytic work by scholars throughout the 20th century (e.g., Cattell, 1947; Digman, 1990; Eysenck, 1947; Goldberg, 1993; Thurstone, 1934; Tupes & Christal, 1961; Webb, 1915) provided a top-down template for classifying personality as intercorrelations between descriptive terms. This body of work leveraged the lexical hypothesis (ca. 1884), which states that those personality characteristics that are most important in peoples’ lives will eventually become part of their language; thus, terms for personality traits are identifiable across cultures through analysis of their descriptive words for individuals (i.e., trait terms; Allport, 1927; Allport & Odbert, 1936). This work, conducted in tandem with the pioneering work by Hans Eysenck elaborating biological models of Extraversion and Neuroticism (Eysenck, 1970), has helped bridge the gap between specific sub-traits and more general personality factors that resulted in a previously disparate field of study (Digman, 1990; Goldberg, 1993).

Figure 6.1
Visual Representation of the Hierarchical Nature of Personality Depicted Across Levels of the Primary Trait Conscientiousness.



Currently, the dominant contemporary taxonomy used by scholars worldwide is the Five Factor Model (FFM) of personality (McCrae & Costa, 2008; Revelle et al., 2011), or similar variants of this model. This widely supported system postulates that the core personality of all people can be classified on five bipolar dimensions: (1) *Extraversion* / Introversion; (2) *Neuroticism* / Emotional Stability; (3) *Conscientiousness* / Undirectedness; (4) *Openness* / Closedness; and (5) *Agreeableness* / Antagonism. Though it is recognized that these terms each reflect one extreme end of the respective bipolar dimension, the trait terms listed here in italics are those typically used to discuss each dimension within the literature. Their counterparts are seldom called out by name, rather, scholars often refer to individuals as scoring either high or low for Extraversion, for example. Nevertheless, it is important to recognize the continuous nature of these dimensions, and to keep in mind that all people can be classified according to their respective scores on each of the Big Five personality dimensions. Descriptions of dispositions or tendencies displayed for high and low ends of each dimension are listed in Table 6.1. Notably, though there are some sub-traits (e.g., sub-traits of Neuroticism) and trait clusters, such as the dark triad (i.e., narcissism, Machiavellianism, and psychopathy), that do represent trait indicators of psychopathology, all Big Five are generally considered to have some evolutionary utility, and to be normal variations of fundamental, biologically based personality traits across the general population.

Table 6.1
Characteristic Tendencies of Individuals Scoring on the High or Low End of Each Bipolar Dimension of the Big Five personality Factors

Trait dimension	High (+) / Low (-) Anchor Labels	Characteristic Tendencies
Extraversion	(+) Extravert	Sociable; assertive; energetic; excitement seeking; affectionate; talkative; friendly; warm; spontaneous; active; propensity towards positive affect.
	(-) Introvert	Reclusive; reserved; aloof; quiet; inhibited; passive; cold; propensity toward negative affect under conditions of high stimulation.
Neuroticism	(+) Neurotic	Emotionally reactive/unstable; anxious; self-conscious; vulnerable; high-strung; worrying; insecure.
	(-) Emotionally stable	Calm; emotionally stable; secure; relaxed; self-satisfied; comfortable; unperturbed.
Conscientiousness	(+) Conscientious	Orderly; dutiful; self-disciplined; achievement oriented; reliable; persevering; hardworking; punctual; neat; careful; well-organized.
	(-) Undirected	Disorganized; negligent; undependable; poor time management/planning skills; lacking self-discipline.
Openness	(+) Open-minded	Reflective; perceptive; creative; welcoming; unconventional; non-traditional; intellectual; original; imaginative; daring; complex; independent; broad interests.
	(-) Closed-minded	Simple; pragmatic; conforming; traditional; unadventurous; “down to Earth”; conventional; uncreative; narrow interests.
Agreeableness	(+) Agreeable	Lighthearted; easy going; cooperative; kind; optimistic; altruistic; trustworthy; generous; soft-hearted; forgiving; sympathetic; acquiescent; selfless; good-natured; lenient; trusting.
	(-) Antagonistic	Ruthless; vengeful; callous; selfish; irritable; critical; suspicious; argumentative; cynical; competitive.

This widely supported taxonomy emerged organically through decades of factor analytic work (Digman, 1990). Further, the Big Five are observed to be moderately heritable (Jang et al., 1996; Riemann et al., 1997), are related to childhood temperament (Ahadi & Rothbart, 1994; Rothbart et al., 2000), follow a stable and predictable trajectory of change over the lifespan (Roberts et al., 2006), and are significantly related to several indices of physical health and psychological well-being (Ferguson, 2013; Steel, Schmidt, & Shultz, 2008). The Big Five are considered to be the core dimensions of personality, and to interact with one's environmental exposures resulting in the expression of more specific sub-traits, (Goldberg et al., 2006; McCrae & Costa, 1995). For example, individuals high in Extraversion may express this higher order trait through excitement seeking, sociability, a positive outlook, or energetic activity under circumstances that facilitate such an expression, whereas these traits would not manifest under the same circumstance for an individual low in Extraversion (i.e. high in introversion). Most theorists agree that primary traits interact with external factors to produce narrower, more contextualized social cognitive and motivational characteristics which strongly influence behavioral action (Ajzen, 1991; Bogg et al., 2008; McCrae & Costa, 1999; Mischel & Shoda, 1999; Rhodes, 2006). A detailed elaboration of this integrative perspective of the personality system is detailed in the Five Factor Theory (McCrae & Costa, 1999, 2008), and a contextualization of these concepts to physical activity and exercise behaviors was recently published for consideration by health professionals interested in using personality to maximize physical activity and exercise outcomes (Wilson, 2019). Generally, integrative theories of the personality system indicate that the way one responds to any external or internal stimulus is moderated by their underlying core personality (which is reflective of individual differences in neurobiological arousal and reactivity in relevant neural networks). Personality is therefore expected to moderate the environmental influences on cognitions, affect, and behavior, making it a salient source of systematic variation in outcomes of interest to a wide-range of behavioral interventionists (Ferguson, 2013).

Personality Measurement

Personality assessment can be approached via self- or proxy-report survey, behavioral observation, or the measurement of psychophysiological correlates (de Geus & Neumann, 2008; Lanyon & Goodstein, 1997). Most frequently, personality is assessed using a validated self-report measure. Survey assessments ask people to rate how well an adjective or sentence describes themselves or someone they know. Common proxy respondents include teachers, parents, or close friends of the individual being assessed. Validated survey instruments often allow users to compute summary scores for traits measured, though reports of normative scores for personality are uncommon, making interpretations of sample representativeness difficult. Surveys are generally easy to implement, low cost, and low burden for the researcher and participant, though they do have some notable limitations. Primarily, survey assessments are vulnerable to response bias (e.g., socially desirable responding or experimental demand). To minimize this possibility, some surveys use "distractor" items that do not ask about personality characteristics, attempting to conceal the purpose of the survey from the participant. Another common approach is to mix the personality assessment items in with items from other surveys in a single question block. Both approaches aim to reduce the potential of response bias resulting from participants deducing what the survey is attempting to assess and tailoring their answers in some way. Some commonly used, well-supported surveys for assessing the Big Five traits include the Big Five Inventory (John et al., 1991), and the NEO-PI-R (Costa Jr & McCrae, 2008). Another resource that many find especially useful is the International Personality Item Pool (IPIP). The IPIP is a free resource in the public domain including more than 3,000 items from over 250 personality scales which are available to be copied, edited, translated or otherwise used for any purpose without seeking permission or paying a fee for use (Goldberg, 1999; Goldberg et al., 2006). Interested readers are encouraged to go to https://ipip.ori.org/ to explore the resource and its applicability for their assessment needs.

Unlike survey assessments, behavioral observations and psychophysiological measures are uninfluenced by participant response bias. Behavioral observations involve coding and analysis of observations made in-person or via video recording. This approach is time-consuming and carries a substantial researcher burden. Coding observations requires careful consideration and control for external conditions, as low inter-rater reliability commonly results from the influence of environmental and situational variables (Rowe & Kamphaus, 2008). To date, observational assessments of personality are rarely used in the exercise and physical activity literature.

Finally, psychophysiological correlates of personality can be used as a proxy measure for biologically based traits. Significant relationships are consistently reported between psychophysiological reactivity and self-reported measures of personality (de Geus & Neumann, 2008). Individual differences in sensory stimulus response of localized brain activity are related to personality as observed in studies using functional magnetic resonance imaging and electroencephalography. Personality modulates responses such as evoked asymmetry and event-related potentials (e.g., error-related negativity, contingent negative variation; Canli et al., 2001; Coan et al., 2006; Pailing & Segalowitz, 2004). For example, individual differences in cerebral blood flow have been observed between introverts and extraverts using positron emission tomography such that introverts are reported to have greater cerebral blood flow in the frontal cortex at rest than extraverts (Johnson et al., 1999). Additionally, indicators of autonomic nervous system responses (e.g., electrodermal conductivity, heart rate variability, pre-pulse inhibition and magnitude modification of the startle reflex) to stressors and emotional stimuli may be useful indicators of personality differences, though evidence to date has been mixed (de Geus & Neumann, 2008). Like behavioral observation, the assessment of psychophysiological correlates of personality in the exercise and physical activity literature has been underutilized.

Personality and Physical Activity

Currently the cumulative evidence supports a modest relationship between personality and physical activity (Rhodes & Smith, 2006; Wilson & Dishman, 2015), as well as physical inactivity, and sedentary behavior (Sutin et al., 2016). These relationships appear robust across the lifespan (de Moor et al., 2006), and some evidence suggests that associations are bidirectional (Stephan, Sutin, et al., 2014). Most of the evidence on personality and physical activity is derived from cross-sectional and longitudinal observations.

Cross-sectional Associations

The relationship between personality and physical activity has received intermittent attention over the past 50 years. Since the elaboration of the FFM, several reviews and meta-analyses have summarized the relationship between physical activity and personality (McEachan, 2004; Rhodes & Pfaeffli, 2012; Rhodes & Smith, 2006; Sutin et al., 2016; Wilson & Dishman, 2015). The first meta-analysis in this area reported small positive associations between Extraversion (r = .23) and Conscientiousness (r = .20) and physical activity and a small negative relationship between physical activity and Neuroticism (r = -.11) among 35 samples (Rhodes & Smith, 2006). Though these effect sizes are small based on traditional standards (Cohen, 1988), more recent guidelines for psychological sciences indicate that effects sizes of about .10 should be judged as relatively small, and of .20 to be considered typical (Gignac & Szodorai, 2016). Concurrent narrative analysis of potential effect moderators revealed that sex, age, and study design did not appear to affect the findings, though it was observed that European studies reported weaker associations between Extraversion and physical activity compared to North American studies.

More recent meta-analyses corroborate and extend these findings. Wilson and Dishman (2015) conducted a meta-analysis of 64 studies on the application of the FFM and physical activity, and Sutin and colleagues (2016) conducted a more selected meta-analysis of 16 population samples. Both studies reported positive associations between physical activity and Extraversion (both r = .11), and Conscientiousness (both r = .10) in the small effect size range. Though statistically significant, all other associations were of a trivial effect size by standards for individual differences research (Cohen, 1992; Gignac & Szodorai, 2016). Formal assessment of study design and sample characteristics as possible effect moderators revealed that Conscientiousness was linked more to the frequency of activity (r = .21) than other types of assessment such as general quantity (r = .06) or volume (r = .07), and the association between Extraversion and physical activity appears intensity dependent, as effects were stronger for effects examined for quantity of moderate-to-vigorous physical activity (r = .13) than for quantity of mild-to-moderate physical activity (r = .04; Wilson & Dishman, 2015). Moderator analyses also corroborated the narrative review by Rhodes and Smith (2006) such that effects between physical activity and Extraversion, as well as Neuroticism, were significantly stronger in samples from North American compared to samples from Europe (Wilson & Dishman, 2015). Notably, these analyses highlight areas where more work is needed, as most of the work has been limited to healthy, North American adults. Studies are needed to further our understanding of these relationships in population subgroups that have received less attention (e.g., older adults, Central American, South American, and Asian populations, clinical samples).

Based on the cumulative evidence, we can conclude that self-reported physical activity has a reliable, yet small positive association with Extraversion and Conscientiousness. Also, Neuroticism appears to have a negative relationship with self-reported physical activity. Importantly, these analyses indicate that, together, Extraversion, Conscientiousness, and Neuroticism account for 7-10% of the variance in physical activity in the population, highlighting the possibility that approaches to physical activity promotion can leverage individual differences to maximize physical activity outcomes, such as adoption and adherence. Consistent relationships between personality and physical activity underscore the possibility of using personality to identify those who may be at risk for inactivity or poor exercise adherence. With respect to the Big Five primary personality traits, Neuroticism appears to signal risk for inactivity, whereas increments of Conscientiousness and Extraversion may protect against inactivity. Studies have yet to determine the degree to which interactions between traits within-subjects influence relationships between traits and activity level. More work is needed to test the utility of personality as a tailoring variable for physical activity interventions and exercise programming.

Though relationships between personality and self-reported physical activity are highly consistent, there is relative paucity of evidence reporting on these relationships using objective measures (e.g., pedometers, accelerometers) of physical activity. Considering the modest relationships between self-reported and objectively measured physical activity in general, it is important to examine whether physical activity measurement impacts observed relationships between personality and physical activity. For example, one study examining cross-sectional relationships between personality factors and physical activity in a sample (n = 298) of female undergraduates reported differential relationships dependent on physical activity measurement (Wilson et al., 2015). Specifically, Wilson and colleagues observed Extraversion to be significantly related to self-reported physical activity only, while Neuroticism was related to objectively measured physical activity only. These results were recently corroborated in a large sample (n = 1,098) of middle-aged women; Neuroticism was negatively associated with leisure time moderate-to-vigorous physical activity as measured by both self-report and accelerometry, whereas Extraversion was positively related to self-reported physical activity only (Kekäläinen et al., 2020). Such discrepancies also appear present in older adult samples. One sample (n = 3,094) of older adults (age > 65 years) responded to self-report items for personality and physical activity conceptualized as participating in exercise for more than 30 minutes at least twice per week (Takatori et al., 2019). Significant, but small (r = .08 to .13), correlations were reported for physical activity and Extraversion, Conscientiousness, Agreeableness, and Openness. Another study of older adults (*n* = 271; age > 79 years) used the activPAL activity monitor (a tri-axial inclinometer) to assess sedentary time and physical activity relative to personality traits, and found no significant associations between personality and physical activity measured as step count, but significant negative associations between sedentary time and Agreeableness, Conscientiousness, and Openness (Čukić et al., 2019). Observations in these and other studies (e.g., Hearon & Harrison, 2020) contrast with bivariate relationships reported in meta-analyses. This might be due to differences in physical activity assessment, as direct measures (e.g., accelerometers) capture all types of physical activity, including incidental movement throughout the day, whereas indirect measures (i.e., physical activity self-reports) are more likely to capture purposeful exercise and memorable bouts of physical activity (Troiano et al., 2014). Another possibility is the presence of a common method bias favoring self-report assessments in the observed associations with personality. Consequently, these inconsistent observations highlight the need to use direct and indirect measures of physical activity concurrently to understand what portion of the covariance may be related to response bias versus true association.

Correlational Associations: Personality and Physical Inactivity

In addition to association between personality and physical activity, the focused meta-analysis by Sutin and colleagues (2016) estimated population effect sizes relationships between personality and physical inactivity, and sedentary behavior (e.g., time spent sitting, hours watching TV). In examining relationships between traits and a dichotomous inactivity variable (i.e. inactive or not inactive), data suggest that for every standard deviation (*SD*) unit increase in Extraversion, Conscientiousness, or Openness, there is about a 10-15% decrease in risk for inactivity. In contrast, for every *SD* increase in Neuroticism, there is a 10% increase in risk for inactivity. Further, Neuroticism appears consistently positively related, and Conscientiousness consistently negatively related, with total time spent sedentary. Finally, Sutin et al. report that evidence for associations between sedentary behaviors and Extraversion and Openness is mixed, and Agreeableness appears unrelated to sedentary behavior. However, additional work highlights the mixed nature of these effects. For example, Extraversion is observed to be negatively associated with total sitting time and, along with Conscientiousness, total leisure screen time in a large sample of young adults in Australia (Burnett et al., 2016). A more recent report indicated that among a sample (*n* = 64) of young adults, sedentary time measured by accelerometry was not significantly related to any of the Big Five personality traits (Hearon & Harrison, 2020). Conversely, self-reported time spent sitting was inversely related to Extraversion and Conscientiousness cross-sectionally, but positively associated with Openness prospectively with follow-up measures taken at 5-months in a sample (*n* = 126) of young adults (mean age = 21.6 years; Joyner et al., 2019). Overall, the associated evidence on personality and sedentary behavior is still in its infancy. Continued work in this area is needed to support our understanding of how personality relates to sedentary behaviors, and whether any of the covariance significantly explains relevant health outcomes.

Longitudinal Associations

Most of the evidence linking physical activity and personality describes bivariate associations observed in cross-sectional or very brief longitudinal investigations (e.g., 8 weeks). Overall, results from subgroup analyses in the Wilson & Dishman meta-analysis indicate that relationships between personality and physical activity from prospective studies are similar to those from cross-sectional studies. The exception to this was observed for effects between Conscientiousness and physical activity; associations from prospective studies were nearly twice as large as those from cross-sectional studies (Wilson & Dishman, 2015). This was later corroborated in a sample (*n* = 126) of college students in which Conscientiousness was observed to significantly predict moderate-to-vigorous physical activity at a 5-month follow-up assessment; no relationships were observed for the other four primary personality traits (Joyner & Loprinzi, 2018). These observations may reflect the propensity of individuals with increasing levels of Conscientiousness to possess a greater aptitude for developing and sticking with a plan. Individuals with higher scores for Conscientiousness demonstrate greater self-discipline and sense of duty for executing plans and reaching goals than those who score low for Conscientiousness. Other primary traits are characterized by qualities that speak to their propensity for behaviors in the present, rather than the likelihood of engaging in future behavior. This quality may explain why longitudinal associations between physical activity and Conscientiousness are statistically significant, while those of other traits are not.

A few studies have examined the interconnected relationship between personality and physical activity across extended periods of time. Repeated measures over time allow for an assessment of the direction of effects between variables, and the stability of these effects over time. Indeed, the existing longitudinal evidence indicates that relationships between personality and physical activity are, for the most part, stable across the lifespan. A population based study using the Netherlands Twin Registry assessed survey data from adolescent and adult twins and their families collected every two years from 1991 to 2002 and demonstrated that regular exercisers were significantly more extroverted and generally more emotionally stable (low Neuroticism) than non-exercisers across age categories from early adolescence (10–15 years) to old age (> 60 years; de Moor et al., 2006). Overall, this provides strong evidence for the stability of associations between personality and physical activity across adulthood.

Repeated measures also provide the opportunity to distinguish between-person from within-person effects. In other words, we are better able to understand differences in how personality differences between people impact change in physical activity over time, and also how the natural flux of personality over time within an individual impacts change in physical activity over time. For example, Mõttus et al. (2017) showed that while Extraversion and Conscientiousness predict between-person physical activity, differences in Neuroticism within-people over time were also predictive of physical activity. This is important preliminary evidence for investigators aiming to adjust behavioral techniques according to personality traits to enhance physical activity interventions or utilize physical activity as a therapeutic tool for individuals according to personality. This is an area ripe for investigation, as scholars are just now beginning to apply personality to focused efforts in health promotion (Ferguson, 2013; Wilson, 2019).

Evidence also exists to suggest that the relationships between personality and physical activity behavior may be bidirectional. It has been observed that personality is predictive of changes in physical activity levels across several decades (Kern et al., 2010), and conversely, that physical activity levels are predictive of the stability (or instability) of personality as we age (Stephan, Boiché, et al., 2014; Stephan et al., 2018; Stephan, Sutin, et al., 2014). One longitudinal trial spanning 40 years revealed predictive qualities of Extraversion and Neuroticism on physical activity changes, specifically, though over time higher physical activity was associated with higher levels of Extraversion and lower levels of Neuroticism. However, these personality traits were associated with a greater decline in physical activity among adult males compared to those who scored low for Extraversion and/or high for Neuroticism at baseline (Kern et al., 2010). This effect between personality and change in physical activity over time was not observed in females. Longitudinal associations between Openness and Agreeableness with physical activity change were not significant.

Interestingly, some evidence supports a beneficial effect of physical activity on personality change over time. A recent report showed that lower physical activity was associated with declines in Conscientiousness, Openness, Extraversion, and Agreeableness over the course of 20 years, although the effect sizes were very small (Stephan et al., 2018). Similarly, change in personality traits was reduced among adults classified as physically active in two large longitudinal cohort studies. Specifically, adults in the Health and Retirement study (n = 3,774) and the Midlife in the United States study (n = 3,758) were followed for 4 and 10 years, respectively. Those who were physically active at baseline had significantly greater intra-individual stability of primary personality traits in both studies (Stephan, Sutin, et al., 2014). Further, research examining lower level personality traits has demonstrated a beneficial effect of physical activity on sub-traits of Neuroticism, possibly due to the documented anxiolytic and anti-depressive effect of activity.

Despite these compelling observations, more work is needed to test plausible biological and cognitive mechanisms of these relationships. Additionally, little has been done to understand the impact of trait-trait interactions on physical activity behavior within people using multivariate techniques to understand these relationships more comprehensively. Though the existing longitudinal research is encouraging, the hypothesis of bidirectionality has mixed support, highlighting the need for further investigation (Allen et al., 2017).

Genetic Links between Personality and Physical Activity

The cumulative associative evidence begs the question of genetic overlap between personality and physical activity level. Heritability estimates for the Big Five traits range from 41% to 61% (Jang et al., 1996; Riemann et al., 1997; Vukasovic & Bratko, 2015), and physical activity is heritable in the range of 48% to 71% (de Moor & de Geus, 2012; Stubbe et al., 2006). Early assessments support rather strong genetic links between personality traits and physical activity. Analysis of a large longitudinal dataset from a sample of 10,105 twins surveyed from 1991 to 2009 indicated common genetic pleiotropy (the existence of a single gene that impacts more than one apparently unrelated or distantly related qualities) between physical activity and Neuroticism, and a combination of genetic pleiotropy and causal effects of Extraversion on physical activity responsible for the small phenotypic associations described in the observational literature (de Moor & de Geus, 2018). In other words, the association between Neuroticism and physical activity was observed to be the result of a shared genetic source, whereas the association between Extraversion and physical activity was partly due to shared genes, but also partly due to a causal impact of Extraversion on physical activity behavior. For instance, higher levels of Extraversion may predispose individuals to more frequent opportunities for physical activity due to the propensity to seek out stimulating environments. The genetic association between Extraversion and physical activity was again corroborated in a sample (n = 373) of adolescent and young adult twins (Schutte et al., 2019). This cutting-edge research begins the process of teasing apart causal effects and shared genetic variance in the physical activity and personality relationship. Additional research is needed to test the reproducibility and generalizability of these compelling observations in more diverse samples, but early results suggest a common genetic etiology between physical activity behavior and primary traits Neuroticism and Extraversion.

Personality, Physical Activity, and Social Cognitions

Though describing direct relationships between personality and physical activity is an important first step, it is important to specify how personality may affect physical activity behavior. Specifically, the influence of personality is hypothesized to be indirect, working through social cognitions (e.g., perceptions, attitudes, norms, self-efficacy), habits, or social and environmental access to behavioral resources (Ajzen, 1991; Bogg et al., 2008; McCrae & Costa, 1995; Rhodes, 2006). Several studies have examined social cognitive theories as mediators of the personality–physical activity relationship (Rhodes & Pfaeffli, 2012; Rhodes & Wilson, 2020; Wilson, 2019). Most of these investigations examined Ajzen's (1991) theory of planned behavior as the intermediary (see Chapter 5; Delli Paoli, 2021).

Theory of Planned Behavior as a Mediator

Rhodes and Pfaeffli (2012) conducted a systematic review and reported that personality was related to theory of planned behavior constructs, and that personality and social cognitive constructs were related to physical activity. However, the test of full mediation (i.e., that the link between personality and physical activity was actually through social constructs) was only supported in two samples (Bryan & Rocheleau, 2002; Hagan et al., 2009). In one case, the effect of Extraversion on physical activity was fully mediated through perceived behavioral control (Bryan & Rocheleau, 2002). A more complex analysis subsequently revealed that a sub-trait of Extraversion, the activity trait, accounted for the observed relationship between Extraversion and social cognitive constructs. Hagan et al. (2009) reported that the activity trait mediated the relationship between Extraversion and theory of planned behavior constructs, and that attitude and perceived behavioral control mediated the relationship between the activity trait and physical activity behavior (Hagan et al., 2009). All other studies only supported partial mediation, as personality had significant direct effects on physical activity. The finding is interesting because it shows that personality may have another route on behavior beyond reflective social cognitions (e.g., intention, attitude, perceived control). For example, dual-process theories (Deutsch & Strack, 2006) propose that behavior is the result of a combination of planned "cold" operations and impulsive "hot" drives (also see Chapter 2, Rebar et al., 2021; Chapter 4, Brand & Ekkekakis, 2021). This may help explain why observations vary between investigations examining behavior in the context of social cognitive theories which lack an affective component. It is plausible that the relationship between Extraversion and impulsivity, or Extraversion and the affective response to heightened arousal, for example, partially influences physical activity behavior beyond the observed relationships between Extraversion and social cognitive constructs (Rhodes & Wilson, 2020). More work is needed which integrates a wider range of cognitive and affective theories into our understanding of how personality impacts physical activity. There is too little evidence at present to make conclusive statements about which traits (at primary or facet levels) have the strongest influence on behavioral antecedents, and which social cognitive and affective factors are best at ultimately transferring the impact of personality differences to predictable differences in behavior (Rhodes & Boudreau, 2017; Wilson, 2019).

Personality and Intentions

Much attention has been given specifically to the relationships between primary personality traits and physical activity intention. Given that intention is considered the proximal determinant of behavior in most social cognition models (Conner & Norman, 2015), investigations have examined the possibility of moderation and mediation in the context of multivariate models including personality, social cognitions, and behavioral intention. Cumulative associative evidence points to moderation of the intention-behavior gap by personality traits, specifically Conscientiousness. Two systematic reviews have concluded that Conscientiousness interacts with intention to impact physical activity level (Rhodes & Dickau, 2013; Wilson & Dishman, 2015). A recent meta-analysis examined moderation according to whether or not participants were asked how active they intended to be prior to an impending physical activity measurement, and found that associations between Conscientiousness and physical activity were twice as large in studies that asked about intention compared to those that did not (Wilson & Dishman, 2015). Moreover, a review of moderators of the physical activity intention-behavior gap concluded that Conscientiousness significantly moderates the intention-behavior relationship, such that higher levels of Conscientiousness are associated with stronger positive intention-behavior relationships (Rhodes & Dickau, 2013). Conner and Abraham (2001) were among the first researchers to test this association and theorized that the disposition toward organization and achievement keeps conscientious individuals from slipping in their original physical activity goals.

More recently, Smith et al. (2017) demonstrated that Conscientiousness interacts with competency to set exercise goals (conceptually similar to intention setting) to predict objectively measured physical activity over two weeks in a sample (n = 94) of adults aged 21 to 65 years. Those who scored low for Conscientiousness and reported poor goal setting skills appear to be at risk for inactivity compared to others. Conversely, those scoring low for Conscientiousness who reported excellent goal setting skills were significantly more active than those with poor goal setting skills, and similarly active to those who scored high for Conscientiousness (for whom goal setting skill did not significantly influence physical activity level). These observations indicate that goal setting skills may be particularly important for those scoring low for Conscientiousness, and that strategies targeting goal setting may not be very useful among those scoring high for Conscientiousness.

Less work has been done to understand these relationships in the context of other primary traits, though there is some evidence that Extraversion moderates the intention-behavior relationship with extraverts more likely to follow-through on intentions than introverts (Rhodes & Dickau, 2013). Rhodes and colleagues (2002) have suggested that individuals high on Extraversion may facilitate their intentions through gravitating toward more active environments than introverted individuals. Neuroticism has also been evaluated as a moderator of the intention-behavior relationship though results are mixed (Hoyt et al., 2009; Rhodes, Courneya, & Hayduk, 2002; Rhodes et al., 2005).

It is plausible that mixed results represent the influence of confounding variables. Theorists agree that traits should work through increasingly narrow and contextualized social cognitions to impact proximal determinants of behavior, such as intention (Ajzen, 1991; McCrae & Costa, 1999; Montano & Kasprzyk, 2015). This expectation of mediation has been tested in a few studies (Bogg, 2008; McEachan et al., 2010; Rhodes & Courneya, 2003; Rhodes, Courneya, & Hayduk, 2002; Rhodes et al., 2004). In a sample (n = 397) of postgraduate students at a large UK University, Conscientiousness impacted intention directly, and indirectly through affective attitude about physical activity, and perceived behavioral control. Conversely, Extraversion did not significantly contribute to physical activity intention or behavior after controlling for social cognitive variables (McEachan et al., 2010). This is an interesting observation when compared to results of moderator analyses in the Wilson & Dishman (2015) meta-analysis; bivariate associations between Extraversion and physical activity were significantly stronger among North American samples than European, and were significantly stronger for effects observed after participants were asked how active they intended to be over the measurement period. Taken together with the results from McEachan and colleagues, evidence points to the possibility that the moderating role of Extraversion on the intention-behavior gap may also be dependent on the cultural background of participants (McEachan et al., 2010; Wilson & Dishman, 2015). More research is required before any definitive conclusions about mediation and/or moderation can be drawn.

Self-Efficacy

Personality and physical activity have also been examined in the context of their common relationships with self-efficacy. In a population cohort (n = 3,471), general self-efficacy was observed to partially mediate the relationships between all of the Big Five personality factors and self-reported moderate-to-vigorous physical activity and leisure time inactivity (Ebstrup et al., 2013). Observed relationships between personality and physical activity were consistent with previous meta-analyses (Rhodes & Smith, 2006; Wilson & Dishman, 2015), but when general self-efficacy was added to the prediction model a significant relationship between Agreeableness and physical activity, not previously supported, was revealed. Mediation by self-efficacy was also observed in a sample of older adults (n = 876; $\geq$ 60 years). Again, the direction and strength of relationships between personality and exercise were consistent with the cumulative literature, but Yasunaga and Yaguchi (2014) found that exercise self-efficacy partially mediated the relationships of Extraversion and Openness, and fully mediated the relationships of Neuroticism, Agreeableness, and Conscientiousness with exercise participation. There is also some evidence demonstrating that self-efficacy to overcome barriers interacts with Neuroticism to predict physical activity (Smith, Williams, O'Donnell, & McKechnie, 2016). In a sample of 94 adults, barrier self-efficacy significantly negatively impacted steps per day (measured by pedometer) to a greater degree among those who scored high for Neuroticism than those who did not. This interaction could indicate that strategies for increasing low barrier self-efficacy may be particularly important for individuals scoring high on Neuroticism. More work is needed to confirm this interpretation. For more discussion on self-efficacy, especially in the context of sport psychology, see Chapter 26 (Hepler et al., 2021)

Motives and Barriers

Another possible explanation for the relationships between personality and physical activity is through its effect upon exercise barriers and motives. Though sparse, existing evidence does indicate that Neuroticism is positively related, and Conscientiousness and Extraversion are negatively related to exercise barriers like fear of embarrassment, lack of motivation, and/or lack of energy (Courneya & Hellsten, 1998). In a multinational sample of adults, personality was observed to differentiate whether motives for exercise were more physical or psychological. Higher levels of Agreeableness and Conscientiousness were related to greater physical, rather than psychological, motivation for exercise, whereas higher levels of Emotional Stability (i.e. lower levels of Neuroticism), Extraversion, and Openness were related to greater psychological motivation for exercise (Courneya & Hellsten, 1998). This is partially in contrast to another report that indicated Neuroticism to be related to exercise motives focused on enhancing physical appearance and/or losing weight, while Extraversion, Conscientiousness, and Openness were reportedly related to exercise motives focused on health and fitness, or stress reduction and enjoyment (Courneya & Hellsten, 1998; Ingledew & Markland, 2008). Work by Lochbaum and colleagues (2013) suggests that the relationship between Extraversion and exercise participation is fully mediated by approach oriented goals to achieve skill mastery, whereas the relationship between Neuroticism and exercise participation was only partially mediated by approach/avoidance goals related to performance compared to others (Lochbaum et al., 2013). Differences in the way that motivations and barriers are conceptualized across this limited body of evidence make conclusive interpretations difficult and point to a need for strategic approaches to understanding how personality relates to motives and barriers to exercise and physical activity participation.

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Personality, Physical Activity, and Affect

Another pathway through which personality might impact physical activity participation is through affective responses to exercise itself (see Chapter 4, Brand & Ekkekakis, 2021; Chapter 11, Jones

& Zenko, 2021; and Chapter 12, Zenko & Ladwig, 2021). Personality has close direct relationships with the propensity to experience positive and negative affect, and to enhance affective responses to a wide range of stimuli. Affective responses to physical activity and expectations of enjoyment are both reliable correlates of future physical activity behavior (Rhodes et al., 2010; Rhodes & Kates, 2015). The fundamental basis for personality development, as discussed previously, lies in temperament (individual differences in tonic arousal, reactivity, and self-regulation). From this perspective, it is intuitive that personality differences might impact how one responds affectively to the uniquely arousing stimulus of exercise. Indeed, there is some evidence to indicate that personality traits are related to physical activity enjoyment. Smith et al. (2016) reported that, in a sample of 94 adults, enjoyment of physical activity has a small negative association with Neuroticism, and a small positive association to Agreeableness. In contrast, Lochbaum & Lutz (2005) reported moderate relationships between exercise enjoyment and Conscientiousness in (*ES* = .67) and Neuroticism (*ES* = -.68) in a sample (*n* = 187) of college-aged females. Another study in a small sample (*n* = 53) of undergraduates reported a moderate positive relationship between physical activity enjoyment and Extraversion only (Baldwin et al., 2016). These mixed results may be the result of sample characteristics, or differences in the conceptualization and measurement of enjoyment (Williams et al., 2019). More work is needed in larger, more diverse samples to understand how personality relates to enjoyment of physical activity and exercise, and the potential moderators of these relationships. Nevertheless, what evidence does exist points to significant relationships between primary personality traits and physical activity enjoyment.

There is some evidence for the biological plausibility of trait level influence on the affective responses to exercise. As discussed earlier, the underlying biological basis for personality lies in temperamental differences in physiological reactivity and self-regulation in stimulus response. Recent studies among adolescents report high (88% to 91%) heritability of physiological recovery from exercise (Nederend et al., 2016), and low-to-moderate (12% to 37%) heritability of affective responses during and following exercise (Schutte et al., 2016). Some evidence indicates that personality interacts with exercise intensity to influence ratings of affect and perceived exertion during exercise (Hall et al., 2005; Schneider & Graham, 2009), and with motivational state to influence the autonomic responses to exercise (Kuroda et al., 2015). On the other hand, Big Five personality traits have been reported to be unrelated to feeling state during high-intensity exercise in a small (*n* = 48) international sample of healthy adults, whereas preferences for higher intensity exercise were related (Jones et al., 2018). Unfortunately, there is a relative paucity of research linking psychological and physiological responses to exercise with personality. Too few studies have been reported to make conclusive statements about the possible relationships between personality and the affective response to exercise.

Personality, Physical Activity, and Mental Health

An emerging area of interest is the multivariate relationship between personality, physical activity and mental health. Affective disorders, such as anxiety and depression, have been the focus of exercise psychologists for decades but only recently have scholars begun to examine these relationships in the context of personality differences. Across the recent investigations in this area, scholars have tested whether personality moderates the mental health impact of physical activity, and whether physical activity mediates the relationships between personality and mental health.

One of the earliest investigations in this area examined relationships between physical activity, personality and general symptoms of anxiety and depression in a sample (*n* = 298) of female undergraduates (Wilson et al., 2016). Moderate-to-vigorous physical activity, measured by accelerometry, was observed to interact with Extraversion and Neuroticism to predict symptoms of mental distress such that physical activity had a protective effect among neurotic-introverts, whereas physical activity did not seem to impact mental health symptoms among extraverts. Taken in context of earlier reports that neurotic-introverts are at risk for mental distress (Steel et al., 2008), these results suggest that inactivity may increase risk for mental distress. In contrast, another study examining interactive effects between personality and self-reported physical activity on symptoms of anxiety among undergraduates (*n* = 200) reported no such interaction (Joyner & Loprinzi, 2017). These effects were more recently examined in the context of subjective well-being in a sample (*n* = 349) of older adults (> 50 years old). Self-reported leisure time physical activity interacted with personality to impact subjective well-being such that higher levels of Extraversion and Openness enhanced the positive effect between physical activity and well-being (Chan et al., 2018). Another study reported that cardiorespiratory fitness moderated the relationship between Neuroticism and depression in a sample of 1,588 adolescents, such that fitness had a protective effect against increased symptoms of depression with increasing levels of Neuroticism (Yeatts et al., 2017). These compelling observations indicate that the relationships between general symptoms of mental distress and physical activity are dependent on personality characteristics, and individuals with personality profiles that put them at higher risk for mental distress may benefit from greater levels of fitness and physical activity participation. It is possible that outcome differences reflect sample or design characteristics influencing observed effects. These discrepancies point to the need for further study.

Examining the relationships between personality, physical activity, and mental health has been limited to non-clinical populations until just recently. An analysis by McDowell et al. (2020) found that physical activity partially mediated the relationships between primary personality and incident generalized anxiety disorder in a large cohort (*n* = 4,582) of adults in the Irish Longitudinal Study on Aging. In contrast to earlier reports, however, physical activity transmitted the positive effect of Extraversion and Conscientiousness to the benefit of reduced clinical incidence, rather than protecting against the negative impact of Neuroticism. Notable distinctions between studies that may account for some of these discriminant findings include characteristics of the sample, the severity of the outcomes (i.e. generalized symptoms vs clinical diagnosis), and the nature of the study design (i.e. cross-sectional vs longitudinal observation). In light of recent advances in mental health practice (i.e., the endorsement of exercise as a frontline strategy for individuals with mild depression; American Psychiatric Association Steering Committee on Practice Guidelines, 2010) and the frequent comorbidity of mental illness with chronic disorders like cancer and cardiovascular disease (Chan et al., 2015; Watkins et al., 2013), investigations among samples with clinical mental health disorders are paramount. Advancing our understanding of the role of personality in the effectiveness of physical activity and exercise for easing mental distress among clinical populations is an important corollary to this effort, and an area ripe for further investigation. For more discussion on exercise and depression, see Chapter 15 (Brush & Burani, 2021). For more discussion on exercise and anxiety, see Chapter 16 (Schuch et al., 2021). For more discussion on physical activity and severe mental illness, see Chapter 17 (Fibbins et al., 2021).

Personality and Physical Activity Preferences

Relationships between personality and physical activity are likely confounded by the way physical activity is conceptualized within studies. Indeed, physical activity is a complex concept and cannot be captured comprehensively with any one measurement method. Different physical activities are characterized with different skill requirements and energy expenditure demands (Ainsworth et al., 2011; Pate et al., 1995). Taken together, the body of evidence on individual differences in preferences supports robust relationships between personality traits and specific attributes of physical activities, such as aesthetics and social qualities (e.g., social, outdoor/indoor), structure (exercise vs. spontaneous activity), extreme energy requirements (intensity), competitiveness, and skill. In a landmark study, Courneya & Hellsten (1998) elaborate on relationships between primary personality traits and a wide range of physical activity preferences. For example, they report that Extraversion is related to preferences for exercising with others (e.g., group or supervised exercise). They also observed that increasing increments of trait Openness are related to preferences for outdoor (rather than home or gym), recreational (rather than competitive), unsupervised, and spontaneous (rather than scheduled) exercise, and a preference for walking rather than modes like skating or weight-training. Furthermore, Conscientiousness was related to a preference for scheduled activity, and high-intensity exercise, rather than moderate-intensity exercise. Those who preferred high intensity to moderate intensity also scored low for Neuroticism. Finally, those who scored higher for Agreeableness preferred aerobics to weight-training (Courneya & Hellsten, 1998). It is important to note, however, that these observations are limited to a sample of 264 undergraduate students.

Additional work has been done to understand how personality relates to preference for different modes of activity. For example, in their systematic review of personality and physical activity, Rhodes and Smith (2006) outlined five studies that explored personality with a particular mode or modes of physical activity. They observed that Neuroticism was negatively associated, and Extraversion was positively associated, with participation in aerobic activity. In a more focused assessment of preferences for physical activity modes according to personality, Howard et al. (1987) found that, in a sample (*n* = 31) of middle-aged men, extraverts were more likely to engage in swimming, aerobic conditioning, dancing, and tennis than introverts; whereas introverts were more inclined to engage in gardening, and home improvement. There was no association between Extraversion and walking, jogging, golf, and cycling. A more recent study replicated and extended these results, reporting no relationship with Neuroticism, Extraversion or Conscientiousness and leisure-time walking (Rhodes et al., 2007). A recent meta-analysis highlighted significant positive relationships between Extraversion, and facet traits impulsivity and sensation seeking, with participation in high-risk sports like skydiving, mountain climbing, surfing, or hang-gliding, among others (McEwan et al., 2019). Participation in these types of activities was also negatively associated with Neuroticism, unsurprisingly. Conversely, self-reported minutes of participation in mindfulness meditation and/or exercise is reported to be positively related to Openness and negatively related to Neuroticism (Barrett et al., 2019). As noted throughout the chapter, studies are needed in larger, more diverse samples to enhance our understanding in this area. Understanding physical activity preferences in the context of personality may help exercise practitioners identify types of activities that new clients may be likely to enjoy, assisting in the effort to promote exercise adherence (e.g., Newsome et al., 2021).

Differences in preferences for exercise intensity are theoretically expected for Extraversion specifically, as extraverts are expected to experience positive hedonic tone at greater stimulus intensities than those who are more introverted (Eysenck et al., 1982). Though not a direct assessment of self-reported intensity preference, perhaps the most robust support for this hypothesis is evident through moderator analyses performed in the Wilson & Dishman meta-analysis (2015). They observed that the relationship between Extraversion and physical activity is weaker in studies that reported physical activity as the amount of mild-to-moderate intensity physical activity than it was when physical activity was conceptualized in any other way. Further, effects were strongest when physical activity was captured as volume of moderate-to-vigorous intensity activity, supporting the postulate that the relationship between Extraversion and physical activity might be intensity dependent. One might expect, based on this finding, that Extraversion predicts naturalistic participation in higher intensity activities, but is less useful for predicting participation in lower intensity activities. Introverted individuals would therefore be less likely to regularly participate in moderate-to-vigorous intensity activities such as those endorsed in national physical activity recommendations (U.S. Department of Health and Human Services, 2018). These observations are in agreement with a more recent report linking more frequent participation in vigorous intensity activity with increasing increments of Extraversion in adult women (Karvonen et al., 2020), though the relationship was not significant among men.

Intensity preference differences according to personality were further elaborated in a large (*n* = 4,649) sample of Danish adults. Observations supported increasing increments of Conscientiousness, Extraversion, Neuroticism, and Openness to predict increasing intensities of leisure time physical activity expressed in METs, measured by validated self-report (Petersen et al., 2018). Analyses also demonstrated a significant positive influence of Extraversion on self-reported physical activity duration, and a social-class dependent association between Conscientiousness and duration such that increasing increments of Conscientiousness predicted greater duration only for individuals within a low occupational social class (i.e., “unskilled” workers, or workers in positions requiring 1.5 years of training at most). Beyond these observations, evidence linking personality to physical activity duration preferences and practices is non-existent. Nonetheless, observations on preferences for different qualities of physical activity (i.e., different intensities, modes, durations) highlight the potential importance of physical activity promotion approaches to target preferences according to these salient individual differences. However, to date, personality targeted physical activity promotion efforts have yet to be reported.

Considerations for Personality in the Promotion of Physical Activity

Evidence suggests that personality may be a useful tool for professionals who are attempting to reduce the risk of disease by increasing physical activity level. Personality appears related to physiological health outcomes of exercise, including body mass index (Sutin & Terracciano, 2016), and cardiovascular and metabolic fitness (Terracciano et al., 2013), and is associated with health outcomes related to physical activity, including mental health (Klein et al., 2011; Steel et al., 2008), allostatic load (Milad & Bogg, 2020), and risk for chronic diseases (Compare et al., 2014; Jokela et al., 2014). Further, personality is significantly related to treatment adherence (Christensen & Smith, 1995).

Associations between personality and physical activity represent a potentially challenging obstacle and not a target for change. Personality resembles other intractable demographic correlates of physical activity such as age, disability status, or gender. Thus, health promoters need to consider interventions adapted to maximize outcomes according to personality differences. Little is known how personality impacts intervention reach (i.e., the effectiveness of strategies designed to attract people to exercise programs) and effectiveness (Glasgow et al., 1999). Personality might also predict which people are likely to succeed in the adoption and maintenance of a new behavior, such as physical activity, and who may be at risk for dropout or poor behavioral maintenance.

Some early evidence suggests that motivational traits interact with promotional message content to influence how that content is perceived. In a large sample (n = 800) of undergraduates, messages about physical activity that were presented in a gain-framed format (i.e. presenting the positive outcomes of a physically activity lifestyle) were perceived significantly more positively by individuals who scored high for approach motivation (conceptually similar to a profile of high Extraversion and low Neuroticism). On the other hand, loss-framed messages, presenting the negative outcomes of a sedentary lifestyle, were perceived significantly more negatively by people who scored high for avoidance motivation (conceptually similar to high Neuroticism and low Extraversion; Wilson & Estabrooks, 2020). Such differences could plausibly translate to an enhanced or reduced likelihood to volunteer for programs such as those being promoted in selected messages. Another study found that messages designed to target affect (i.e., “enjoyable” messages) were more effective in increasing walking behavior among conscientious individuals than messages targeting knowledge (i.e. “instrumental” messages), and that walking behavior increased under this messaging condition to a greater extent than for their less conscientious counterparts (Why et al., 2010).

Though the proposal for personality-matched interventions has appeal, there is very limited research on this approach at present. What evidence there is, is mixed. Rhodes and Matheson (2008) attempted a planning intervention for individuals low in Conscientiousness aimed at improving physical activity. Physical activity did not differ between the intervention and control group, however. Importantly, this null result may have reflected an ineffective intervention approach, as most of the participants reported that they did not complete the planning worksheet, highlighting the issue of participant compliance with intervention protocols. This may especially be true for people scoring low for Conscientiousness, as they are characterized by low adherence to instructions and an absent sense of duty to comply. More recently, a planning intervention was observed to significantly impact the translation of intention for physical activity into successful performance of the behavior in a sample of 136 adults in cardiac rehabilitation, but only for those with high levels of Conscientiousness (Lippke et al., 2018). This echoes the observational evidence discussed previously with regard to intention, personality, and physical activity, and underscores the importance of identifying methods to assist individuals with low levels of Conscientiousness in following through on behavioral intentions.

Evidence linking personality to preference for, or responsiveness to, specific behavior change techniques could inform the continued efforts towards intervention adaptions according to personality. One study assessed ratings of behavioral techniques applied in mobile apps promoting physical activity among a sample of Dutch adults. Belmon and colleagues found that Agreeableness was related to a preference for goal setting and goal reviewing techniques, and Neuroticism was related to negative ratings of feedback and self-monitoring techniques (Belmon et al., 2015). Some evidence suggests that individual differences in Extraversion and Neuroticism may impact how effective different social strategies are for influencing behavior change. Extraverts and those scoring higher on Neuroticism were found to increase physical activity in response to a mobile app intervention under a condition of social comparison, but not peer pressure (Lepri et al., 2016). Another study examined personality in the context of behavior change when participants were provided a wearable physical activity tracker for a 35-day period. Among a sample (n = 52) of adults, step count increased significantly more over time with increasing increments of Conscientiousness, as well as among individuals with a combination of high scores for Conscientiousness and Neuroticism (Stieger et al., 2020). Interestingly, personality may also impact how using a wearable physical activity tracker makes them feel. Some evidence suggests that increasing increments of Openness and Conscientiousness are positively related to experiencing positive affect while wearing a physical activity tracker (Ryan et al., 2019). It should be noted that the opposite of positive affect is the absence of positive affect, rather than negative affect (Watson et al., 1999; Watson & Tellegen, 1999; but see Russell & Carroll, 1999; Chapter 12, Zenko & Ladwig, 2021). That is to say, the corollary to these observations is that with decreasing increments of Openness and Conscientiousness, we might expect no effect of wearables on positive affect. Encouragingly, there were no associations between personality and negative affect related to wearing a physical activity tracker. These early results underscore the importance of considering personality in the context of selecting behavior change techniques and suggest that targeted approaches based on personality may be helpful to maximize intervention effectiveness. Continued work is needed to ascertain the utility of personality-matched intervention.

Though emerging evidence is encouraging, direct tests of strategies targeting individual differences in personality have yet to be reported for interventions aiming to increase physical activity. Table 6.2 presents considerations derived from the body of evidence reviewed herein. An earlier iteration of these considerations is presented by Newsome et al., (in press). These preliminary considerations are presented with the intent to inform the application of personality psychology to physical activity promotion, and to provide a basis from which personality tailored or targeted approaches may be developed and tested with rigorous study design. It should be emphasized that this list of considerations has not been fully empirically tested and reflects the expertise and interpretations of the limited body of evidence discussed herein by the authors. Further, use of these considerations may be particularly challenging as they focus on individual traits. It is likely that individuals will present with high or low scores on multiple traits, complicating the application of these considerations. Everyone expresses individual differences on each of the Big Five factors; in other words, we are all classifiable according to this model and each of us present characteristics along each of these five dimensions. As an example of the challenge presented, imagine two individuals who both score high for Extraversion. These two individuals, however, score significantly differently for another trait, like Openness. This very likely influences the types of behavioral strategies that will work best for each person. Practitioners may be able to combine considerations to accommodate for these unique interactions. For example, because extraverts like being active with others, and open individuals prefer unsupervised, outdoor activities (Courneya & Hellsten, 1998), one might recommend joining an unsupervised, socially supported (i.e., recruit a walking buddy), outdoor walking program to an open, extraverted patient. As is standard in physical activity programming, practitioners should always include the client in the development of a physical activity program. Considerations listed here should be viewed only as a potential starting point for discussion around program development.

Table 6.2
Considerations for Physical Activity Promotion and Exercise Programming for People with High or Low Scores on the Big Five Personality Dimensions

Trait expression	Promotion and Programming Considerations
(+) Extravert	Preferences include moderate-to-vigorous intensity, and activity with others. Motivated to exercise for enjoyment. May tend to go “too hard, too fast”; emphasize safe progression and recovery.
(-) Introvert	Likely to have an initial preference for lower intensities. Tend to avoid exposure to excessive sensory stimuli; recommend restorative and mindful activities. Likely to enjoy exercise alone or with a close friend. Outdoor or home exercise settings may enhance activity enjoyment.
(+) Neurotic	More likely to remain inactive due to embarrassment. Primary exercise motives related to appearance. Derive less enjoyment from exercise than others. Likely to benefit from strategies to enhance self-efficacy to overcome barriers related to physical activity/exercise, and programming to focus on short term, realistic goals. Focusing on the mental health benefit of exercise as a motivator may enhance adherence.
(-) Emotionally Stable	Pay attention to self-reported goals and logical program progression. Provide a means for feedback and self-monitoring.
(+) Conscientious	Very good at setting short- and long-term goals and creating action plans for success. Recommend long-term adherence as a focused goal. Self-monitoring techniques are typically well implemented, and feedback appreciated. May prefer higher intensity activities.
(-) Undirected	High risk for drop out, especially during times of high stress. Poor planning and goal setting skills. Be mindful of upcoming life events that may disrupt normal participation. Not motivated by tracking or feedback techniques. Social accountability with an important other is advisable. Try to identify activities that are challenging yet enjoyable to promote adherence.

Table 6.2 (continued)

(+) Open-minded	Variety may help facilitate adherence. May prefer outdoor and adventure activities. Make programming suggestions but promote autonomy in program development.
(-) Closed-minded	May challenge new ideas or unusual approaches (not likely to adopt the latest trend). Stick to traditional exercise programming. Highlight the evidence supporting programming development.
(+) Agreeable	Generally cooperative and easy going. Likely to take instruction well. May benefit from motivational interviewing to understand exercise preferences.
(-) Antagonistic	Likely to enjoy competition with oneself or others, and to be achievement oriented. Include progress checks and feedback while working towards short and long-term goals.

Conclusion

Physical activity has many antecedents that range from the individual to environmental and social policy. One personal factor that has received much attention and has the potential for broad reaching adaptations to current physical activity theory and practice is personality. Personality theory has one of the longest and richest traditions in psychology; currently, the dominant taxonomy used by scholars worldwide is the FFM. This model has also been used extensively to understand the role of personality in physical activity.

Currently the cumulative evidence supports a modest relationship between personality and physical activity. In particular, self-reported physical activity has a reliable, yet small positive association with Extraversion and Conscientiousness and a small negative relationship with Neuroticism. Much of the research to support these relationships is cross-sectional, yet there is a growing evidence base to show that personality can affect physical activity over time using longitudinal designs. Interestingly, some evidence even supports a beneficial effect of physical activity on personality change over time.

How personality may influence physical activity has also seen considerable research attention. There is a body of evidence that personality traits may play a role in social cognitive constructs such as attitudes, enjoyment, self-efficacy, barriers/motives, and intention. Conscientiousness, in particular, has been shown to influence whether people are likely to follow through with intentions, and may contribute to what is known as the intention-behavior gap. Similarly, personality may moderate the affective response to physical activity, thus influencing more impulsive determinants of behavior beyond social cognitions. Personality is also linked to physical activity choices and preferences. For example, it has been established that higher intensity aerobic activities are more likely to be performed by extraverts.

The relationships between general symptoms of mental distress and physical activity are dependent on personality characteristics. Individuals with personality profiles that put them at higher risk for mental distress may benefit from greater levels of fitness and physical activity participation. Less work has been done among populations with clinical mental disorders, which are frequently comorbid with chronic illness, highlighting the need for continued work in this direction.

Finally, research is starting to explore how personality may be used to improve physical activity interventions. Associations between personality and physical activity represent a potentially challenging obstacle rather than a target for change. Thus, health promoters may need to consider interventions adapted to personality to maximize program reach and effectiveness. Preliminary considerations for the application of personality psychology to physical activity promotion provided herein (Table 6.2) should inform practitioners and interventionists aiming to maximize physical activity and exercise programming with the goal of adherence through personalized approaches.

In summary, much evidence exists on the relationships between personality and physical activity, though more work is required to understand genetic, cognitive, and affective mechanisms, developmental associations across extended periods of time, and the development and implementation of personality adapted physical activity promotion strategies. Lastly, rigorous measurement of physical activity with concurrent direct and indirect measures is needed to understand the differential observations of association between physical activity and personality to better inform application moving forward.

Learning Exercises

1. What is personality? Define personality in one sentence.
2. Describe the relationships between primary personality traits and physical activity in terms of direction and strength.
3. What are some social cognitive variables that have been studied in the context of personality and physical activity? How do these variables relate to personality and physical activity?
4. Based on what you know about the primary personality dimensions, what are some programming recommendations you would make for someone who is extremely extraverted? Introverted?
5. Have a friend complete one of the five factor personality measures available on the ipip website. Create exercise recommendations for them based on their survey responses.

Further Reading

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Chapter 7
Body Image and Physical Activity

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Chapter Overview

Body image is an important construct worthy of examination in physical activity contexts, as it is a notable correlate, antecedent, and outcome of physical activity behavior (Sabiston et al., 2019). Physical activity is broadly described in this chapter as structured exercise, sport, leisure and lifestyle activity. Within this chapter, the definition and components of body image will be described including the appearance and function facets, four dimensions, positive and negative valence, and body image investment and internalization. Next, a description of the similarities and differences between body image and the physical self is presented. Body image pathology, development, and measurement are also considered. Throughout this chapter, the bidirectional relationship between body image and physical activity is outlined and potential mechanisms that help to explain this relationship are presented. Finally, the identification of key areas (e.g., varying study designs; individual differences) of future research consideration when studying body image and physical activity are also described.

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What is Body Image?

Within the fields sport and exercise psychology, body image is a central factor given its relevancy in the initiation, maintenance, and withdrawal of physical activity (Sabiston et al., 2019). The relationship between body image and physical activity is complex, and understanding this interrelationship is key to improving the physical activity experience and increasing and sustaining sport and exercise behaviors across populations. Body image is most commonly defined as a multidimensional construct that includes how one sees, thinks, feels, and behaves related to their body's appearance and function (Cash & Smolak, 2011).

Appearance and Function Facets

Body image includes the appearance (i.e., what the body looks like) and function (i.e., what the body can do) of the body. While these facets of body image are often related, they are independent of one another. For example, an individual may be satisfied and take pride in their fitness abilities, but at the same time may be dissatisfied and embarrassed about their appearance. Therefore, it is important to differentiate between and examine both facets.

Body image research has predominantly focused on the appearance facet. How an individual describes and thinks about their appearance is bi-directionally associated with sport and exercise behaviors and experiences (Sabiston et al., 2019). The way an individual perceives and thinks about their appearance can enhance or limit their participation in physical activity or alter their physical activity experiences (e.g., reduced enjoyment). For instance, when studying adolescent girls, some girls have described avoiding sport due to their appearance (Moreno-Murica et al., 2011) and wishing their appearance was different (e.g., taller, slimmer) so to improve their functionality in their chosen sport (Porter et al., 2013). Meanwhile for other girls, higher levels of body appreciation (positive body image) predicted an increase in physical activity one year later (Andrew et al., 2016). Among young men and women, physical appearance has been described as a key motivator for engaging in physical activity (Sabiston et al., 2019). Alternately, given the opportunity for public displays of the body and appearance judgments in physical activity settings, sport and exercise environments might promote changes in how one describes and evaluates their appearance. Aesthetic sports (e.g., gymnastics, dance) bring greater awareness to the body's appearance and are associated with more negative outcomes (e.g., body surveillance, upward body comparisons; Abbott & Barber, 2011). However, in interviews with girls with high body image concerns, those in non-aesthetic sports (e.g., soccer, basketball) also reported negative sport experiences related to their appearance. Girls in sport have reported feeling that their athletic body must not only be able to optimally perform but also must be aesthetically pleasing to others (Vani et al., 2020).

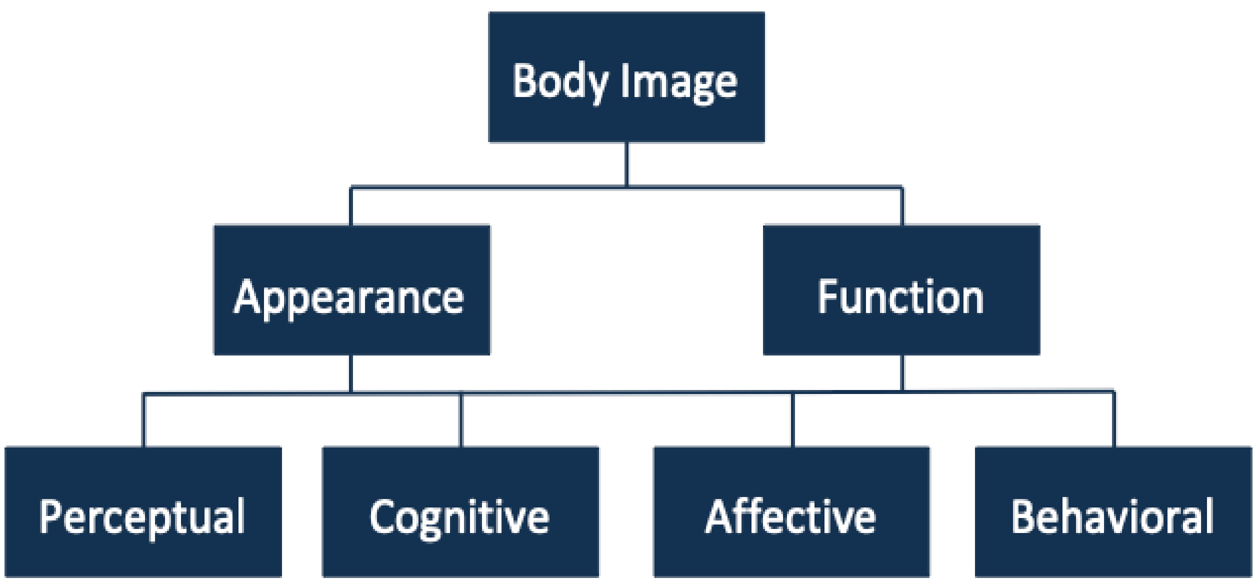
Conversely, focusing on the body's function results in greater positive thoughts and feelings towards the body and more adaptive body image behaviors (Abbott & Barber, 2011; Alleva, Martijn, et al., 2015). The physical activity environment often encourages identity building that involves physical competence and mastery, supporting a focus on body functionality. Girls who participate in sport are more likely to describe favorable body function perceptions compared to non-sport participants (Abbott & Barber, 2011). Similarly, college-aged men and women who engaged in a body function writing exercise also expressed feeling grateful for their body's essential role in engaging in activities that brought them joy, including physical activity (Alleva et al., 2019). Promising results with sport participants have also been reported, such that adolescent girls who have high perceptions of their body's functionality (in the form of sport competence and skill) were less likely to disengage from sport due to negative appearance evaluations (Vani et al., 2020). Promoting a functional body focus through fostering skill acquisition and physical competence may be a key factor in keeping adolescent girls in sport.

As demonstrated, the functional body is typically viewed more positively when compared with the body's appearance. In fact, if health outcomes are of primary interest, then focusing on body function may be more important than focusing on appearance (Tylka & Homan, 2015). As well, body image appearance and function often intersect and interact. These intersections require greater attention in research and practice. Sociocultural models (e.g., Petrie & Greenleaf, 2012a) may be used as a perspective to better understand the interacting bidirectional relationship between body image appearance and function and physical activity experiences and behavior. To illustrate, physical activity environments often highlight a body focus and perpetuate sport-specific appearance ideals (e.g., what a body should look like for the sport type) and function ideals (e.g., how the body should perform in varying activities) through various sources (e.g., coaches, teammates, opponents). As such, individuals may internalize ideals and compare their appearance and function to these internalized ideals, leading them to experience positive and/or negative body image perceptions, thoughts, feelings, and behaviors. Taken together, there is great value in better understanding both the appearance and functional facets of body image in relation to sport and exercise and the sociocultural model can prove valuable to our increased understanding.

Multidimensional Construct

In addition to the appearance and function facets, the dimensions of body image include the perceptual, cognitive, affective, and behavioral dimensions (Cash & Smolak, 2011). A general schematic of body image is presented in Figure 7.1. Body-related perceptions, cognitions, and feelings influence behaviors related to the body.

Figure 7.1
A Figural Representation of Body Image



Perceptual Dimension

The perceptual dimension of body image refers to the mental representations that an individual holds related to their own body's appearance and function. The mental representation is usually defined as the accuracy level between perceived and actual characteristics, as it relates to the body as a whole or specific body parts (e.g., legs, arms, torso; Cash & Smolak, 2011). Importantly, an individual's mental representation is not always accurate and may widely vary from their actual self. Furthermore, these body perceptions do not indicate the thoughts, satisfaction, dissatisfaction, or feelings that are attributed to this perceived self.

Cognitive Dimension

The cognitive dimension of body image refers to individuals' thoughts, beliefs, and evaluations of their body's appearance and function. Body image is most commonly assessed as the cognitive dimension. For example, cognitive body image includes body dissatisfaction (or satisfaction) assessments, where an individual indicates their level of satisfaction (or dissatisfaction) with their body's appearance and/or function. In terms of appearance, (dis)satisfaction measures ask participants to indicate their (dis)satisfaction with particular body parts (e.g., torso, face, legs) or attributes (e.g., thinness, weight, muscularity). For example, appearance dissatisfaction pertaining to specific body parts and weight was assessed in a quasi-experimental study with women who were randomized to either abstain from exercise for 72 hours or continue with normal exercise. Compared to the normal exercise group, women who abstained from exercise had a significant increase in body dissatisfaction from pre- to post-intervention (Niven et al., 2008). Meanwhile, functional (dis)satisfaction assesses physical functioning elements such as strength and endurance.

Affective Dimension

The affective dimension of body image describes the feelings and emotions that individuals experience in relation to their body's appearance and function. These feelings and emotions are commonly assessed as social-physique anxiety and body-related self-conscious emotions (i.e., shame, guilt, embarrassment, envy, pride). Social-physique anxiety is defined as the anxiety an individual feels as a consequence of perceived or actual judgments from others (Hart et al., 1989). Body-related shame and guilt are both negatively-valenced self-conscious emotions, yet shame has a global focus on the self (e.g., "I am a person who is unattractive"), while guilt focuses on a specific behavior (e.g., "I do not do enough to improve the way I look"). Lesser-studied negative emotions include body-related embarrassment, which is often experienced following an individual's perception of a public violation of social standards in relation to appearance or function (e.g., exposure of the body in public; negative body commentary; "I feel embarrassed when others see my fitness level"), and body-related envy, defined as a feeling one has when they desire the possessions or characteristics that others have (e.g., thin legs, muscular arms; "I am envious of others' fitness abilities"). Among the identified body-related self-conscious emotions (Tracy & Robins, 2004), body-related pride is the only positively-valenced emotion. Body-related pride involves two facets: authentic and hubristic pride. Authentic pride is derived from the satisfaction and achievement one experiences from their own behaviors of effort and hard work (e.g., "I am proud because of the effort I place on maintaining my fitness"), while individuals experience hubristic pride when they perceive their appearance or function is superior to others (e.g., "I am proud that I am more fit than others"; Castonguay et al., 2013). Although social-physique anxiety and body-related self-conscious emotions are often studied separately in exercise psychology, it is recommended to include social-physique anxiety within studies of body-related self-conscious emotions to expand the implications of affective body image.

Behavioral Dimension

The behavioral dimension of body image depicts an individual's decisions and actions that are informed by their perceptions, cognitions, and emotions related to their appearance and function. These actions often fall under two negatively-valenced components (i.e., appearance fixing and avoidance) and one positively-valenced component (i.e., positive rational acceptance). These behavioral components are most commonly assessed using the Body Image Coping Strategies Inventory (Cash et al., 2005). Appearance fixing involves actions such as body checking, wearing loose fitting clothing, and engaging in behaviors in an attempt to control appearance (e.g., physical activity, dieting, substance use, cosmetic surgery). Body checking is characterized by actions of self-weighing and pinching or measuring one's body to assess fatness. In interviews with sport coaches, the coaches reported observable actions from individuals on their team. For example, coaches described that commonly used signs of body image were covering up and fixing actions (e.g., wearing loose clothing; pulling at uniforms; Sabiston, Lucibello, et al., 2020). Examples of cognitive and behavioral avoidance include avoiding thinking about a negative body experience and avoiding situations or events such as physical activity, respectively. For instance, women who reported body dissatisfaction were more motivated to avoid exercise, which in turn related to lower exercise engagement (Vartanian & Shaprow, 2008). Notably, negative body image can motivate engagement or avoidance of behaviors, such as physical activity. Finally, positive rational acceptance comprises engagement in adaptive cognitive and behavioral actions such as positive self-care and rational self-talk. More research is needed to better understand how positive rational acceptance may be used within physical activity contexts.

Positive and Negative Facets

The four dimensions of body image can be positive and/or negative. Positive body image refers to an overall love and respect towards the body's appearance and function and includes an appreciation and acceptance of the body. Further, those who have a higher positive body image tend to use a broad conceptualization of beauty, focus on their inner self rather than appearance, and experience an inner positivity (Tylka & Wood-Barcalow, 2015a). In relation to the dimensions, positive body image may be expressed as accurate perceptions of the body, positive thoughts, beliefs (e.g., satisfaction), and feelings (e.g., pride) toward the body, and health-promoting and adaptive behaviors (e.g., positive self-care). Conversely, negative body image involves the pathological aspects of body image and can be expressed as inaccurate perceptions, negative thoughts, beliefs (e.g., dissatisfaction), and feelings (e.g., shame, guilt), and risky or maladaptive behaviors (e.g., excessive exercise). It is essential that both positive and negative body image are considered in research and practice.

It is crucial to note that positive body image is distinct from negative body image. These constructs do not exist on the same continuum; low levels of negative body image do not suggest high levels of positive body image. For example, lower levels of body dissatisfaction do not necessarily indicate that people are satisfied with their bodies. There is still much work to be done to better understand and assess positive body image. Focusing on positive body image, and its unique antecedents and outcomes, will help to advance body image theory, research, and practice.

Body Image Investment

In addition to the four body image dimensions, body image also integrates an investment component that involves the cognitive, behavioral, and emotional importance an individual places on their body's appearance (Cash, 2012). The amount that one is invested in their body (i.e., how meaningful appearance is to their sense of self) defines how an individual sees, thinks, feels, and behaves toward their body. Body image investment is often assessed by measuring the beliefs and assumptions about the importance, meaning, and influence of body appearance in an individual's life (Cash et al., 2004). Those who tend to be more invested in their body's appearance may experience greater worry and be more preoccupied with what their body looks like. More invested individuals also tend to use greater maladaptive body image coping strategies (e.g., frequent body checking and fixing, over-exercising; Engle et al., 2009). For example, one study used a cross-sectional survey to assess body image investment and exercise dependence among young women. Findings revealed that cognitive body image investment (i.e., determining self-worth from appearance) was associated with higher symptoms of exercise dependence (Lamarche & Gammage, 2012). Interventions that attempt to reduce appearance investment typically involve psycho-education on body image. These interventions help participants to identify antecedents to their experiences of negative body image, record occurrences of negative body experiences including critical self-talk and the associated emotions and behaviors, cope with body and weight stereotypes and prejudices that they hold, and work on cognitive restructuring of harmful appearance assumptions (Carraça et al., 2011). These tasks help to increase understanding and awareness surrounding body experiences and promote strategies like cognitive restructuring and journaling that can be used to reduce appearance investment.

Body Image Internalization

Body ideals are highly encouraged in societies and are transmitted through various sources (e.g., parents, media, peers, personal trainers) and contexts (e.g., gyms, fitness studios, sports). The commonly maintained westernized body ideals include thinness for women and muscularity for men. Although these body ideals are widely unrealistic for the majority of the population, many individuals adopt these appearance ideals and compare their appearance, shape, and size to the widespread ideals. This leads the majority of those who internalize idealizations of the body to experience negative body image (e.g., dissatisfaction; Tiggemann, 2011). Relevant to exercise psychology, women who internalized the thin ideal engaged in compulsive exercise (i.e., negative affect towards missing an exercise session) seven months later (Homan, 2010). Similarly, men who internalize an athletic ideal (i.e., muscular/athletic build) are more likely to engage in compulsive exercise (Martin & Racine, 2017). Those who reject the mainstream body ideals are less likely to experience negative body image and potentially harmful exercise behaviors. And so, interventions often involve activities that help participants to identify, critique, and challenge the messages and images that project ideals of thinness (women) and muscularity (men; Alleva, Sheeran, et al., 2015).

Similarities and Differences between Body Image and Physical Self

Body image foundations have evolved from Franzoi and Shields' (1984) conceptual paradigm of body esteem and Secourd and Jourard's (1953) initial concepts of body cathexis (i.e., a term borrowed from psychoanalysis to reflect the distribution of mental and/or emotional energy to the individual's body). Body esteem is a distinct multidimensional aspect of self-esteem in which individuals demonstrate an appearance and body-related orientation and evaluation. Harter (2012) argues that the physical or body-related aspect of self-esteem is one of the most coveted aspects, and this is particularly true of individuals in western cultures.

In sport and exercise psychology, terms of body image and physical self-concept have been used to generally refer to self-esteem focused on the body or physical features of the body. Specifically, based on the initial foundations stemming from self-esteem, body image holds many similarities to physical self-concept (i.e., a description of one's appearance and function/competence of the body). Both body image and physical self-concept are domain-specific dimensions of self-esteem. The terms of body image and physical self-concept have been used interchangeably by some researchers, and with intentional and purposeful distinctness by other researchers.

As a broad distinction, body image has been studied within the different dimensions (perceptual, cognitive, affective, and behavioral) and is a broad multidimensional construct focused on many (if not all) aspects of how the body looks and how the body performs/functions. In contrast, physical self-concept is defined as a hierarchical construct comprising descriptions specific to physical activity and sport competence, and appearance and weight. There is no direct consideration of the physical self-descriptions being negative or positive, although lower scores on the respective measures suggest poorer perceptions. With body image, as was discussed earlier in this chapter, there are emerging programs of research on both the positive and negative attributes (see Tylka, 2011).

As another distinction, there are far more measures associated with body image compared to only a handful of unique (i.e., not including translated versions of the scales) measures used to assess physical self-concept and/or self-worth. In this way, body image is a broader construct providing more depth and understanding to acceptance, importance, and evaluation of body appearance, weight, and body shape; whereas the physical self is a focused descriptive account on appearance and body fat as the only body-specific descriptions coupled with specific perceptions of body-related function/competence. In fact, physical self-concept could be used as a measure of the perceptual dimension of body image, and offers a more in depth description of body functionality and competence compared to existing body image measures that tend to focus on appearance. Finally, both body image and physical self-concept generally lack integration into physical activity, exercise, or sport theories. Nonetheless, both constructs have been identified as having bidirectional relationships with physical activity, exercise, and/or sport behaviors.

Body Image Pathologies

Body image concerns were once described as more important and relevant in western cultures, however with more research focus it is now clear that many individuals all over the World identify at least one aspect of their body appearance or functionality that they would like to change. This is called a normative discontent (it is called normative because most individuals are discontent) and is not usually a serious body image concern. However, individuals who have excessive frequent and intense negative thoughts about their appearance may experience body image concerns that are clinically meaningful. In fact, body image pathology is recognized as disorders by psychiatric standards (e.g., American Psychiatric Association, 2013). As one disorder, body dysmorphia is described as overexaggerated and inaccurate perceptions of flaws related to body parts and characteristics and a preoccupation with flaws that severely limits an individual's daily functioning and quality of life (American Psychiatric Association, 2013). Symptoms of body dysmorphia may include a heightened focus, comments, and discussions about one's perceived flaws, body monitoring and checking behaviors, and also individuals in sport and exercise settings may demonstrate withdrawal from others or constant need for reassurance from coaches, teammates, personal trainers, and others in leadership positions. Often of interest to individuals working in sport and exercise settings, muscle dysmorphia is a specified condition within body dysmorphic disorder, and is defined as a chronic preoccupation with insufficient muscularity and inadequate muscle mass (American Psychiatric Association, 2013). Individuals presenting with muscle dysmorphia perceive themselves as much thinner than they actually are and this condition involves excessive attention to muscularity, distress over presenting the body to others, extreme weight training, a focus on diet, and often use of muscle-enhancing supplements and performance-enhancing drugs (Pope et al., 2005).

Some people who experience body dysmorphic disorder are also diagnosed with an eating disorder. Eating disorders are recognized mental disorders that are defined as abnormal eating habits resulting in insufficient or excessive consumption of food (American Psychiatric Association, 2013). Bulimia nervosa, anorexia nervosa, and binge eating disorder are three commonly recognized eating disorders. Bulimia nervosa is defined by bingeing (i.e., recurrent excessive eating) and purging through self-induced vomiting, laxative/diuretic use, and/or excessive exercise. Anorexia nervosa is characterized by major restriction in food intake, heightened fear of gaining weight, and unrealistic perception of current body weight. Finally, binge eating disorder is characterized as compulsive and excessive overeating without purging (American Psychiatric Association, 2013).

The importance of introducing body image pathologies is the heightened threat among athletes and exercisers (e.g., Petrie & Greenleaf, 2012b). It is important to be aware of the possibility of body dysmorphic disorder and the co-occurrence of eating disorders clinically or sub-clinically among athletes. Athletes use many actions or behaviors that characterize these body image disorders to change their body shapes and sizes for judging and performance outcomes tied to both the way the body looks (i.e., aesthetic sport competitions) and how the body functions. These actions are not always indicative of diagnosed disorders, but they can certainly lead to health- and performance-compromising outcomes.

How does Body Image Develop?

There are a number of perspectives used to generally describe the development of body image, and specific possible outcomes related to eating disorders. Of note, the models tend to focus on negative and pathological body image, whereas there has been little emphasis on developing models of positive body image. The models and theories that will be presented in this chapter include the tripartite influence model, social comparison theory, and self-discrepancy theory.

The tripartite influence model (Thompson et al., 1999) is a long-standing perspective that fits within the sociocultural perspective. This model suggests that there are formative social factors that influence the development and maintenance of negative body image and disordered eating. As the name indicates, parents, peers, and media are the three primary social influences proposed to form the basis for later development of body image concerns and eating dysfunction (Thompson et al., 1999). In sport and exercise contexts, there is also consideration for coaches, trainers, and teammates as additional social agents. As a very general overview, it is thought that these social agents generally foster heightened focus on the body appearance and/or functionality through direct and indirect communication, projection of values and norms, and endorsing stereotypes and idealized body shape, size, and function. For example, coaches may make descriptive physical comments about an opposing team's player (e.g., "watch out for number 10, she is a tank!"), parents may place sanctions on diet and exercise in an attempt to control their child's body size, and the media—whether traditional forms such as magazines and television commercials or social forms such as Instagram or Twitter—is a constant display of text and imagery perpetuating normalization of specific body types based on, for example, gender or race. There has been substantial research identifying the ways that these social agents generally lead to body image concerns.

In basic terms, these social agents are thought to foster environments that are conducive to physical appearance and function comparison, and thin-ideal (or muscular-ideal) internalization. As such, comparisons and internalization of ideals are thought to be precursors to body image concerns. The concept of comparisons to others emanates from Festinger's social comparison theory (1954) stating that individuals have an inherent need to evaluate their appearance and abilities against others. According to social comparison theory, individuals either compare themselves to those who are worse off (called downward social comparison) or better off (called upward social comparison) than they are on attributes of value (e.g., appearance, body shape, physical skill). Downward comparisons generally lead to positive perceptions, cognitions, and affect whereas upward comparisons are consistently linked to more negative body image outcomes.

In addition to comparisons, the internalization of body ideals is also considered to be a factor related to whether individuals will experience positive or negative body image. For example, individuals who value and invest in body attributes such as attractiveness and/or competence in physical activity are more likely to desire these attributes. When these attributes are not feasibly or naturally attainable (which is often the case with body-related attractiveness standards that are genetically predisposed), a discrepancy is created between an individual's actual body and "desired" or ideal body. Discrepancies have been studied extensively within the self-discrepancy theory (Higgins, 1987) whereby differences in an individual's actual body shape (or appearance, competence, skills, etc.) and desired body shape (or appearance, competence, skills, etc.) are indicators of body dissatisfaction, and more generally cognitive body image.

Taking these factors into account, Trent Petrie and Christy Greenleaf (2012b) have developed a sociocultural model of unhealthy eating behaviors among women college athletes. The model generally proposes that sport-specific social agents and pressures (coaches, teammates, sport type, sport regulations, training programs) and general sociocultural pressures (i.e., parents, peers, media) together impact internalization of body norms and ideals that lead to negative body attitudes and emotions and ultimately to eating disorder behaviors. The factors identified in the sociocultural model are likely to be consistent with exercise contexts such that fitness centre advertising, media posters, and social agents (e.g., personal trainers) impact internalization of body ideals, which may also lead to negative body perceptions, cognitions, affect, and behaviors.

Measuring Body Image

There are many measures of body image that are focused on assessment of the four dimensions. While earlier measures focused predominantly on the pathology of body image and more negative perceptual, cognitive, affective, and behavioral implications, there have also been a number of scales recently assessing positive perceptions, cognitions, emotions, and behaviors. It is important to remember that if scales are meant to measure more negative connotations of body image then the opposite scores are not intended to represent positive body image (and vice versa). As such, be sure that the measure used is assessing the body image dimension of interest, while also the valence (i.e., positive or negative) of interest.

Some of the earliest measurement tools focused on the perceptual dimension of body image. For example, Traub and Orbach (1964) designed a mirror that individuals were asked to adjust until the reflection represented their actual body shapes. The discrepancy between an individual's "distorted" body shape and the undistorted reflection was used as a perceptual measure of body image. These distortable mirrors not only made it into every fair and haunted house, but were also inspiration for many other techniques used to measure perceptions of body image. For example, simple measures have included an *open door* test whereby individuals are asked to open the door as wide as would be needed for them to fit through, or compass-like devices that individuals open as wide as their perceived body shape or size. Individuals can also choose a different body size drawing that they perceive to be representative of their body shape and size, and most recently there are computer programs that have individuals manipulate avatars or their own photos to represent their perceived body shape and size. To illustrate, body image perception using a figure rating scale was used in a study examining body image differences between elite male soccer players and matched controls. Findings demonstrated that soccer players had less accurate perceptions of their body when compared to controls (Arroyo et al., 2008). The overall outcome of these perceptual measures is a comparison between an individual's body perception and their actual body shape and size. When there is a weighting or value component to these perceptions, it becomes a cognitive measure.

The cognitive dimension of body image is often assessed using measures of satisfaction (or dissatisfaction) with an individual's body shape, size, weight, and functionality/competence. There are many cognitive body image measures requiring individuals to indicate the degree of satisfaction or dissatisfaction with different body parts (e.g., nose, arms, legs), attributes (e.g., thinness, weight, appearance, muscularity), or physical function (e.g., strength, endurance). Other common measures include individuals identifying images of body sizes and shapes that resemble their own body (i.e., as described within a perceptual measure) and also the body they would like to have. A discrepancy in what they look like and what they want to look like is used as a cognitive assessment of body image dissatisfaction (i.e., larger discrepancy) or satisfaction (i.e., smaller to no discrepancy). Using this discrepancy method of cognitive measurement, a study of men and women found that individuals who were more active were more satisfied with their body when compared to individuals who were primarily sedentary (Bibiloni et al., 2017). Overall, body dissatisfaction measures are the most commonly used in sport and exercise psychology research to date (Sabiston et al., 2019). However, there is a surge in positive psychological perspectives in sport and exercise psychology, and measures like the Body Appreciation Scale (Avalos et al., 2005; Tylka & Wood-Barcalow, 2015b) and the Functionality Appreciation Scale (Alleva et al., 2017) have been used consistently as cognitive measures of favorable thoughts about the body.

The affective dimension of body image is measured by capturing individuals' body-related feelings and emotions that often include anxiety, shame, embarrassment, guilt, pride, and envy. Most affective measures are self-report, and often include frequency and/or intensity of emotional experiences. Emerging use of the Body-related Appearance Self-conscious Emotions Scale (BASES; Castonguay et al., 2014) and the Body-related Self-conscious Emotions Fitness Instrument (BSE-FIT; Castonguay et al., 2016) has broadened the scope of studying body-related emotions that was dominated in early work by the Social Physique Anxiety Scale (SPAS; Hart et al., 1989). To date, measures of body-related embarrassment and envy lag behind measures of emotions specific to anxiety, shame, guilt, and pride.

The behavioral body image dimension is often measured based on avoidance or engagement in behaviors such as physical activity, diet/eating, or substance use. Individuals are asked to report on the frequency of participation in these types of behaviors, as well as general avoidance of situations or events because of their body image. Cosmetic surgery use is also an indicator of behavioral body image, as is frequency of body checking and monitoring. Generally, these measures are self-report or collected via interview and focus groups.

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Body Image and Physical Activity

Positive and negative body image is associated with numerous behavioral outcomes, including physical activity. Physical activity (including sport, exercise, and leisure pursuits) is a context where individuals often engage in social comparisons, are evaluated based on physical and functional features, and experience judgment from others based on their appearance and function. These aspects may contribute to experiences of negative body image. Yet, physical activity can also be an outlet where individuals experience mastery, enjoyment, and positive affect experiences, which can foster positive body image. In this section, we outline the relationship between body image and physical activity in greater detail, and identify mechanisms that may influence this relationship.

Bidirectional Relationship

Body image and physical activity have a bidirectional relationship, meaning that one's positive or negative body image can influence their participation in physical activity, and one's participation in physical activity can influence their body image (negatively or positively; Sabiston et al., 2019). To date, most of the literature has focused on examining how physical activity is associated with lower negative and higher positive body image. For example, a quasi-experimental study that aimed to examine the role of yoga as a promoter of body satisfaction in young adults, found that those who engaged in yoga were more satisfied with their bodies, when compared to non-participants (Neumark-Sztainer et al., 2018). There is also some literature aimed at studying how physical activity interventions might be used to improve body image. To illustrate, Taspinar and colleagues (2014) examined the effects of a seven-week intervention of hatha yoga and resistance exercise on body image. Although both groups reported less negative body image, greater improvements were noted for the resistance exercise group.

Studied less often, yet equally important, are articles examining how body image can deter or motivate physical activity behavior. Among the limited literature available, negative body image is associated with lower activity and is described qualitatively as a barrier to physical activity, while positive body image is associated with greater physical activity behavior (Sabiston et al., 2019). For instance, in interviews with adolescent boys, boys revealed that body dissatisfaction and negative body perceptions discouraged them from engaging in physical activity (Jachyra & Gibson, 2016). Conversely, older adolescents and young adults have described using physical activity as a behavioral response to experiencing body-related pride (Castonguay et al., 2013). To establish a deeper understanding of the bidirectional relationship between body image and physical activity, it is critical that the mechanisms that explain this relationship are explored.

Mechanisms Linking Physical Activity and Body Image

The majority of quantitative studies examining body image in sport and exercise psychology have been cross-sectional (Sabiston et al., 2019). These studies have elucidated our understanding of the predictors of body image (e.g., attributions: Crocker et al., 2014), along with highlighting the potential positive influences that physical activity can have on body image (Martin-Ginis, Bassett-Gunter, et al., 2012; Martin Ginis, McEwan, et al., 2012). Much of this research, however, has been atheoretical, and as such, a deeper understanding of the mechanisms explaining these relationships is needed. While there are numerous theories linking components of physical activity with body image, three likely mechanisms that can advance our understanding of physical activity and body image are presented below. Specifically, individuals' perceptions of their body, efficacy beliefs, and motivation are discussed as potential mechanisms that can explain associations between exercise and body image.

Actual and Perceived Body Change

Due to the strong emphasis placed on a lean physique in western societies, researchers have focused on whether improvements in physiological changes in the body explain the relationship between higher levels of physical activity and improved body image. However, there is only weak evidence suggesting this is the case, with the majority of evidence demonstrating inconclusive results (Martin-Ginis, Bassett-Gunter, et al., 2012). For example, Anderson and colleagues found that changes in body composition (i.e., weight, waist circumference, and body mass) as a result of a physical activity intervention were not associated with improvements in self-perceptions (Anderson et al., 2006). Although there is a positive relationship between body composition and body image (Rinaldo et al., 2016), it appears physical activity-induced changes in body composition do not improve body image.

Instead of objective body change improvements, it may be that ones' perceptions of body improvements as a result of physical activity are related to body image. In a 16-week exercise intervention, researchers found that women engaging in physical activity improved body image outcomes, with changes in physical self-perceptions explaining these improvements (Martin Ginis, McEwan, et al., 2012). Similar results have been observed in men, whereby participants reporting that perceived fitness improvements after a strength training intervention significantly improved body image (Martin Ginis et al, 2005). Collectively, this research indicates that the perception of fitness improvements after increased physical activity, as opposed to actual improvements, is the primary factor responsible for inducing changes in body image.

Self-Efficacy and Control

In addition to the perceptions of fitness improvement, individuals' belief in their capabilities pertinent to physical activity (i.e., self-efficacy: Bandura, 1997) is likely an important mechanism explaining the relationship between physical activity and body image (McAuley et al, 2000; McAuley et al., 2002). In other words, those who are confident in their physical capabilities experience better body image as a result of exercise. Researchers suggest that self-efficacy might mediate this relationship due to feelings of empowerment and control, whereby individuals feel like they have control over their environment (Martin-Ginis, Bassett-Gunter, et al., 2012). While the mediating effect of control has yet to be examined, attributing successful exercise outcomes to controllable reasons (e.g., good time management) strengthens the effect of physical activity on body image (Murray et al., 2021). However, further research is needed to understand whether body image improves because individuals feel higher levels of self-efficacy and perceptions of control after increased physical activity.

Motivation

Self-determination theory (Ryan & Deci, 2002) might be applicable in understanding motivation as a mechanism to explain the relationship between body image and physical activity. According to self-determination theory, motivation lays on a continuum from external motivation (i.e., engaging in a behaviour due to external pressure) to internal motivation (i.e., engaging in a behaviour because it is enjoyable), with individuals who are externally motivated being less likely to engage in sustained exercise behaviour (Ingledew & Markland, 2008). Therefore, engaging in physical activity to improve appearance is likely associated with more external levels of motivation, meaning individuals are less likely to continue to exercise. While no studies have examined this mediating effect, researchers have observed that exercise is not strongly associated with body image when individuals are exercising with the purpose of improving appearance (Homan & Tylka, 2014). This might explain why interventions discussing physical activity as a means of adapting body image actually resulted in worse body image (Alleva, Sheeran, et al., 2015). However, levels of motivation have not been explicitly tested as a mechanism of the relationship between exercise and body image, and therefore is a potential avenue for further research.

The Exercise and Self-Esteem Model

The exercise and self-esteem model (EXSEM: Soenstrom & Morgan, 1989; Soenstrom et al., 1994) explains associations between physical activity and general self-esteem, to which body image is an important contributor. The EXSEM suggests that participation in physical activity increases self-efficacy then perceptions of physical competence, which in turn boosts general self-esteem. Researchers testing the EXSEM have observed body image to be an important component of general self-esteem (Fernández

Bustos et al., 2019; Martin-Ginis et al., 2014), especially during adolescence - a time when perceptions of the physical self are of heightened importance (Harter et al., 2012). To date, the EXSEM has shown to be a valuable model guiding research on the mechanisms that explain relationships between physical activity and body image

Three of many potential mechanisms that might explain associations between exercise and body image were outlined here. A better understanding of the mechanisms will elucidate reasons why sport and exercise contexts can improve or inhibit body image, and why body image leads to changes in physical activity behavior.

Key Considerations for Body Image Research

In this section, a description of the limitations of the existing work on body image and physical activity is presented. In addition, different research approaches that will provide a richer understanding of these relationships are described. Specifically, future considerations within the topics of longitudinal, interventional, and mixed-methods study designs, theory development and testing, and individual differences are outlined. A focus on the key issues to be addressed in future research and practice is provided.

Need for Varying Study Designs

Longitudinal Studies

The likely bidirectional nature of the relationship between body image and physical activity necessitates longitudinal research. In their review, Sabiston and colleagues highlight that, at that point, only 9.3% of quantitative studies examining body image are longitudinal (Sabiston et al., 2019). Longitudinal studies examining physical activity, sport, exercise, and body image might disentangle the nature of these relationships, elucidating predictive associations. For example, longitudinal research investigating whether the ostensibly positive relationship between sport and body image (Hausenblas & Downs, 2001) is due to a positive effect of increased physical activity on body image, or if these associations reflect individuals with negative body image and/or low positive body image drop out of sport.

Recent longitudinal research in sport indicates that girls' negative self-conscious emotions appears to increase across adolescence, while positive self-conscious emotions decrease across adolescence (Pila et al., 2020; Sabiston, Pila, et al., 2020), and these changes coincide with decreasing levels of sport commitment and enjoyment throughout adolescence. This evidence highlights that in the context of sport, adolescent body image is an ever-changing process, which requires measurement at multiple occasions. While researchers have yet to explore how sport and exercise relate to body image across the life span, body image and self-perceptions are known to change over time (Orth et al., 2010), understanding how physical activity, sport, and exercise contributes to these changes is a worthwhile endeavour.

Intervention Studies

Intervention studies are needed to bridge the gap between research and applied practice. However, regardless of the positive relationship between physical activity and body image, interventions aiming to improve body image through increasing physical activity opportunities are not efficacious (Alleva, Sheeran, et al., 2015). Indeed, researchers have observed that exercising to avoid feelings of guilt and shame are not conducive to sustained participation (Assor et al., 2009), with appearance based motives weakening the association between body image and exercise frequency (Homan & Tylka, 2014). Alternatively, researchers should test the efficacy of focusing on body functionality instead of appearance to facilitate exercise frequency through body image (Alleva, Sheeran, et al., 2015). Further, interventionists might examine potential strategies to increase exercise through changing perceptions of body image or changing the context in which physical activity is engaged in (e.g., sport settings). For example, increasing individual's belief in their ability to engage in exercise (i.e., exercise efficacy) and encouraging participation in specific types of exercise (e.g., yoga) might facilitate better body image outcomes (Gammage et al., 2014, 2016). Taking steps to reduce the emphasis on the body's appearance in sport and exercise settings may be an effective strategy to reduce negative body image outcomes. For example, using exercise videos which minimize comparisons with instructor's physique (Martin Ginis et al., 2008) may be an effective intervention strategy that can increase sport and exercise participation, and positive body image.

Mixed-Method Studies

Finally, there is a dearth of mixed-methods studies examining associations between exercise and body image. Taking both quantitative and qualitative approaches to the study of exercise and body image is a necessary step to understand why sport and exercise are positively and negatively associated with body image (Sabiston et al., 2019). For example, many quantitative studies examining physical activity and body image indicate a positive association (Hausenblas & Downs, 2001), however, qualitative samples describe situations in which sport and exercise settings contribute to negative body image (Vani et al., 2020). Mixed-methods studies can be used to understand trends in physical activity and body image while identifying the aspects of sport and exercise settings that contribute to negative and positive body image. These studies will provide a valuable contribution to research on body image in sport and exercise settings and inform interventions aimed at creating more inclusive and welcoming sport and exercise environments.

Theory Development and Testing

Although several theories have been described within this chapter, a theory of body image and physical activity has not yet been developed. The lack of a theory hinders the advancement of understanding mediators and moderators of the body image and exercise relationship. A basic model of exercise and body image was developed by Martin Ginis, Bassett-Gunter, and Conlin (2012) that outlines potential mediators (e.g., changes in self-efficacy) and moderators (e.g., intensity level, sex) of the relationship from exercise to body image. However, this was designed to guide researchers to choose measures to include in exercise interventions and it doesn't include the potential effects of mediators and moderators in the relationship from body image to exercise. Developing a theory that addresses the bidirectional relationship between body image and exercise is needed.

Individual Differences

There are many personal characteristics that relate to body image in sport and exercise settings. Below, four characteristics (age, gender, race/ethnicity, and sexual orientation) are discussed, however, it is important to note that there are many other individual differences beyond those discussed in this chapter which likely impact these relationships.

Age

Research on body image in sport and exercise typically focus on adolescents and young adults (Sabiston et al., 2019) and as such, many of the relationships discussed in this chapter pertain to this younger demographic. Generally, positive body image decreases while negative body image increases across adolescence (Sabiston, Pila, et al., 2020). However, these maladaptive patterns likely taper off as adolescents progress into adulthood (Orth et al., 2010). That is, as individuals progress across the lifespan they typically experience more positive and less negative body image. The importance of body shape, weight, and appearance typically decreases as individuals progress into later adulthood

(Tiggemann, 2004). However, adults 65 and older report fitness related aspects of body image as important (Bennett et al., 2017) and as such body functionality is an important facet of body image in older adults that warrants further investigation. While body image plays a strong role in adolescents and young adults' physical activity experiences, the decreasing importance of body image in adulthood may result in better physical activity experiences for adults. In short, those who disengage from sport and exercise as adolescents may have better experiences as adults. Further research is needed to test these claims and develop an understanding of how body image relates to physical activity across the lifespan.

Gender

Body image is relevant to all genders. Meta-analyses and reviews have indicated no consistent differences between men and women in their experiences of body image and exercise (Hausenblas & Fallon, 2006; Sabiston et al., 2019). However, societal influences encourage different body image standards for boys/men and girls/women with a higher emphasis for girls and women to be slender and toned, but not muscular, while men are pressured to be muscular. In the sport and physical activity context, the ideal body of being muscular aligns with the ideal man's body but does not align with the ideal women's body (Lunde & Gattario, 2017). This can lead to the perception that sport and exercise align more with the masculine identity than the feminine identity, thus discouraging participation in girls and women. Importantly, discussion on body image in sport and exercise settings among individuals who identify as non-binary, transgender, or two-spirit is lacking. Further research on these populations is needed to understand which sport and exercise settings facilitate or inhibit participation among non-binary individuals, and how this impacts their body image.

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Race, Ethnicity, and Culture

The extent to which race and ethnicity impact body image in sport and exercise settings is relatively unknown. When examining physical activity levels, there is inconsistent evidence on the differences in physical activity levels between Black and White adolescents (Butt et al., 2011; Trost et al., 2002). There is some evidence indicating Black adolescent girls participating in sport hold differing perceptions of body image compared to White adolescent girls (Crissey & Honea, 2006; Mabry et al., 2003). However, in their review of exercise and body image Hausenblas and Fallon concluded there was not enough research on racially diverse samples to understand the impact of race in the relationship between exercise and body image (Hausenblas & Fallon, 2006). Most of the research outlined in this chapter pertains to individuals who identify as White; however, early evidence indicates there are marked differences between body image within different racial groups. As such, research purposefully examining the relationship between exercise and body image in racially and ethnically diverse samples is needed to further our understanding of body image and physical activity.

Sexual Orientation

Research investigating exercise and body image among those who identify with sexual orientations that differ from heterosexual is also limited. There is evidence however that gay men and heterosexual women may be more motivated to engage in exercise for appearance related purposes when compared to heterosexual men (Grogan et al., 2006). This research indicates there are likely meaningful differences in body image experiences between gay, lesbian, and heterosexual participants in sport and exercise settings. Research understanding these differences and how individuals of varying sexual orientations (e.g., bisexual, gay, lesbian, pansexual, queer) experience body image in sport and exercise settings may provide valuable knowledge that can encourage more inclusive sport and exercise environments.

Intersectionality

Finally, it is important to note that these individual differences do not occur in a vacuum. Individuals will have multiple identities that can occur simultaneously, intersecting across different situations, with some identities being more valued and salient dependent on the situation. There is a lack of research understanding intersectionality in sport, particularly in terms of understanding the impact of individual identities (e.g., Black, lesbian, woman, able-bodied) in the sport and exercise context and how these relate to perceptions of body image. For example, in the sport context, the gay body and the athletic body may be perceived as markedly different (Morrison & McCutcheon, 2012). Further research is needed to understand how intersectionality impacts physical activity and body image experiences.

Conclusion

Generally speaking, body image is multidimensional, involves the appearance and function of the body, includes investment and internalization of ideals, and can be negative and/or positive. Body image has been studied using a number of theories, models, and measures, and is a key factor in the development of body dysmorphia and eating disorders. Further, body image shares a complex bidirectional relationship with physical activity. Despite this established association, the mechanisms that explain this relationship are not fully understood. Within the limited research, there is preliminary evidence to suggest that perceived body changes, self-efficacy and control, and motivation might help to explain the link between body image and physical activity. A more thorough understanding of these mechanisms will be fruitful for the development of effective interventions. Future considerations in research and practice should aim to explore the relationship between body image and physical activity over time and using intervention and mixed-method studies. Further, the development of a theory that recognizes the bidirectional relationship between body image and exercise is needed. Finally, future research would benefit from a greater consideration of individual differences and the intersectionality of identities and individual difference factors. These future developments will advance the fields of exercise and sport psychology, as it will deepen our understanding of body image and physical activity.

Learning Exercises

1. Define body image and the four dimensions of body image described in this chapter. Provide one example of how you would measure each dimension.

2. Consider whether positive and negative body image are on the same or separate continuums. Name one positive and one negative body image construct that fall within the affective and cognitive dimensions.

3. Compare and contrast body image and the physical self.

4. What are some of the factors that can influence the development of body image?

5. Describe the bidirectional relationship between body image and physical activity. Outline two mechanisms that link body image and physical activity.

6. Choose two individual differences and explain how they relate to body image in sport and exercise settings.

7. You are tasked with designing a fitness facility and creating guidelines for this new facility. Your goal is to avoid body-related evaluations. What important factors would you consider?

8. You are creating a social media account to promote body positivity within a movement context (e.g., physical activity, sport, exercise). Based on what you have learned in this chapter, what movement setting would you choose, what population would you target, and what principles you would uphold?

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Chapter 8
Youth Physical Activity and Considerations for Interventions

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Chapter Overview

Child physical activities can include sports (with or without organization and supervision from adults), physical education classes and recess, active transportation, active free play (without direction from adults), chores, and other incidental bouts of physical activity. Children are more likely to obtain physical activity in short, unstructured bouts than are adults who often plan and structure daily workouts. While children may be more naturally inclined to be active than are adults, they may still need additional encouragement or opportunities to be active. This chapter will explore opportunities for physical activity across these contexts as well as the role of parents and possible approaches for increasing physical activity for children and adolescents.

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Introduction

The development of physical activity habits should begin in childhood. The current World Health Organization physical activity guidelines call on children and youth ages 5–17 years old to obtain at least 60 minutes of moderate-to-vigorous physical activity per day, although additional health benefits are seen with additional physical activity (Bull et al., 2020). This can and should include aerobic exercises such as running, hopping and skipping, muscle-strengthening activities such as climbing trees and playing on equipment that requires children to climb and lift their body weight, and bone-strengthening activities such as jumping rope and hopscotch. Unfortunately, most children fail to reach these recommended physical activity levels. The Global Matrix 3.0 Report Card provides grades across various physical activity goals for children and youth from 49 countries. Of these, only two scored above a grade of C for overall physical activity (Slovenia A-, Zimbabwe C+; Aubert et al., 2018).

Contexts for Physical Activity in Youth

There is no universally agreed upon definition for ages that make up “youth,” however the United Nations defines “youth” as those persons between 15 and 24 years of age, with children including those younger than 15 (United Nations, n.d.). Conversely, the United Nations Convention on the Rights of the Child defines “children” as persons up to the age of 18 (Office of the United Nations High Commissioner for Human Rights, 1989). For the purposes of this chapter, the term “youth” encompasses both children and youth and generally refers to those up to age 18 or until completion of high school/secondary school. Youth can be active in many different contexts and settings. This chapter will discuss Sport, Recess and Physical Education (school), Active Transportation, Free Play, and the Home Environment (family and peers).

Sport

Sport is perhaps the most thoroughly researched domain for youth physical activity, particularly in regard to psychological determinants of participation. In adults, there are commonly documented gender disparities in sport participation, with men generally engaging in more sport than women, a trend that likely has its roots in childhood and adolescence (Van Tuyckom et al., 2010). According to the U.S. Report Card on Physical Activity for Children and Youth, roughly 56% of 6- to 12-year-old children report playing an organized sport. This report showed disparities in sport participation with girls and individuals from low-income households participating at lower rates than boys and youth from high-income households. While the income disparities were also documented in Canada’s national report card (ParticipACTION, 2018), the gap between boys and girls is not documented in Canada as it is in the United States. On a global level, participation in organized sport has been correlated with life expectancy, gross national income per capita, and global food security index (Aubert et al., 2018).

There is evidence that participation in youth sport, and specifically prolonged participation in youth sport, is a significant predictor of adult physical activity levels. Telama et al. (2006) examined the relationship between sport participation when participants were 9–18 years old and continued participation 3, 6, and 21 years later (covering years 1980–2001). They found that those who were active in sport in both 1980 and 1983, as well as those who were active in both 1980 and 1986, were significantly more likely to report high levels of physical activity in adulthood when compared to individuals who were not involved in sport at any time point. The type of competition at baseline (sport-club, regionally or nationally competitive) was not a significant predictor for adult activity level and the specific sport the individual participated in during youth was not necessarily indicative of the chosen sport in adulthood. These results suggest that exposure and experience, more than specific activities, help to build activity habits for a lifetime.

Benefits of sport participation include skill acquisition, social interaction and development, mental and physical health benefits, and weight management (Logan et al., 2019). Sport participation contributes to development of motor skills and coordination for movements such as running, throwing, catching, and kicking, and increased strength and speed (Christou et al., 2006; Hardy et al., 2014; Melekoglu, 2015). Sport participation may also help youth develop skills that benefit them academically and in other life areas outside of sport, such as planning and self-monitoring (Jonker et al., 2010), time management (Brettschneider, 1999; Durand-Bush & Salmela, 2002), emotional regulation, teamwork and leadership (Hansen et al., 2003; Holt et al., 2008; Larson et al., 2006). Sport participants have shown higher levels of stress resistance (Brettschneider, 2001), lower levels of depression, and higher confidence levels (Boone & Leadbeater, 2006; Eime et al., 2013). Positive sport experiences help to build self-esteem, which may be particularly important for body image and acceptance among girls who learn a broader definition of what it means to be female (Richman & Shaffer, 2000).

Motivations for participation in youth sport range from skill development, fitness, and status to challenge, release of energy and affiliation (being part of a team; McCullagh et al., 1993). Research has consistently shown that perceived competence is a key factor in a child's enjoyment of sport and their likelihood of staying involved in organized sport (McCarthy et al., 2008). When youth feel that they have the necessary skills to be successful in a given sport, they are more likely to enjoy playing that sport. There appears to be a changing relationship between effort and ability level as it relates to perceived competence in sport as children grow. Younger children (under 11 years old) general do not differentiate between effort and skill and therefore perceive themselves as competent (and therefore enjoy sport) if they feel that they have tried hard. Older children may be more likely to engage in comparison with their teammates and competitors and therefore require not only effort but playing well in order to view themselves as competent and report continued enjoyment (Scanlan et al., 2005).

Burnout, including from early specialization, and excessive competition may lead to eventual dropout from youth sport participation. Specialization refers to the concept of intense focus on a single sport, typically year-round, and often at the expense of participation in other sports and is associated with high levels of competition, burnout and increased risk for injury (Brenner & AAP Council on Sports Medicine and Fitness, 2016). Youth who start this specialization earlier in life, those with a lower total number of extracurricular activities, and those with lower levels of unstructured play, may be at highest risk for burnout and subsequent drop out from sport (Fraser-Thomas et al., 2008). While individuals who excel at sport at a young age may be seen by others as exceptional achievers, this intense focus and its associated time commitment can foster social isolation and limited social and problem-solving skills (Logan et al., 2019).

Implications for Interventions in Sport

Pre-School Children

In early childhood (3 to 5 years), children undergo dramatic changes to body composition and motor skills (Gomez, 2000). These young children have limited fundamental sport and balance skills, difficulty judging the speed of moving objects, and short attention spans (Purcell, 2005). During this period, focus should be placed on developing fundamental skills including running, throwing, catching, and riding a bicycle (Purcell, 2005). According to the Long-Term Athlete Development (LTAD) model, before age 6, the focus is on play and mastering basic movement skills (Balyi et al., 2013). The goals of participation should be to be active, have fun, and to have a positive sport experience through learning and practice of fundamental skills (Gould & Petlichkoff, 1988). Children should be introduced to a variety of activities with the mindset of exploration and experimentation (Purcell, 2005). Adults should reward effort and create a fear-free environment for trying new activities (Weinberg & Gould, 2019). During early years, competition should be avoided (Purcell, 2005).

School-Aged Children

During ages 6 to 9, children's growth slows down as they continue to develop fundamental sport skills and begin developing transitional skills (e.g., throwing or kicking for distance). Children still have short attention spans during this age and have limited rapid decision-making skills (Purcell, 2005). During this stage, the focus should be on acquiring a wide range of skills necessary for multiple sports and early specialization should be avoided as this promotes one-sided physical, technical, and tactical development and increases the likelihood of injury and burnout (Balyi et al., 2013). Increasing perceived competence should be encouraged as those with low perceptions of their abilities to learn and perform successfully are likely to drop out from sport (Balish et al., 2014). Children will be more likely to continue with sport if they feel competent (Weinberg & Gould, 2019). Competition can be introduced at this age, but rules should be flexible with the major emphasis on further developing fundamental skills and beginning development of transitional skills. Age-appropriate activities include soccer, baseball, swimming, running, gymnastics, dancing, martial arts, and tennis.

During ages 10 to 12, transitional skills improve, and many children can master complex motor skills (e.g., layup in basketball; Purcell, 2005). Adults should reward correct technique and provide supportive, instructional feedback when teaching (Weinberg & Gould, 2019). With increased attention spans, children are now ready to learn strategy and more complex playing tactics. Coaches should emphasize continued skill development with increasing emphasis on strategy and playing tactics (Purcell, 2005). Encouraging children to focus on self-referenced standards will help them avoid focusing solely on the outcome of competition (Martens, 2012). Age-appropriate sports include football, basketball, and ice hockey (Purcell, 2005).

Adolescents and Teenagers

During ages 13 to 15, growth increases exponentially with gains in muscle mass, muscle strength, and cardiopulmonary endurance, but this age is also marked by a temporary decrease in coordination, balance, and flexibility. Varying onsets of puberty may affect sport performance during these ages. Teenagers have improved attention span and good memory skills allowing them to memorize and strategize with plays and game situations (Purcell, 2005). Concentrating on the process over outcome leads to better development and increased long-term involvement in the sport (Balyi et al., 2013). Athletes continue to grow and develop from 16 to 18, seeing increases in attention span and memory skills. All sports are appropriate at this age, but most self-select into sports that they are good at and enjoy (Purcell, 2005). Around age 16, teenagers have developed the physical, cognitive, social, emotional, and motor skills needed to specialize in a sport if desired (Côte et al., 2009).

Recess and Physical Education

The National Association for Sport and Physical Education (US, NASPE) recommends that all elementary school children receive at least one recess period per day of at least 20 minutes in length. While more than 90% of American elementary schools provide regular recess as part of the school day from Kindergarten (approximately age 5 years) to 5th grade (age 10–11 years), only 35% of 6th grade students have regularly scheduled recess (Centers for Disease Control and Prevention, 2015). In the European Union, 14 of 28 countries report schemes to promote active breaks during the school day (World Health Organization Regional Office for Europe, 2018). And when recess is available, children are not necessarily active the full time. Data suggest instead that students are active for only 23–31% (girls) to 32–38% (boys) of recess time (Mota et al., 2005; Ridgers et al., 2005).

Due to insufficient levels of activity during recess, approaches for increasing activity must be considered. A review of the impact of recess-focused interventions to improve youth physical activity levels found generally positive results, but few studies have examined long term impacts (Ickes et al., 2013). Common intervention approaches include adding new equipment or materials to the playground, enhancing playground markings, creating specific play zones, teacher involvement, and planned activities, with largest impacts seen for structured recess and new playground equipment (Erwin et al., 2014). This study also found increases in physical activity to be associated with the duration of the intervention per session. In other words, it is important to give children enough time during a given recess period to become and stay active.

Photo by Lukas from Pexels

Physical Education (PE) differs from recess time in that there is more supervision and direction from trained teachers. The Society of Health and Physical Educators (SHAPE) America recommends that schools provide 150 minutes of instructional physical education per week for elementary school children and 225 minutes of instructional physical education per week for middle and high school students. While 97% of US schools require PE in 6th grade, this percentage drops below 45% for 11th-12th grade students (Brener et al., 2017). In the European Union, all Member States provide physical education in schools and most require at least two hours per week of instruction (World Health Organization Regional Office for Europe, 2018). Of the 28 reporting countries, 22 mandate PE in primary schools and 20 mandate PE in secondary schools.

Data evaluating the dose of physical activity provided by a PE class has shown that children are active for approximately 34% of the time they are in a PE class (Fairclough & Stratton, 2006). Contrary to much of the physical activity data in youth, no gender differences were found. CATCH (McKenzie et al., 1996) and SPARK (Sallis et al., 1997) are two physical education interventions that succeeded in increasing physical activity levels to around 50% of class time.

Child and Adolescent Trial for Cardiovascular Health (CATCH): CATCH is designed to be delivered over grades 3, 4, and 5 (ages 8–11) and uses a multi-component approach to behavioral health. CATCH consists of school food service, physical education, and classroom curricula approaches at school and home curricula and family fun nights within the students' families. Physical activity is a specific focus of the program in Grades 4 and 5.

Sports, Play, and Active Recreation for Kids (SPARK): SPARK focuses on promoting lifelong well-being through high quality physical education with required teacher training. Although SPARK has adapted since its original development and evaluation, the original program consisted of in-school health-fitness activities (i.e., walking/jogging and jumping rope), skill-fitness activities (i.e., basketball and soccer), and self-management components including self-monitoring, goal setting, and problem solving.

Implications for Interventions in Recess and Physical Education

Pre-School Children

The World Health Organization suggests that children ages 1–4 years of age should spend at least 180 minutes per day in a variety of physical activities (World Health Organization, 2020). Considerations should be taken in the design and staffing of early childcare facilities to promote physical activity, including utilization of both fixed and portable equipment and training of staff to support and encourage physical activity (Coe, 2020). Interventions and programs in young children should be focused on development of motor skill competence, which may support increased physical activity later in life (Coe, 2020).

School-Aged Children

A whole-of-school approach is recommended to increase opportunities during PE, recess, and before, during and after school hours (National Physical Activity Plan Alliance, 2018). These programs often include physical activity breaks incorporated into the classroom and have been shown to effectively increase physical activity (Donnelly et al., 2009). In regard to physical education, interventions can include teacher training to increase the percentage of PE class time spent in moderate and vigorous physical activity (McKenzie et al., 1996; Sallis et al., 1997) as well as a shift in focus to activities that build lifelong physical activity habits such as in Estonia's "Schools in Motion" project (World Health Organization Regional Office for Europe, 2018). Enjoyment of PE may influence future adult physical activity levels, with memories of embarrassment, bullying and social-physique anxiety related to lower future activity levels (Ladwig et al., 2018). Because of this possible relationship, efforts should be made to increase enjoyment of PE for all students while avoiding embarrassment and bullying.

In addition to providing additional recess and PE opportunities, manipulation of the play space may also increase physical activity levels. New equipment, markings, and play zones may increase interest in novel physical activities (Ickes et al., 2013). Renovations of play spaces from traditional equipment to more natural designs (e.g., trees, rocks, water, logs and more) has also been shown to increase physical activity levels (Coe et al., 2014). Finally, allowing for longer recess periods may give school-aged youth more opportunities to engage in physical activity (Erwin et al., 2014).

Adolescents and Teenagers

Requirements for physical education drop in high school/secondary school compared to younger grades (Brener et al., 2017; World Health Organization Regional Office for Europe, 2018), so the first priority must be to increase physical education opportunities in this age group. While adolescents may not be as likely to engage in spontaneous physical activity during recess as younger children, this is an important time period for encouraging adoption of physical activity as a lifelong habit, particularly for females who experience sharper decreases in physical activity during the early teen years (Kimm et al., 2002). PE in this age group may focus less on games and sports and instead provide opportunities for exposure to new activities such as hiking, skiing, or other outdoor pursuits if resources allow. Programs that address other risk behaviors at this age (e.g., cigarette smoking, teenage pregnancy) may also provide opportunities to encourage physical activity as part of a healthy lifestyle (Kimm et al., 2002).

Active Transportation

Active transportation is defined as travel to and from school (or work or other destinations) which involves physical activity and often includes walking or cycling. Active transportation has been associated with overall higher physical activity levels in youth (Stewart, 2011). Mixed-mode commuting may also include some level of physical activity. Mixed-mode commuting involves multiple methods of transportation such as walking to and from a bus stop, train stop, or carpool pickup/drop off point. This is in contrast to inactive commuting which relies solely on motorized travel. Levels of active transportation have declined in the United States since the 1970s (Bassett et al., 2015; McDonald et al., 2011). Among children grades K-8th (4-14 years old), the percentage of youth using non-motorized transportation to get to and from school (i.e., walking or biking) has declined from 47.7% in 1969 to just 12.7% in 2009. Similar - though less drastic - declines have also been documented in Canada, Switzerland, and other countries (Buliung et al., 2009; Grize et al., 2010).

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Safety, functionality, aesthetics, and destinations influence active transportation behaviors (Panter et al., 2008). Due to elements pertaining to the home, the destination, and/or the route, active transportation may simply not be an option. For example, many rural children live too far from their schools for active transportation to be a realistic choice. Routes for children who do live near schools could include hilly and winding roads that may be unappealing. Safety considerations include road safety as well as safety of the overall environment. Lower speed limits for motorized traffic, safe street crossings, complete sidewalks, bike lanes and good visibility can all make a route safer. Youth and adults alike are more likely to engage in active transportation if there are destinations within walking distance without unnecessary barriers. Areas with higher land use mix and therefore more diversity in shops, parks, schools, homes and other destinations are likely to encourage active transportation. Finally, an aesthetically pleasing environment will make active transportation more enjoyable.

Safe Routes to School (SRTS) programs encourage active transportation through the 4 Es: Engineering, Enforcement, Education, and Encouragement. Engineering refers to design changes in the environment such as improved sidewalks, crosswalks, and bicycle lanes. Enforcement efforts include collaborations with local police departments to enforce speed limits in school zones or installing real-time speed monitoring signs. Education programs often focus on classroom instruction to teach pedestrian and bicycle safety. Encouragement efforts create incentives and excitement around active transportation. An assessment of Safe Routes to School programs in New York City, US showed a 44% decrease in the rate of pedestrian injury for youth age 5-19 years for census tracts with these active transportation interventions compared to those without (Dimaggio & Li, 2013). A study comparing schools with and without SRTS programs found that rates of walking and bicycling to school increased with each year of participation in the SRTS program (McDonald et al., 2014). Similar positive impacts have been found by others (Boarnet et al., 2005; Stewart et al., 2014).

Implications for Interventions in Active Transportation

Pre-School Children

Depending on childcare arrangements, there may be few opportunities for young children to engage in active transportation. If children are not attending pre-school or daycare, they may not have regular opportunities to leave the house and travel to destinations close enough for active transportation, especially for young children. However, pre-schoolers may still be encouraged to walk or bike along with a parent when taking older siblings to school or completing other trips and tasks. They may also ride-along in bike carriers/trailers to begin exposure to active transportation.

School-Aged Children

Proximity is important for active transportation and so this may simply not be an option for youth who live too far from their school or other destinations. For younger age groups, travel choices may also be strongly influenced by traffic safety concerns of parents (Panter et al., 2008), but there are opportunities available to address these concerns and increase utilization of active transportation. A popular approach to increasing active transportation is the walking school bus. Walking school busses consist of a group of children that walk a set route to and from school with adult supervision, picking up children throughout the neighborhood along the route. These programs help to allay parent fears about safety by increasing adult supervision and teaching safety behaviors (Mendoza et al., 2011, 2012). Schools can also encourage active transportation by addressing their vehicle traffic patterns and designating specific car-free approaches to the school to reduce the chance for vehicle-pedestrian accidents.

Adolescents and Teenagers

Active transportation may appeal to adolescents because of the opportunity for independence. Walking or biking to school or other destinations may provide an additional opportunity for time away from parents and/or with friends. Females are less likely than males to engage in active transportation (National Physical Activity Plan Alliance, 2018), possibly suggesting continued need for safety improvements such as lighting along possible transit routes. Parents are encouraged to work with their teenagers to plan safe routes they can follow for active transportation as a way to find a compromise between the teen's desire for independence and parents' concerns about safety.

Free Play

Free play is the first introduction to physical activity for most young children. From first crawling across a room to explore new areas, to running, jumping, and climbing in parks and playgrounds with friends and classmates. Free play presents opportunities to develop motor skills as well as social skills. Guidance from the American Academy of Pediatrics states that most children are ready for organized sports at around age 6, but should engage in free play until (and after) that time (Logan et al., 2019). Free play is valuable for the physical activity it provides, but it has additional benefits not seen with other types of physical activity including imagination, creativity, and social skills. Free play, often referred to as unstructured play, gives children and youth a chance to create and enforce their own rules, without direct oversight from a parent, teacher, coach, or other adult. Play is so important for children that it is recognized by the United Nations as a universal human right (Office of the United Nations High Commissioner for Human Rights, 1989). There are few studies available examining the access for children to free play, although many barriers are known, including weather, safety, and lack of infrastructure in the surrounding built environment (Brockman et al., 2011; Veitch et al., 2006). The most commonly reported locations for physical activity include a home/apartment complex yard, park or playground, school grounds after school hours, and a friend or relative’s home (Corder et al., 2011).

Outdoor Play

A special area of interest within free play is the exposure and opportunity it often presents for children to be outside. In fact, the amount of time spent outdoors has been found to be a significant predictor of a child’s overall physical activity level (Sallis et al., 2000). Additionally, the higher variety of places to be active that a child visits is also associated with overall physical activity levels (Corder et al., 2011). Natural play spaces include unique terrain, plants, rocks, water and other natural elements that children can choose how to use, as opposed to traditional playsets where it is very clear what should be done with a swing or a slide. Renovation of play spaces from traditional to natural playgrounds has been shown to increase physical activity and may also increase engagement in “risky play” (Coe et al., 2014). Risky play refers to activities such as climbing, jumping, and fast running and has been shown to be associated with healthy child development (Brussoni et al., 2012).

Implications for Interventions in Active Free Play

Pre-School Children

Parental support for active free play is particularly important for young children who are not yet enrolled in school. Evidence suggests that children who attend pre-school are less active when at school than at other times in the day (O’Dwyer et al., 2013) but that family-focused education and activity can increase physical activity and decrease sedentary time in this age group (O’Dwyer et al., 2012). Some children may prefer—and be more active during—structured activities while others may prefer free play and so a variety of opportunities should be presented (Frank et al., 2018).

School-Aged Children

While development of motor skills is driven by physical activity in early childhood, this relationship may reverse in middle childhood as children with better motor skill development become and stay more active (Coe, 2020). Access to recess and other opportunities for free play must be maintained and improved in this age group, showing interaction of efforts to increase free play with other contexts such as school and family settings. More research is needed in this area to identify specific intervention characteristics that can successfully support free play, but safety and access are two likely factors. As suggested by the Protection Paradox, overprotection on the part of parents and teachers who are (understandably) trying to avoid injury, may result in reduced opportunity for children to engage in challenging and appealing play. Long-term health, supported by appropriate physical activity levels, should be valued as much as safety (ParticipACTION, 2015). It is possible to increase the amount of time that families spend being active outside by providing education and information about local activity resources (parks and greenways) and empowering parents to act as physical activity role models (Flynn et al., 2017).

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Adolescents and Teenagers

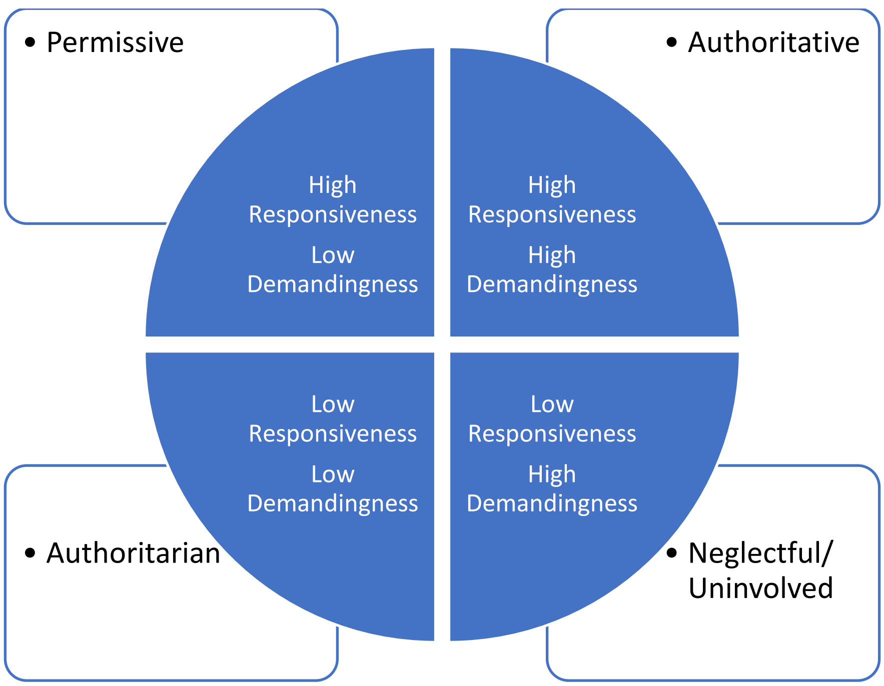
Parents can support active free play by providing transportation to recreational areas where adolescents can be active with friends. As teenagers build lifelong activity patterns, exploring a variety of outdoor hobbies can increase the likelihood of identifying physical activities that they enjoy, such as hiking, water activities, and other outdoor pursuits beyond organized sport. These activities may be particularly appealing for adolescents who have dropped out of organized sport due to disinterest in competition.

Home Environment: Parental Involvement and Modeling

There are no valid and internationally recognized instruments available to document the role of parents in encouraging and supporting physical activity for their children, despite the known importance of parents as “gatekeepers” (Aubert et al., 2018; National Physical Activity Plan Alliance, 2018). Parents exert a large amount of influence on child behaviors, including physical activity, both in providing or restricting access and as a role model. Parents can provide support for physical activity through many avenues: social and emotional support, financial support, transportation and investing time to play with or watch their child participate in organized sports.

Much of the research on parent influence has focused on parenting type. Traditionally, parenting types have been categorized as Authoritarian, Permissive, or Authoritative (Baumrind, 1966); although a fourth style (Neglectful/Uninvolved) is sometimes added. These styles are determined based on Demandingness and Responsiveness (see Figure 8.1). The authoritarian parent attempts to control their child's behavior with high levels of restriction and authority and is often viewed as strict or stern. Children of parents who display this type of restriction may be less likely to engage in moderate to vigorous physical activity (MVPA) and active transportation (Carver et al., 2010). The permissive parent is acceptant and affirmative toward child desires and actions and consults his/her child about decisions while exerting little overt power. In the context of physical activity, this parent is less likely to insist on direct supervision and is likely to have few rules about where a child can go and what they can do. Authoritative parents attempt to direct their child's behavior while balancing reason and power to encourage both discipline and child autonomy. This parent is likely to have high expectations, but also clear rules and show high support for their child.

Figure 8.1
Aspects of Parenting Styles



There is some evidence that more active parents have more active children. One of these studies (Brouwer et al., 2018), found a sex-specific relationship with girls' physical activity more closely associated with that of their mother and boys' physical activity more closely associated with that of their father. However, a 30-year analysis as part of the Cardiovascular Risk in Young Finns study (Kaseva et al., 2017) did not find this gendered response. Other researchers have found stronger ties between parent sedentary behavior and low child physical activity than between parent and child high physical activity levels (Fogelholm et al., 1999), suggesting that modeling of sedentary behaviors and modeling of active behaviors may influence child behaviors differently.

Modeling is not the only way that parents can support physical activity for their children. Youth are more likely to achieve the physical activity guidelines if their parent(s) take the child to places where they can be active, take part in physical activities with their child, and encourage their child to be active outdoors with friends or family members (Pyper et al., 2016). Parental influence is usually stronger for younger children (under 12 years of age) as parents play a stronger role in promoting or inhibiting opportunities for physical activity in younger children. There is also some evidence that youth from lower income families perceive less support in the form of being watched by family or friends, which has been associated with overall physical activity level (Duncan et al., 2005).

Implications for Interventions in Parental Involvement

Pre-School Children

Parents are integral at this age level as they provide opportunities and supervision for play, both structured and unstructured. Parents can provide support by exposing their pre-school children to a variety of activities. Young children can also be exposed to parent support by attending sporting events or other physical activity opportunities for older siblings with their families, creating a family-wide culture of physical activity support.

School-Aged Children

Parents serve as a major role model for this age group, as children still have little volitional control over aspects such as enrollment in organized sport and transportation to places to be active (Pyper et al., 2016). There is some evidence that interventions for parents should directly target behaviors and planning, rather than increasing positive attitudes towards physical activity. Parents are likely already believers that activity is important for their children but need more tangible information such as resources and approaches to planning (Flynn et al., 2017; Pyper et al., 2016). It is possible to increase the amount of time that families spend being active together by providing education and information about local places to be active and empowering parents to act as physical activity role models (Flynn et al., 2017).

Adolescents and Teenagers

Although adolescents exert more autonomy over their own activities than younger children, there is still a degree of influence from parents and other family members (Pyper et al., 2016). Parenting style may come into play in this age group as teenagers begin to explore their limits and strive to make more of their own decisions. Authoritative parenting – demanding yet responsive – will allow youth to explore physical activities to find what they enjoy while still being safe. Older children report lower levels of support from parents and siblings than do younger children – an opportunity to provide intervention; however, as children transition into adolescence, peers often become a stronger source of social support (Duncan et al., 2005).

Youth with Disabilities

Youth with disabilities often obtain lower levels of physical activity than those without disabilities. According to a report from the United States, 58% of boys between 5–11 years old that have long-term mobility limitations met the physical activity guidelines compared to 75% of boys in this age range without mobility limitations (National Physical Activity Plan Alliance, 2018). Additionally, less than 20% of children with cerebral palsy, autism spectrum disorder, or Down syndrome between ages 6–17 years met the guidelines. Similar discrepancies have been reported in Canada, where only 16% of children and youth with disabilities report at least 60 minutes of daily physical activity (ParticipACTION, 2018). The National Survey of Children's Health (US, NSCH) gathers data on noninstitutionalized youth ages 0–17 in the United States. A review of NSCH data from 2011-2012 demonstrated lower levels of physical activity among adolescents age 13–17 with severe visual impairments (2.4 days of MVPA per week) compared to those without impairments (3.93 days of MVPA per week; Haegele et al., 2019a). However, as similar review of NSCH data from 2016 found that visual impairment was not associated with the likelihood of meeting the physical activity guidelines either for children or adolescents (Haegele et al., 2019b). These results suggest a need for additional research in this area along with consideration of the degree of severity of impairments.

Programs and opportunities that promote physical activity must consider different adjustments for youth with physical disabilities and intellectual and developmental disabilities. This may include considerations for equipment, space, group size, instruction, and safety. A systematic review of physical activity interventions for youth who use wheelchairs found that programs could achieve improvements in health, fitness, and well-being but that results were often not maintained during follow-up and that studies were generally of low quality (O'Brien et al., 2016). Parents of children with disabilities report many perceived benefits of physical activity participation for their child such as health and socialization. Unfortunately, they also report many barriers to physical activity participation including low motivation on the part of their children, overprotection, and lack of programs and professionals that address the specific needs of their children (Columna et al., 2020).

Interventions for youth with disabilities are likely to vary greatly depending on the age group and the specific disability. For example, interventions for youth with visual impairments need to consider different factors than physical activity programs for youth with intellectual disabilities or those who have experienced an amputation. While the validity of activity monitors among wheelchair users has been studied (Learmonth et al., 2016; Sonenblum et al., 2012), much more work is needed to develop and evaluate physical activity promotion programs for this population. Despite a call for more research on youth with disabilities being issued over 20 years ago (Cooper et al., 1999), additional data is still needed in this area.

Considerations for Measurement of Physical Activity in Youth

An important consideration when evaluating youth physical activity behaviors and subsequent interventions is in how physical activity is measured. Self-report tools that rely on recall or memory are limited by our ability to accurately recall our behaviors. Self-report tools that are completed in real-time (e.g., logs, diaries) often create a high amount of burden on the participant to continually track their activities. For children, self-report measures often rely on parents serving as a proxy and reporting activity levels for their child. These reports are limited to the time which the parent spent with their child and parent perceptions of the child's activity level while they were apart (e.g., at school, sport practices, after-school programs). Children tend to be more sporadic in their physical activity than adults are. If you have ever observed children, especially young children, playing on a playground or in a park, this quickly becomes apparent. A child may play for a few minutes on the swings before sprinting to the slide to play with a friend, take a break to play in the sandbox and then join a stop-and-go game of soccer. These short bursts of activity are harder to record or recall.

In recent years, devices have been designed that can capture physical activity, including pedometers and accelerometers. Pedometers measure step count and are a cheap and easy way to capture the volume of physical activity performed by an individual. Accelerometers, on the other hand, measure the amount of acceleration, and can therefore capture intensity. When accelerometer data is processed, it can identify not only the volume of physical activity performed by a participant, but also the intensity and the length of specific bouts of exercise. Accelerometer software from device manufacturers produce data referred to as "counts" with more counts per minute indicating higher intensities of physical activity. There have been many studies done to determine appropriate cut points to separate sedentary, light, moderate, and vigorous activity based on counts per minute. However, rather than arriving at a consensus, this has resulted in a multitude of different sets of cut points that researchers must choose from. To do so, the setting, age of participants, and activities included in development and validation of those cut points should be considered.

Conclusion

There are many contexts for children and adolescents to engage in physical activity, but in many of these areas, opportunities are lacking. Interventions should address safe and practical ways to increase physical activity levels while exposing youth to an array of different activities that allow them to identify their own interests. Policies are needed to support physical activity in schools as well as in the larger community environment through education, built environment, and utilization of proven curricula and programs. Parents serve as important role models and gatekeepers for physical activity and should be encouraged to identify easy and practical ways to provide more opportunities for physical activity for their child. Healthy physical activity patterns built in childhood may lead to healthy physical activity habits maintained throughout the lifespan.

Learning Exercises

1. Develop a 6–10 question survey about youth sport participation and adult physical activity levels that could be distributed online. What details would you want to know about sport participation that you believe might predict adult physical activity levels? Distribute the survey to at least 15 classmates, family members or friends and review for trends.

2. Imagine that you have been tasked with writing the requirements for recess time for a school district/school system. What guidelines would you write for elementary/primary schools and for middle/high/secondary schools? Criteria may include rules for number of recesses per day/week, length of recess, equipment provided, supervision, space requirements, bad weather contingencies and other considerations.

3. Using Google Maps or another similar program, design at least three walking school bus routes through surrounding neighborhoods to your nearest elementary school. Use the Street View tool to make note of any segments of the route without sidewalks or with dangerous traffic crossings that could be improved with a Safe Routes to School project.

4. Visit a local park and complete the Community Park Audit Tool (CPAT). After completing the tool, reflect on three positive aspects of the park highlighted by the tool and three areas for possible improvement.

5. Create a community guide that provides information about at least five places in your community where parents could be active with their school-aged children. Create a table that could be provided as a handout to families about these resources. Be sure to include the address and name of the park, trail, or other resource as well as information about parking, accessibility, and what activities can be done at that location.

Further Reading

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Chapter 9
Emotion Regulation of Others and Self (EROS) During the COVID-19 Pandemic

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Chapter Overview

By March 1st 2021, the COVID-19 pandemic caused over 2.5 million deaths worldwide. To restrict spreading of the virus, movement was restricted. At the outbreak of the pandemic, there were concerns for poor mental health in both the immediate and long-term future. Encouraging people to use strategies to regulate the emotions of others and self is therefore worthwhile. In this chapter, I look at how the pandemic affected emotion and the use of emotion regulation strategies guided by the Gross and Thompson (2007) five-family model. Strategies people typically used were often not available or easy to do in lockdown, and so careful planning was necessary. A reflective case study that describes an emotion regulation strategy via a physical challenge is described. The case study outlines how setting an exciting challenge and how sharing progress can influence the emotions of others and self. In summary, active planning of emotion regulation strategies that you do is worth considering for managing emotions and mood, which help maintain positive mental health.

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Introduction: COVID-19, Emotions, and Emotion Regulation

In 2020, COVID-19 was a new virus, with no known cure or antidote. On March 23, 2020, the UK government implemented a national lockdown to try to prevent the virus spreading to reduce the risks of mass deaths. The measures implemented included banning non-essential travel, closing pubs, restaurants and theatres. The effects on employment were equally dramatic. People were asked to work from home unless they were an essential worker, where examples of jobs included those working in hospitals, the police, armed forces, shop keepers, supermarkets, travel and firefighters. People with underlying health conditions, over the age of 75 years, and pregnant women were also told to minimise social contact for 12 weeks.

At the outbreak of the pandemic, poor mental health, negative mood, and intense negative emotions were expected consequences (MacIntyre et al., 2020; Restubog et al., 2020). Evidence shows such fears materialised. In a study of 17,685 people in China, Wang et al. (2020) reported an increase in anxiety and depression. Based on such findings and theoretical predictions, advising people to actively use emotion regulation strategies to help manage mental health is sensible advice. At the outset of the pandemic, a special issue by the journal *Frontiers* called for articles for a special issue.

Learning Exercise One

Look at the articles in the special issue on COVID-19, select one article and read it in-depth. I authored one article on mood states in boxers (Roberts & Lane, 2021); evaluate the strategies used by boxers with reference to Gross and Thompson's (2007) model.

In this chapter, I encourage people to identify and evaluate the use of self-regulation strategies. People naturally self-regulate (Bandura, 1997; Carver & Scheier, 1990). If people have strategies that they believe will work and can self-regulate effectively this alleviates a great amount of pressure on mental health services. This approach sits well with advice from key members of the Scientific Advisory Group for Emergencies (2020), whose model for behavioural change was based around the capability, motivation, and opportunity to keep others and oneself safe during the pandemic (West et al., 2020).

Learning Exercise Two

Think back to the start of the Pandemic, and what were your initial responses to hearing the restrictions? The aim of this exercise is to engage in reflection on your experiences at the start of COVID-19. Try to identify thoughts and feelings in relation to imposed restrictions. The following headings might be useful.

What are your reflections?

What occurred:
Thoughts and feelings:
What happened:
Reflection on thoughts:

At the outbreak, in my role of being a sport psychologist practitioner, I had athletes experiencing intense emotional responses such as anxiety and uncertainty. As 2020 started, athletes had hopes and goals focused on athletic achievement and in the space of a few weeks, these goals were put on hold. Athletes needed to be patient and see out the pandemic. It should not be surprising that athletes did not have the experience to deal with such rapid and unexpected changes (see Carruthers, 2020). I recently discussed the importance of emotion and emotion regulation in the work of practitioners (Lane, 2020) where awareness of one's own emotions and how they might transmit to others should be considered. Evidence suggests how current emotional state influences relative positivity or negativity to future hopes, where a positive emotional state associates with feeling hopeful (Schubert et al., 2020). In this chapter, I examine self-regulation in the COVID-19 crisis through a case study. I focus on emotion regulation of others and self. I will outline key theoretical issues before going through the case study to illustrate how theory applies to practice.

Emotions and Emotion Regulation

Emotions are subjective feelings experienced in response to events either in an individual's environment, for example, a boxer climbing into a boxing ring or a surgeon going into theatre, or in an individual's mind, for example, anticipation of an upcoming event. For example, if either a boxer or a surgeon thought about the contest or surgery coming up and was concerned about the outcome, then they are likely to experience an increase in the intensity of their emotions. Emotions encompass three types of response (Lazarus, 2000):

1) Emotions include physiological responses such as increased respiration and heart rate. Although the intensity of a physiological response is a key part of emotion, it is very difficult to identify an emotion from physiological measures alone, and especially in tasks where movement is involved. A perception of physiological states was a positive feature of research into competitive anxiety (Marten et al., 1990), although this approach did not extend to other emotions or areas of application other than sport. Evidence suggests that failed attempts to regulate intense emotions associated with a disturbed physiological response (Beedie et al., 2012; Lane, Wilson, et al., 2011) possibly due to challenges in self-control (Gailliot et al., 2007). When regulating emotions, self-awareness of physiological changes is important and at times, focusing directly on the physiological responses is necessary (Thompson & Gross, 2007). At the outset of the COVID-19 pandemic, a sense of fear of being exposed to situations where you could catch COVID-19 coupled with no reliable and proven self-regulation strategies to cope (these were soon learned) meant that focussing on managing the physiological aspects of emotion was a useful skill.

2) Emotions include cognitive changes such as attention, perception, and information processing priorities. Emotions influence what information comes to mind and how we might feel at a later point in time (Baumeister et al., 2007). The ongoing changes in cognition as people attempt to regulate their current emotional state is relevant. For example, during COVID-19, if you are anxious about catching the virus, then the thought of visiting the shops could intensify these anxious feelings. Further, the thought of transmitting the virus to loved ones could contribute to anxiety further. It could also lead to shame and sorrow if you thought you passed the virus onto another person via an act of carelessness. The COVID-19 crisis raised the intensity of anxiety, and this can prompt a search of the environment to identify the cause of the issue, something that is difficult as you cannot see a virus. In this instance, anxiety is likely to prompt adherence to behavioural advice such washing hands and social distancing (West et al., 2020). As I later point out, if you are running, people attempt to get out of your way and look anxious; seeing people become anxious is not something runners are used to, and so this changes the nature of the run. If you are running to improve mood, then seeing your actions negatively impact other people's emotion has the reverse effect.

3) The third aspect of emotion is behavioural such as increasing the intensity of behaviour to actively pursue a goal. Behavioural change could be directed to raise or to conserve energy. For example, anxiety and anger can provide a flight or fight response whereas depression promotes a response that conserves energy. Emotional energy can help people attain their goals with numerous studies showing positive relationships between emotions and performance. This has been evidenced in goal achievement in sport (Beedie et al., 2000; Han et al., 2020) and goal achievement in work settings (García-Buades et al., 2020). Recent work has developed models on how emotion regulation could operate in achievements settings (Harley et al., 2019). Identifying emotional profiles associated with success and failure has been a challenging line of investigation with a great deal of evidence pointing towards an ideographic model as the best explanation (Han et al., 2020; Hanin, 2010; Lane, 2012a). What this means is that for people to be able to effectively regulate their emotions, they need to know what emotions help them perform well. Evidence shows that many people accept experiencing unpleasant emotions before trying to achieve important goals, and learn to interpret these feelings as ready to perform. In other words, they use the energy developed by unpleasant emotions to raise arousal, and via increased arousal, effort increases (Lane, Beedie, Devonport, & Stanley, 2011). If emotional profiles cannot be linked to success, then it begs the question as to how an individual knows whether they should try to increase or decrease the intensity of any given emotion. In keeping with the idiographic approach, knowledge of how emotion influences your actions is an important aspect of self-awareness (Lane, 2012a; Lane, Beedie et al., 2012). From those meta-beliefs, it is possible to have a personal database of how to interpret emotional states and decide whether to try to amplify, dampen, or maintain the intensity of a given emotion. Clearly, this process works well when there is a good knowledge of the emotions required for successful performance. In COVID-19, where the situation was new and unclear, the bank of experiences on which to base meta-beliefs was shallow as the outbreak began and developed via learning.

Learning Exercise Three

Reflect on your emotional experiences. Select one, and then close your eyes and think back to when you were experiencing it. What did you hear? What did you feel? Immerse yourself in the experience. Now try to identify

1) What feelings did you experience?
2) What thoughts occurred?
3) What physiological changes occurred?

It is important to consider all physiological, cognitive, and behavioural responses together. Via these three types of response, emotions influence the goals people establish, their intentions and choices to attain them, and their behaviour (Baumeister et al., 2007). Baumeister et al. (2007) argued that emotions have powerful effects and we monitor emotions via self-regulatory processes. We identify how we feel in comparison to how we want to feel. How we want to feel can depend on the task we are doing. When we anticipate or experience emotions we dislike, we seek strategies to regulate the intensity of these feelings. A key aspect is that we regulate to an internal standard of how we wish to feel, although when we ask people how they wish to feel we do not always get precise answers (Beatty & Janelle, 2020). Of available evidence we have, it should not be surprising that unpleasant emotions feature highly (Hanin, 2010; Lane, 2012a), and when people experience emotions such as shame, sadness, and misery they could seek actions to down regulate the intensity of these emotions.

Emotion regulation is the automatic or deliberate use of strategies to initiate, maintain, modify or display emotions (Gross & Thompson, 2007; Gross & Feldman-Barrett, 2011). Ongoing self-regulation of emotions can not only help regulate emotions to improve feelings, but also help people achieve goals. For example, the emotions of anger and fear, which are unpleasant and intense could drive strategies to regulate these emotions to deal with the causes of them (the "fight or flight response", see Nesse & Ellsworth, 2009). However, emotion regulation attempts might be dysfunctional. For example, an athlete might be angry about having to run alone or not be able to train at the gym, and the expression of this emotion might be an angry response focused toward people they live with, creating an unhappy mood, meaning that the negative emotion lasts longer than it should. Devonport and Lane (2013) showed how couples can regulate their own and each other's emotions.

In terms of how people regulate their emotions, studies indicate that people organically use conscious and non-conscious strategies to regulate their emotions with over 400 strategies identified (Augustine & Hemenover, 2008; Koole, 2009; Thayer et al., 1994). For example, talking to people, watching television, going out for meals, playing sport, listening to music, are all tasks that people identify with as part of day-to-day living, and when prompted to reflect on how they aid emotional well-being cite them as effective strategies (Thayer et al., 1994). In terms of a theoretical model, Gross and Thompson (2007) developed a five-family model which specifies that people regulate their emotions by selecting the situation they are placed in (situation selection), how they might change the situation (situation modification), what they choose to concentrate or focus on (attentional deployment), how they modify their thoughts and as such select information to focus on that changes their emotion (cognitive change) or how they try to modify the physiological responses or try to squash the effects of the emotions (response modulation). Four of these families of regulation (situation selection, situation modification, attentional deployment, and cognitive change) can be used before the emotion has become fully blown with response modulation being used once the emotion is intense and warrants regulation. A key feature of emotion regulation is that many strategies are not exclusively emotion regulation strategies, but when asked how people regulate their emotions, people recognise the link between the actions and their feelings. On recognising these links, an individual learns to identify that using the strategy can bring about changes in emotions, thereby creating a conscious link. And so, of course, the restrictions placed during COVID-19 meant many of these strategies could not be used.

Learning Exercise Four

How do you regulate your emotions? Think back to when you have experience intense emotions, what did you do? How long did the emotion last? Write down as many actions or thoughts as possible. There are no right or wrong answers. It will help identify what you do to alter your emotions.

After doing this, consider what a sport psychologist might do if presented with a person presenting these emotions and describing how they regulate them. And so, imagine yourself as the sport psychologist where you are also the client.

Emotion Regulation Strategies During COVID-19

I will illustrate how the five-families (Gross & Thompson, 1997) of the model could be applied during COVID-19.

Situation selection refers to the process whereby you actively choose to place yourself in one situation rather than another. As previous research has illustrated, there are a range of strategies people use. People can self-select situations to alter emotions, for example: the decision to meet friends in a cafe, to go to the theatre, to go for a run, to watch a funny film, or to go on holiday. It is likely that people do not explicitly see these as emotion regulation strategies, but when asked to think about what they do, they report doing such activities (Thayer et al., 1994). When we asked athletes the same questions, they responded in a similar way (Stevens & Lane, 2001; Terry et al., 2006). During lockdown, some of these strategies became more difficult to do. For people living in close conditions, where people could only go out of their house for one hour for exercise or shopping, then being in close proximity to others would be very restrictive. In such conditions, it is likely people will experience increased anxiety and frustration. For people trying to exercise alone, the restricted choice of possible activities available creates concerns. For people used to running, there was a possibility of running outside for an hour. At the start of the lockdown, runners raised concern that they would be seen running outside twice in one day and were conscious of avoiding possible arguments with neighbours who might observe them. For people who regularly used gyms, which were closed, the ability to train required equipment and the speed the virus spread was so fast that sports equipment was sold out, and if not sold out, delivery of sports materials was restricted. A challenge was to find ways to exercise although there were a plethora of celebrities running exercise sessions via social media.

As the lockdown in the UK began, we wrote an article that encouraged people to exercise and use green environments to help manage mood (MacIntyre et al., 2020). We encouraged people to use the strategy *savouring* when getting into nature was not easy. There is a growing evidence base on the therapeutic effects of being in nature, and the notion that exercising in nature has additive effects (Lahart et al., 2019). Savouring is done by using images from prior experiences in nature to remind yourself of previous positive experiences and feelings. The restrictions on movement and social interaction meant that people became consciously aware of not being able to change location very easily and often who they were with. Conscious awareness of what emotion regulation strategies is argued to be a key reason why they are effective (Custers et al., 2019; Lane, 2012a). Knowing what you wish to use, but not being able to use them has negative effects. Therefore, to effectively use situation selection with a self-regulatory framework is to be aware of the options available, to know what factors are readily available to change and what are not.

The second approach is *situation modification* which refers to attempts to modify external aspects of the environment. For example, if you recognise your mood needs regulating, that is you wish to cheer yourself up, or stop yourself feeling anxious, then deciding to modify your situation is a good strategy. Many strategies had to be modified due to the requirements for keeping safe during COVID-19. If people ran or cycled to help manage emotion and did so alone or with a member of their own house, then they could continue. People who ran with training groups felt the impact of the new restrictions as people could not meet to go running. Evidence shows the benefits of exercising in groups via social benefits where people support each other and performance benefits. Performing with others can build confidence via reflections on performance creating the mindset “if they can do it, so can I” (Bandura, 1997). The impact of COVID-19 meant that people needed to re-think what they could and could not do (Roberts & Lane, 2021), and this additional act of thinking and planning could be tiring (Gailliot et al., 2007). Repeated acts of self-control are proposed to be tiring, and although there is some dispute on this theory (Inzlicht & Friese, 2019), COVID-19 did serve to disrupt automated habits.

The third strategy is *attention deployment* which refers to the process whereby an individual directs their attention to influence their emotions, and with COVID-19 restrictions this strategy could be used, for example, planning your training. For example, making a conscious decision on what to focus on. With COVID-19, where running outside brought unusual interactions from others due to the new need for distancing (see Carruthers 2020, who details her experiences) and so runners who are used to focusing internally on running are made more aware of others, and so change their normal routines. Runners needed to plan sessions so that they had little potential contact with others.

Attention deployment is often used when it is difficult to change or modify the situation. Attentional deployment could be done in the form of distraction, for example, deciding to listen to music when exercising and focusing on the music. When running during the early stages of COVID-19, as Carruthers (2020) points out, there was a sense that people were looking and thinking "why is this person running when we should be in lockdown?", and if such a thought went through your mind, it could create unpleasant emotion. And so, focusing on listening to music can be helpful. Attentional deployment can perpetuate unpleasant emotions via rumination, and so repeatedly focusing on potentially negative events in the future serves to maintain the intensity of the emotion.

Learning Exercise Five

Go through the five families of emotion regulation and give an example from personal experience of how you have used them.

- Situation selection
- Situation modification
- Attention deployment
- Cognitive change
- Response modulation

Now repeat this task as if you are working with an athlete. Go through the five families and consider how you might use them.

In the COVID-19 crisis, where normality shifted, active planning was desirable and therefore planning your training could enable situation selection and modification strategies being achieved by appropriate planning. The fourth approach is *cognitive change* which involves changing the meaning of an event or situation, and with COVID-19, this can be useful as priorities shifted via aggressive messaging to stay home/save lives meant a re-think of many actions previously seen as normal. Spending some time to re-think these and so avoiding frustrations at not being able to do them can prevent unpleasant emotions arising. Examples of cognitive change include distancing or taking a third-person perspective when evaluating an emotional event and thereby being able to gain an in-depth reflection. Humour is an example of cognitive change, and by having a goal to make yourself and others laugh it is possible that this has wider benefits.

The fifth approach is *response modulation***.** The other four emotion regulation strategies are anticipatory, whereas response modulation is used once the emotion has been experienced fully. Response modulation refers to strategies designed to regulate the physiological and cognitive aspects of emotion as directly as possible. Regulating the physiological arousal associated with emotion makes intuitive sense in sport given that optimal arousal levels will vary substantially between sports, from the low arousal associated with sports such as archery to high arousal in sports such as powerlifting. Regulating strategies include progressive muscular relaxation, centring, imagery, listening to music and exercise (see Karageorghis et al., 2011; Lane, 2012a).

In summary, the COVID-19 crisis intensified the emotions in many people and simultaneously also influenced the availability of strategies to regulate emotions. This combined effect can explain an increase in poor mental health and why people should be encouraged to plan to use emotion regulation strategies. Consistent with theoretical proposals, prevention of unpleasant emotions is better than cure (Gross & Thompson, 2007). To illustrate how this can happen, I will use a case study of an emotion regulation strategy used in COVID-19.

Case study

From the outset it should be emphasized that this a reflective piece of work on emotion regulation during the unique situation of a pandemic. The goal of writing this particular case study was to illustrate the key issues. Reflection is a key part of a researcher and practitioner's work and so should be treated accordingly (Devonport & Lane, 2013). In terms of the options I considered, I developed a case study of work with athletes which articulates my effort to maintain their motivation, of which gave me good first-hand insight into how the stresses and strains of a pandemic affect high-performing individuals. I collected daily mood data on this athlete which details the intensity and severity of emotions experienced. Within this case study, I could talk about strategies that were used to maintain training and emotional health. Running concurrently, I supported several athletes, and the work produced similar findings, that emotions became unpleasant, normal regulation strategies were harder or suspended, social challenges were more difficult. MacIntyre and colleagues (2020) detail some of this work. The summary of this work was that I was seeing trends in emotional response that were similar to what was observed in other case studies that focused on emotions experienced in stressful challenges (Devonport et al., 2011; Lane & Godfrey, 2010; Lloyd, Pedlar, Lane, & Whyte, 2007). Our book on case studies (Lane, Godfrey, et al., 2014) provides many examples for practitioners, hence I was keen to do something different. Our article that details experiences going through In-Vitro-Fertilization (Devonport & Lane, 2013) which the author (Devonport) was also a participant, and my article on experiencing from boxing (Lane, 2006), and my recent chapter on emotions practitioner's feel, were all influential in my decision. I decided to use myself as the target of the case study. I further thought, as the chapter will reveal, this could be suitable as from the outset I set out on a programme of activities that were designed to maintain positive emotions in myself and others.

Photo by [Andrea Piacquadio](#) from [Pexels](#)

Case Study on Emotion Regulation: "Keeping Your Chin Up By Doing Chin Ups"

Prior to lockdown, my life would involve going to work, which is a 15km (Walsall campus) or 40km (Wolverhampton Campus) drive depending on which campus I was attending. Each week I ran a 5km parkrun, amassing 451 parkruns since October 2011, which shows how few weeks were missed. At parkrun, we have a group of friends whom we would meet and have coffee with after the run. I had started indoor rowing, partly as a response to a knee injury, and had competed in indoor competition and would go to a leisure centre most evenings. In those evenings, we would have coffee and meet people. My wife, who has run a similar number of parkruns, would come to the gym with me most evenings; and the act of going to do exercise in varying formats was a major aspect of our social life. I detailed in a chapter how exercise can be used to regulate emotions with the idea that you could "run yourself happy" (Lane, 2012b). Lockdown, of course, changed this approach to emotion regulation with all of these stopping overnight as gyms closed, parkrun suspended, and all events I had entered being cancelled. Competitive events such as parkrun have more than an exercise function; they create a time and place to raise the intensity of high-active emotions and make use of anxiety and unpleasant emotions (Lane, Beedie et al., 2012; Stanley, Lane, et al., 2012; Stanley, Beedie, et al., 2012).

I had been watching how the spread of the virus was unfolding in France and Spain, where leisure facilities closed three-weeks ahead of the UK, and so bought a Concept2 rowing machine for use at home (the Concept2 is seen as the gold standard for indoor rowing and used by Olympians and by a large online indoor rowing community), clearing a room out, meaning I disposed of two sofas. They were put to the side of the house initially and later permanently removed, thereby to illustrate that we had sufficient space and were not having to overcome cramped living conditions. The huge change to my living conditions was easier because my wife shared these goals; had the situation been different, then this course of action would have an adverse effect. If my actions upset my wife, then the social aspect of emotion regulation means that her emotions influence me, and therefore, further thought is needed.

As we went into lockdown, the emotion regulation I used would not be possible. I felt I needed a challenge and running in preparation for the return of races seemed too distal, and importantly, I had little control over when this would occur. Being a sport psychologist, and advocate of promoting mental health through physical activity, active across social media and a regular media commentator, I felt the message of encouraging people alone to be active would be shallow and lack meaning; that is, I should practice what I preach! Further, I felt it needed to be contextualised in the current situational constraints. This is an important aspect of any self-regulation attempt in that the person doing it needs to see the task as suitably worthwhile to do. The self-regulation strategy was to be a behavioural goal. When setting a goal, it needs to captivate interest to be effective; a key reason why goal setting is effective is that they direct attention and motivation. I saw this as an opportunity to promote mental health through doing physical activity and simultaneously doing something to manage my own mental health.

In considering the options, I wanted a challenge that was largely under my control. Perceived control and a strong sense of autonomy is argued to be an important aspect of sustaining behavioural change (West et al., 2020). At the time, the message from the UK government was that people could exercise for one-hour outside. During my initial runs, I noticed many people displaying signs of anxiety through fear of social contact. Looking at what happened in Italy and Spain around the same time, there was a possibility that all forms of going outside would be restricted. I felt the exercise should use a confined space.

Why One More Chin Up for Each Day of Lockdown?

My decision was to do one chin up for each day of lockdown, whereby on day one, I did one chin up, two chin ups on day two and so on until lockdown was over. I used the phrase “keeping your chin up by doing chin ups” across social media, recorded a film of me doing the chin ups, doing impersonations, and trying to create funny stories, and posted them to a YouTube channel (Lane, 2020). The plan was to perform one more chin up for each day of lockdown, and so I did a single chin up on day one going through to doing 125 chin ups on the final day. I decided lockdown had eased sufficiently with the key marker being the re-opening of gyms. The rationale for selecting the closure and opening of gyms was that I used exercise and going to the gym as a social event as one of my main emotion regulation strategies.

Before lockdown, I was doing chin ups occasionally on a morning run in the park, where there is a park gym, so I was confident I could do at least one chin up, and confident I could get through the first few days. I hoped to make progress during that time that would enable attainment of more chin ups; but the goal was specific and only one more chin up. Using self-efficacy theory (Bandura, 1997), I should have confidence to attain the target. It should be noted that the chin up facility in the park was also closed early on. I had a chin up bar on the side of my house. From the start I felt confident I could do one chin up. It was only one extra chin up and so at the point of failure, the question of whether I could do one more is consistent with a great deal of advice I have given to endurance athletes (Lane, 2012b). With endurance athletes, the advice has been to break tasks down into short units, specific goals and ones that are attainable (Lane, 2012b). The goal is achieved by holding a narrow and process-based focus of attention. I wished to test and showcase this mindset, which is something I see not only as good advice for others, but also for myself. In applying science to practice, an important aspect is the evidence that it works. My view was that I was modelling this, something I felt was useful from the role of sport psychologist, but also by doing it myself; I would be regulating my own emotions. In terms of emotion regulation, it is a case of situation selection (Gross & Thompson, 2007) and I decided that doing the chin ups would serve many goals;

a) it was exercise, which I used daily to manage my mood, and physically challenging as I wondered how many I could do and how it would unfold;
b) it was outside, and so I could engage with nature; and
c) it was challenging, and so I sought to advertise to as many as possible, thereby increasing anxiety to some degree, which helped me commit to doing them.

Doing the chin ups presented many challenges, but it also revealed many positive aspects that were not considered at the start of the process. These include using humour and the positive effects of planning humour on your mood and on others, managing sensations of fatigue, finding time, and maintaining motivation.

Humour as an Emotion Regulation Strategy

On March 23rd, 2020, which was also my birthday, I did one chin up, filmed it on my phone and posted the film to Twitter and Facebook. The film received several thousand views daily; I became more adventurous in how I made the films. Using the Apple I-Movie suite, I would film the chin ups, adding music, narrative, pictures, and on occasions created a storyline. Watching chin ups is not something that easily makes for the best programme, and so I tried to make them funny. I did this in a variety of ways, doing impersonations of famous people (Michael Caine, Frank Spencer, Bruce Forsyth) and having a storyline. For example, on the day of the Swimathon (I had entered to do a 5000m swim) I did the *chin up Swimathon*, doing chin ups in a swimming costume, swim hat and goggles (see Lane, 2020).

The act of trying to make humorous material is in itself an emotion regulation strategy (Samson & Gross, 2012). Evidence shows humour is effective and is used by people in extreme conditions where situational opportunities to alter emotions are minimal. Planning activities and scenes of a video is a creative process and you are trying to envisage material that is funny. If this is positive, and you think it could be funny, then that thought is a positive one, and you think you are making something worthwhile. The image of people smiling when watching your video is a positive one; what you are doing is modifying the situation of others, and thereby improving emotions if possible. This produces a large sense of satisfaction, which is mood enhancing.

However, acts such as pretending to be going to a swimming gala and walking out in your garden in your trunks evoke feelings of being self-conscious, and with that a fear that people are not laughing with you but at you, which brings unpleasant emotions. To manage such potentially unpleasant emotions, I engaged in the emotion regulation strategy of cognitive change (Gross & Thompson, 1997); to change the meaning, I reminded myself that the goal was for it to be entertaining. It was important for me to recognise the multiple roles people have and that, despite this coming out under the banner of me as a sport psychologist, acting out exercise in an enjoyable way and creating as entertaining a backdrop as I could did not conflict with that image.

Overcoming Fatigue—Keeping the Challenge in Perspective and Focusing on the Present

At the start of the chin up process, I had not thought what day 30 would feel like or look like. After day seven, I knew that the chin ups would not be done in one continuous set. I started researching how to do chin ups and learning any technique that might help by looking at experts. It showed that world chin up records were carried out in a series of sets of repetitions and even the best and fittest did not do more than 10–15 chin ups in one set, typically going for multiple sets of a lower number. In the early days, my confidence to do a large number grew when I found I could repeat sets of seven repetitions. Performance accomplishments are a strong source of self-efficacy (Bandura, 1997), and a strong sense of self-efficacy is a good strategy for the management of unpleasant emotions. In Gross and Thompson's (2007) model, it is a cognitive change and beliefs to do the task, and therefore uncertainty over failure was low. The knowledge that even the very best chin up performers do not do sets over 10 repetitions that frequently, and rarely exercise to failure, provided a strategy I was confident to follow. Alongside this, I viewed many YouTube videos on how to do chin ups that focused on the skill aspect rather than only about physical fitness. This enabled breaking down chin ups into discrete movements and practicing them. For example, I practised hanging for 30 seconds, and used this practice to provide entertainment also (I sang *Always Look on the Bright Side of Life* from the Monty Python film *The Life of Brian* whilst hanging over the chin up bar one time). By having it as a part of a comedy sequence, where I sang a song and had to act happy, I also regulated physical discomfort by changing my attention. Brick et al., (2018) found that smiling during a marathon race is a good way to manage fatigue.

The comedy aspect is important. If the challenge was truly demanding to the extent that few people could do it, then that in itself is worth reporting. I have supported people doing such challenges such as riding across America, doing a channel swim (Lane & Whyte, 2008), running the Marathon Des Sable (Lane, 2006), and the North Pole Marathon (Lane & Devonport, 2008). A large number of chin ups is something most people would not want to do but, possibly similar to a challenge such as running a marathon, think they could do with training. I thought the same. I did not want to try to present a message that the challenge was particularly impressive; therefore, the goal was to complete the required number of chin ups, try to make the video funny via the storyline, impersonations, and by wearing fancy dress. The details and their anticipated impacts on my emotions and the emotions of others are important; via feedback on social media and requests for impersonations, the chin up videos evolved.

Finding Time

As the number of chin ups grew, it clearly took longer to do the chin ups and make the film. In addition to this, there is a growing sense of fatigue. Once I had to do more than 80 chin ups, the number of sets and repetitions needed to be thought through carefully. In addition to this, it became an expectation that the chin up film would be published on social media in the morning. Attempting to overcome a difficult challenge is motivating; it directs attention to what is needed and as such encourages prioritising actions and resources. To develop strong self-efficacy beliefs that you can do this is about following key principles as outlined by Bandura (1997). To develop confidence in being able to do the task, I watched videos on YouTube to develop technique. What this enabled was to re-think how to approach doing the chin ups, insomuch that I focused on the skills needed as opposed to seeing it as a fitness task. This has relevance to regulating perceptions of fatigue when doing chin ups; by focusing on skill, I sought ways to make the task easier to do, which helped with a narrative on what to focus on.

Being in Control

In the COVID-19 crisis, a key point was to perceive I was in control of when and where I could exercise. I had a chin up bar and the instruction of not leaving your house meant I didn't focus on having to go out. Whilst in normal times, going out is to be encouraged, during the early stages of lockdown, when people were wary, I feel people were watching me when running. Whether this was merely my being self-conscious, it changed the quality of the experience. Added to that, there were instances where people were clearly frightened, and so being able to exercise in my home was suitable. These features are relevant to the uptake of any emotion regulation strategy. Setting challenges where contextual factors increase the size of the challenge should be an important consideration. Sedentary people who wish to exercise regularly often set a goal to exercise daily, but exactly how to do this is not clear. Having the opportunity to do the exercise makes the choice to do it is easier and having an attainable goal as to how much exercise to do helps build motivation. With the chin up exercise, the first 10 days were relatively straightforward, and so the aspect of forming the habit of doing the exercise was successful. A key issue is developing the behaviour so that the habit is formed from the performance itself–starting easy and making the progress small, one more chin per day up in this case, helped develop the mindset that it was possible. A key part of this was also to not think too far ahead. If I thought about how hard day 60 was at day 10, this could be overwhelming. In a similar way, it is how marathon or endurance athletes are coached, that is to keep the focus on the here and now because seeing the overall size of the task can be overwhelming.

Learning Exercise Six

Open Google Scholar and use the key search terms “COVID James Gross emotion”. This will give you the latest articles that use Gross’s work. Compare how findings relate to one of these articles.

Conclusion

The abilities to identify current emotional states, identify how you wish to feel, possess sufficient skills, and have confidence in your ability to use these skills should be a part of the toolkit people have. COVID-19 was an assault on emotions, and, via restrictions imposed, impacted the emotion regulation strategies that could be used. The present chapter has used a case study to illustrate how emotion regulation strategies can be used and how the principles of finding an engaging task, which you can make progress on, can develop confidence in being able to do it. Then, via performance accomplishments, belief in abilities increases, and the habit is formed. I suggest that such a process could be applied to learning new emotion regulation strategies and that people should be encouraged to see learning emotion regulation strategies as a key goal to maintain their mental health.

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Chapter 10
Social Support, Relationships, and Physical Activity

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Chapter Overview

We live in a social world where our interactions with others influence our physical activity behavior. A parent may take their child to the park to play. A spouse may encourage their partner in reaching their goal of running a half marathon. A person may keep going to an exercise class because they enjoy the people in that class. An older adult may be more likely to go for a walk if they have someone to walk with them. In this chapter, we will explore the different ways that other people influence our physical activity. First, we will explore social support, which is probably the area that has received the greatest attention in the research. We will also look at other types of social influences including social norms and social control. We will also explore the role of groups in our physical activity. We will examine how these social influences relate to physical activity and ways they have been used to promote physical activity. At the end of this chapter, we will learn about some of the many ways we measure these social influences. While we are focusing on physical activity, these social relationships also influence our health and well-being. For more discussion on social support in the context of rehabilitation from sport injury, see Chapter 31 (Griffin et al., 2021).

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Social Relationships and Health and Well-being

Social Networks and Health

The recognition of how our social relationships influence our health and well-being has been around a long time. Durkheim in 1897 published a book called *Suicide* that described how a lack of social integration or a lack of connection with others was associated with increased rates of suicide (Berkham et al., 2000). When looking at risk of dying (mortality), there is a decreased risk of dying when someone has a strong social network compared to a poor social network (Holt-Lunstad et al., 2010). The reduction in mortality risk associated with high levels of social support versus low level of support is similar to that reduction of risk by quitting smoking, and larger than risks associated with other conditions, such as obesity (BMI; Holt-Lunstad et al., 2010). There are many pathways in which social networks or social contacts can influence one's health, including influencing one's behaviors (e.g., diet, exercise, smoking), how one feels (e.g., decreasing depression, improving self-esteem, helping us cope) and even improving one's physiological functioning (e.g., improving immune function; Berkham et al., 2000).

The effects of social networks on health are often separated into (a) the *structural aspects* (i.e., how many people in your social network and how often you interact with them) and (b) the *functional aspects* (i.e., the content of those interactions in terms of social support provided; Umberson et al., 2010). Examples of this functional support include providing social support, creating social norms or expectations for how one is to act, and helping to regulate behavior (e.g., social control). These interactions with others can influence both mental health as well as health behaviors (Umberson et al., 2010). Most of the social influences covered in this chapter will look at the functional aspect of social support.

What is Social Support?

Social support is described as the resources that one has available or perceives available to them from their social relationships (Gottlieb & Bergen, 2010). These resources are the ways that other people can help a person. One example of social support would be realizing there is a friend that someone could invite to be physically active with, while another person may rely on a spouse to watch their children, so they can be active themselves. Another person might value having a person motivate them so they can reach their goals. Different people may be able to provide different types of support for an individual to help them be physically active.

There are two general ways to view social support: (a) *perceived support* and (b) *received support* (Gottlieb & Bergen, 2010). Perceived social support is the support one perceives available from others regardless of whether they use it or not. Someone who knows that they could call a friend would perceive that support is available to them if they were to need it. Received social support is the support that others provide to a person. An example of this would be when a teen reports that their parent encouraged them to keep going on a run. This is the support that has been provided often in response to stressful situations. While both types of social support have been related to health behaviors, perceived support may help individuals develop positive coping skills and subsequently decrease the development of chronic disease (Uchino, 2009). Knowing that support is available if needed, regardless of whether one uses it or not, is important for engaging in health behaviors such as physical activity.

Models of Social Support

When looking at how social support may influence health behaviors and health, several different models have been suggested. These models include a main-effect model, stress-buffering model and more recently the thriving through relationships model. Each model specifies a different path through which physical activity may be influenced by our social relationships.

Main-Effect Model

The view that social support has a direct effect on well-being is called the main-effect model (Cohen & Wills, 1985). This model is closely tied to the idea that large social networks are associated with positive outcomes such as well-being and health. According to this model, the social support received has a protective effect on an individual as a whole. In this model, social support directly influences physical activity regardless of whether a person is experiencing stressful events. For example, someone driving a friend to the gym would be having a direct effect on their physical activity. In this example, the social support directly helps someone engage in physical activity. The direct effect on behavior and well-being occurs directly as a function of the social support provided.

Stress-Buffering Hypothesis

The stress-buffering hypothesis focuses on the role of social support in helping individuals cope and manage stress (Cohen & Wills, 1985). Stress is experienced when a person does not think they will be able to meet the demands of the situation (Lazarus et al., 1984). This perception of a threat leads to the experience of stress including feelings of worry and helplessness. It also may lead to negative changes in behaviors including less exercise, alcohol abuse, and poor diet (Cohen & Wills, 1985). Social support may help a person in these potentially stressful situations in two ways. First, with support, they may not perceive that situation as stressful. Someone who knows that they have a friend that they can call on for help may not find a situation as stressful. When in the potentially stressful situation of juggling the demands of being physically active and their job, a friend providing encouragement may help someone realize they can handle the situation. The second way that social support could help in these potentially stressful situations is that support may provide added resources that will help them cope with the situation. For example, someone balancing being active and other demands finds this situation stressful. By having a co-worker help them balance the job demands, they may now have the resources to cope with the situation and be able to fit exercise into their schedule. In this instance, social support helps a person cope with the situation by providing resources. In this model, social support plays a role in protecting someone from the negative effects of stress.

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Thriving Through Relationships

A newer model of social support put forward by Feeney and Collins (2015) focuses on how to help people thrive. This model looks at how social support plays a role in someone's overall well-being. This model focuses on two pathways in which social support influences one's well-being: (a) in the face of adversity and (b) seeking opportunities.

In the first pathway, the focus is on helping an individual deal with life adversity. This pathway is similar to the stress-buffering pathway. It looks at how social support can help someone cope with challenges they are facing. In this case, the support person serves as a *source of strength* and provides support in a way that may help someone deal with challenges. Think about someone who is trying to return to being active following an injury. In this case, they might need the encouragement and support from someone as they are just starting out. The support may take the form of emotional comfort such as listening to someone's fears about returning to being active. The support also could take the form of helping the individual build up their abilities by assisting them with activity modifications that they could do. Another way that support could occur during this return following injury would be to help motivate the person as they are returning physical activity. In these instances, the support provided is helping someone cope with the stress of returning from injury and the support person serves as a source of strength to the recipient. Also see Chapter 31 (Griffin et al., 2021).

The second pathway involves support that encourages people to seek out opportunities. In this manner, social support from others would encourage someone to set goals and push someone to grow, develop and thrive. In this pathway, the person is called a *relational catalyst* as they are helping someone seek out new opportunities. Many of the examples in the physical activity context may relate to this pathway of support. The support provided could take the form of encouraging someone to reach goals they might not usually set for themselves, such as running a half marathon, or helping a person to push themselves outside of their comfort zone and try something new. Other examples of this support include helping the individual reach their goals by helping them plan (e.g., creating an exercise program with them), and providing assistance (e.g., driving someone to a fitness facility or watching their children while they exercise). Within this pathway, the support involves helping someone to develop and grow as they strive to achieve their physical activity goals.

Learning Exercise One

What are the main differences between a person serving as a "source of strength" and a "relational catalyst" when providing social support?

Social Support and Physical Activity

Social support has frequently been examined as a correlate of physical activity. Several reviews have suggested that there is a positive relationship between social support and physical activity (Scarapicchia et al., 2017; Smith et al., 2017). In a review of 20 prospective studies that examined the role of social support for future physical activity participation, there was a small positive effect for social support, meaning that those who reported more social support at one time tended to be more active at a later point in time (Scarapicchia et al., 2017). Two of the most common sources for social support examined were from family, friends, and significant others. However, in this review, there was a lot of variation in results. For instance, support from family appeared to be related to physical activity, but the studies looking at friend social support were inconsistent. In a review of 27 studies examining social support in older adults, family-provided social support showed a positive association with physical activity participation (Smith et al., 2017). In a review of 75 articles examining social support in adolescents, an overall positive association with physical activity was reported for social support provided by parents, family, and friends (Mendonca et al., 2014). These reviews support the positive effects of the provision and receipt of social support on physical activity across the lifespan (e.g., Mendonca, et al., 2014; Scarapicchia et al., 2017, Smith et al., 2017).

Several studies have started to look at social support that is provided on a day-to-day basis. Using the thriving model of social support, Berli and colleagues (2018) examined how daily support from a spouse influenced one's physical activity level that day. Couples who were previously inactive participated in the study with the goal of becoming more physically active. In this study, people completed an average of 25 more minutes of physical activity on days when their spouse provided support towards their goals than on days when they did not provide support. They also reported more physical activity on days when both partners engaged in physical activity together. This joint activity may reflect a type of companionship support where the partners have someone to be active with. In another study, daily support by spouses was related to increased perceptions of confidence and physical activity in individuals with type 2 diabetes (Khan et al., 2013).

One population in which social support for physical activity is particularly influential is cancer survivors (McDonough et al., 2020). Physical activity settings provide the opportunity for social support both for being active as well as coping with cancer. This is an example of how—in the case of adversity, surviving cancer—the social support is vital for coping with stress and overall well-being (McDonough et al., 2020). In a review of 39 qualitative studies, cancer survivors described many ways their social relationships supported their physical activity, such as through encouragement, accountability, and companionship (McDonough et al., 2020). Support for coping with cancer was also commonly described across several studies; this included strategies such as understanding the cancer experience, being able to talk about cancer, normalizing cancer, and modeling living after cancer.

Social support, especially if it is from family, appears to have a positive influence on physical activity behavior (Scarapicchia et al., 2017; Smith et al., 2017). Most of the research has looked at social support as a whole and has not differentiated the types of social support (e.g., Scarapicchia et al., 2017; Smith et al., 2017). However, as people support each other in many different ways, researchers look at the role of specific types of social support, such as instrumental support (e.g., tangible aid), emotional support (e.g., encouragement and caring), and companionship (Golaszewski & Bartholomew, 2019).

Types of Social Support

Given that social support has big potential to influence physical activity behavior, what does it involve? There are several different ways of classifying social support. These different types of social support pertain to what is the actual content of the social support. Is someone providing information or encouragement, or are they someone to be active with? While there are different ways of conceptualizing the types of social support, (Gottlieb & Bergen, 2010; Golaszewski & Bartholomew, 2019), some common types are described below in Table 10.1.

Research in the physical activity area often combines social support into a summary score and does not differentiate the types of support (Beets et al., 2010; Scarapicchia et al., 2017). Among studies examining social support and youth physical activity, social support is sometimes separated into tangible support (e.g., instrumental and companionship) and intangible support (e.g., emotional and informational; Beets et al., 2010). Both types of support have been related to youth's physical activity. Using a newly developed measurement tool, Golaszewski and Bartholomew (2019) reported that five different types of support (emotional, companionship, instrumental, informational, and validation support) were positively related to self-reported physical activity behavior, with companionship and informational support showing the strongest relationships. While social support can influence physical activity in many ways, social support is not the only social influence on physical activity.

Table 10.1
Examples of Different Types of Social Support (Gottlieb & Bergen, 2010; Golaszewski *& Bartholomew, 2019)*

Type of support	Definition	Examples
Emotional	Provision of caring and encouragement	Helping someone keep going when they are struggling to reach a goal Cheering a person on or listening to challenges that someone is facing
Instrumental	Tangible aid such as the provision of resources or services	Someone helping a friend by driving them to the gym. A parent purchasing sport equipment for their child Spotting another person as they lift weights
Informational	Provision of advice, feedback, or help problem-solving	Advice from a friend on how to overcome a plateau in their fitness goals Enlisting the help of a partner to problem-solve how to deal with a particular barrier for physical activity
Companionship	Having someone to be active with and spend time with	Having someone to go for a walk with or lift weights with
Esteem	When others make someone feel like they matter, are valued, and accepted	Someone commenting on how much they value being active with a person Helping another feel like they are needed
Validation	Provides social comparison in terms of behaviors and norms	An individual who feels sore after just starting to work out, may seek out validation support from others who also were working out to see if this “soreness” is normal

Learning Exercise Two

Think about your own physical activity and provide an example of each type of social support that you have experienced. Which type do you think made the biggest difference in your own physical activity?

Other Types of Social Influences

Social support is just one of the ways that social relationships may influence physical activity. Several other common social influences include *social norms* and *social control*. These are described below.

Social Norms

Social norms reflect perceptions surrounding what is appropriate behavior (i.e., either typical or desired behavior; Cialdini et al., 1991). There are two primary types of social norms that have been investigated relative to physical activity behavior. Descriptive norms are based on what other people do (Cialdini et al., 1991). For example, if a person's friends are all going on a hike, they likely would feel pressure to go with them. Injunctive norms are norms that are based on what is viewed as desirable behavior by others (i.e., what behavior is acceptable; Cialdini et al., 1991). An example of this would be engaging in physical activity because someone thinks it is what their family thinks they should do. Previously an overlooked type of social influence, social norms seem to influence physical activity behaviors more than previously thought (Priebe & Spink, 2011). When asked reasons for being active, people typically report health- or appearance-related reasons and are less likely to report being active because others are too (Priebe & Spink, 2011). However, perceiving others to be active was related to physical activity participation; this leads the suggestion that descriptive norms are important for influencing physical activity behaviors (Priebe & Spink, 2011).

The evidence for the effects of norms on our physical activity behavior has continued to grow. In a study looking at social norms for using the stairs among university students, both descriptive and injunctive norms were related to stair use (Crozier, 2019). Using data from an online exercise-focused database, people were more active when they had more friends in the database and their friends reported more physical activity (Carpenter & Amaravadi, 2019). In efforts to predict physical activity and healthy eating in a sample of African American church members, researchers found that a descriptive norm for physical activity was positively associated with physical activity engagement, even after controlling for individual variables (e.g., sex, employment status, risk perceptions) and neighborhood variables (e.g., access to parks, presence of sidewalks; Heredia et al., 2020). These three studies illustrate the potential influence of descriptive norms on physical activity behavior.

In addition to being related to physical activity behavior, social norms have been related to other important outcomes. Researchers have reported that performance on a muscular endurance task (i.e., a maximal plank hold task) was greater when people were provided information that others held the second plank for longer (Priebe & Spink, 2014). With this descriptive normative message, people also felt more confident that they could hold their second plank longer (Priebe & Spink, 2014). Another study showed that participants receiving normative information (e.g., "97% of those tested improved their balance") had better standing balance than those who received no information (Spink et al, 2019). Studies such as these have used experimental designs and manipulated the normative messaging, leading to changes in perceptions and behavior. With the potential to manipulate norms, others have examined the effects of using norms to promote physical activity on a larger scale.

Using norms to promote physical activity is receiving increasing attention. For example, messages that focused on norms have been used to prompt stair usage (e.g. "We're doing it! Are you? Join staff and students in taking the stairs today" and "Most staff and students think we should increase stair use"; Crozier, 2019, p. 103). During the period when the norm messages were displayed, stair use increased by 3.1%. To examine the effects of changing physical activity norms in a care center for older adults (age range: 80–95 years), researchers used a news report that highlighted a descriptive norm: "Increasing numbers of exercising older adults in the local community" versus a control story that just referred to "older adults in the local community" (Koeneman et al., 2017). Compared to the control group, older adults exposed to the normative message reported greater intention to take part in the physical activities offered at the care center and reported participating in more physical activity three months later (Koeneman et al., 2017). In another study, pedometers were used to provide descriptive norms by giving information about the group average step count for participants, along with indicating if the person was above or below the average (Wally & Cameron, 2017). Compared to the no-message control group, the group that received this messaging reported more steps (Wally & Cameron, 2017).

The potential impact of norms such as what others are doing has been shown to be related to physical activity across a wide variety of populations (e.g., University students, general population, African American church members, and older adults) and a wide variety of behaviors (e.g., stair use, step counts, muscular endurance and balance tasks). While people may not recognize the role of norms in their own behavior, the research suggests that perceptions of norms (i.e., number of people active) and normative messaging are related to physical activity behaviors.

Learning Exercise Three

Describe the descriptive norms and injunctive norms that you see from your family and friends as they relate to physical activity behaviors, such as exercise or active choices (e.g., taking the stairs).

Social Control

Another way that social relationships influence physical activity is through the provision of social control, which reflects the efforts by one person to monitor, prompt, or persuade another to engage in a desired behavior (Craddock et al., 2015). Social control is viewed as a more active influence where the person providing the influence is attempting to change or control the behavior of the recipient. Much of the research on social control in the physical activity domain has been with older adult populations (e.g., Newsom et al., 2018) or adults at risk or with chronic conditions such as obesity (Scholz et al., 2021) and diabetes (Kahn et al., 2013).

While social control has not received as much attention as social support with respect to physical activity behaviors, it does appear to have the potential to exert both a positive and negative impact depending on the type and other contextual factors surrounding the influence (Craddock et al., 2015; Scholz et al., 2021). Factors such as social support (Kahn et al., 2013) or experiences of emotions (Newsom et al., 2018) may lead to different responses to social control. Positive types of social control (e.g., more encouraging forms that prompt the behavior) appear to be related to positive outcomes (Craddock et al., 2015; Scholz et al., 2021). In contrast, the more pressuring form of social control, often called negative social control, may have a negative or no effect on the behavior (Craddock et al., 2015; Newsom et al., 2018). In a sample of couples who were overweight and intending to become more active, positive social control was associated with more physical activity and feeling more positively while negative social control was related to feeling more negatively and reporting doing the opposite behavior or hiding that they were not active (Scholz et al., 2021). *Behavioral reactance* is a common negative response in which an individual performs the opposite behavior or hides the unwanted behavior in response the pressuring type of social control (Scholz et al., 2021).

Another relationship where social control has been examined is the parent–child relationship (e.g., Wilson & Spink, 2011). Parents have been identified as key influences for children's physical activity (Gustafson & Rhodes, 2006). As parents guide their child's physical activity behavior, they may exert social control. In a qualitative study, parents and adolescents described parents using social control to regulate their child's physical activity level during a physical activity lapse (Wilson et al., 2014). When parents viewed their child spending too much time in front of a screen or when parents viewed a lack of motivation for physical activity, they described acting to prompt their child to engage in physical activity through the use of social control strategies. This indicates that parents may use social control as a type of regulation to prompt children to be active when they are perceived as not meeting the desired amount of physical activity (Wilson et al., 2014). In another study, adolescents (age 12–18 years old) reported an increase in their physical activity after an activity lapse when they perceived their family exerting more collaborative social control (e.g., offering to be active with them; Wilson & Spink, 2011).

Parental Influences

Parents have been identified as playing a vital role in their children's physical activity. Previously, we explored the role of parental social support (Beets et al., 2010) and social control (Wilson & Spink, 2011; Wilson et al., 2014). A parent may provide opportunities for their child to participate in physical activity by, for example, providing a bicycle or ball for them to play with. A parent may encourage and support their child as they are participating in physical activity. A parent may also serve as a model for the child's behavior by being active themselves. Several reviews have highlighted the positive relationship between parental encouragement and physical activity in children (Beets et al., 2010; Gustafson & Rhodes, 2006). Across these different reviews, the potential of parents to influence their child's physical activity has been consistent. Given the diversity of ways that parents may influence their children's physical activity, there has been an effort to conceptualize the influences. Mâsse and colleagues (2017; 2020) grouped parental influences into three broad types: (a) autonomy promotion, (b) structure, and (c) neglect and control.

Autonomy promotion reflects efforts by parents to support their child's independence as well as promote physical activity through encouragement (Mâsse et al., 2017; Mâsse et al., 2020). This classification also has been called autonomy support (Mâsse et al., 2017). Many aspects of these parental influences focus on guiding the child to choose to engage in physical activity. Encouragement has been reported as a strategy that has consistently been related physical activity behavior (Gustafson & Rhodes, 2006; Beets et al., 2010). Often this encouragement from parents has a stronger effect among younger children than adolescents as it is thought adolescents may be more influenced by peers than parents (Gustafson & Rhodes, 2006). The other aspect of autonomy promotion appears to be praise and rewards provided by parents (Mâsse et al., 2020). This type of parental influence often has been combined with parental support measures and not examined on its own (Beets et al., 2010). Across several studies, the encouragement and reinforcement provided by parents appears to be a key type of parental influence for encouraging children to engage in physical activity (Beets et al., 2010).

Structure refers to parents creating an environment that promotes physical activity (e.g., co-participation, facilitating physical activity, modeling; Mâsse et al., 2017). When parents engage in physical activity, their children are also more likely to participate in physical activity (Beets et al., 2010). In school-aged children, both mothers' and fathers' physical activity was related to their child's physical activity on both the weekend and weekdays (Fuemmeler et al., 2011). In their review of parental influences, Gustafson and Rhodes (2006) identified modeling as a potential type of parental influence; however, this form of influence was not always related to children's behavior. In preschool-aged children, parents' activity was related to their child's activity when they reported being together as opposed to times when they were apart (Keyes & Wilson, 2020). This suggests that parents being active on their own (e.g., going to the gym without their child) may not have the same influence as parents being active with their child (e.g., going for a walk together). Another example of this type of parental influence may come from parental provision of collaborative social control that involves co-participation and helping children learn the skills to be active (Wilson & Spink, 2011). This type of social control is the type that appears to be most promising in prompting children to participate in physical activity (Wilson & Spink, 2011). The beneficial effects of parents and children co-participating in physical activity has been seen across several studies (Beets et al., 2010). Children were more likely to meet the recommended physical activity standards when their parents were directly involved in the physical activity, co-participated, or watched their child participate in physical activity (Beets et al., 2010). This active participation by parents appears to be a key form of parental influence.

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Neglect and control reflect pressures by parents to prompt their child to be active without focusing on the child's interest (e.g., nagging the child; Mâsse et al., 2017). This strategy includes pressuring influences such as nagging, punishing, or using threats to prompt physical activity. Negative social control reflects parents nagging and pressuring them to be active and it does not appear to have a strong influence on physical activity behaviors unless it is perceived as supportive by adolescents (Wilson & Spink, 2010). Another aspect of this type of parenting strategy is that the parent does not encourage physical activity at all and leaves it up to the child to decide if they want to engage in physical activity or not (e.g., permissive strategies; Mâsse et al., 2017). While not directly looking at parenting strategies, parenting styles such as uninvolved and permissive styles may provide some idea of how this absence of strategies may relate to physical activity (e.g., Henessey et al., 2010). One study reported that children (aged 6–11 years) were the least active when they had uninvolved parents (low demandingness and low responsiveness) when compared to other parenting styles (Hennessy et al., 2010). The strategies identified by Mâsse et al (2017) may have less of an impact on physical activity behavior than the other strategies.

While much of what we know about the different types of parental influences can be classified into these three broad types, it is still a relatively new taxonomy. There is a lot of support for the benefits of the autonomy supportive strategies and the structure that parents may provide (Beets et al., 2010; Gustafson & Rhodes, 2006). For more on discussion on autonomy in the context of self-determination theory, see Chapter 3 (Quested et al., 2021) and Chapter 32 (Kingston et al., 2021). In an effort to move our knowledge of parental influences forward, Mâsse et al. (2020) have also put forward a tool for measuring parental influences based on this classification system.

Learning Exercise Four

A parent is wondering how to help their child become more physically active. Based on the different types of parental influences, what recommendations would you give?

Group Dynamics in Physical Activity Settings

It is thought that as humans we have a fundamental need to belong (Baumeister & Leary, 1995). Physical activity settings allow us to satisfy this need to belong by interacting with other people. Much of our physical activity is done with others and many people prefer to be active with others.[1] For example, people may go for a walk or run with a friend, join a fitness class, or lift weights with a group of friends. While some of these settings may seem very much like a group (e.g., walking with a group of friends), others may look a little less like a group (e.g., a drop-in fitness class).

Groupness

Researchers have examined the degree to which these physical activity groups possess the characteristics of a true group (Spink et al., 2010). This is reflected in the concept of groupness, which is the degree that a collection of individuals perceives themselves to be a group (Spink et al., 2010). In structured exercise settings like group fitness classes or running clubs, perceiving that setting to be more like a group has been related to participating more often in that setting (Spink et al., 2010). Perceiving higher levels of groupness within a fitness class has been related to greater reports of enjoyment and effort (Graupensperger et al., 2019). In fitness classes, having higher perceptions of groupness was related to greater satisfaction for the basic needs of relatedness and autonomy[2] and subsequently was related to more physical activity (Evans et al., 2019). Because groups can address the need to belong and have positive effects on physical activity behavior, it is not surprising that research has focused on group environments, structure, and processes (for review, see Eys et al., 2019). The group environment (e.g., member characteristics), structure of the group (e.g., positions, norms, and roles), and group processes (e.g., group cohesion) all have the potential to influence the experience of people within physical activity groups (Eys et al., 2019).

Cohesion

One of the group processes that has received the most attention in the physical activity setting is cohesion (Eys & Brawley, 2018). Cohesion reflects the “dynamic process that is reflected in the tendency for a group to stick together and remain united” (Carron et al., 1998, p. 213). It is conceptualized with two dimensions. The first dimension relates either to the *task* such as getting a good workout in, or the *social* aspect such as enjoying the company of the others you are active with. The second dimension relates to either *attraction to the group* (i.e., the desire of an individual to be a part of the group) or *group integration* (i.e., the unity of the group as a whole). The combination of

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[1] While many people prefer to engage in physical activity, others may prefer to participate in activity alone for a variety of reasons including personality types and even experiences self-presentational anxiety (Hausenblas et al., 2004).

[2] The basic needs of autonomy and relatedness pertain the psychological needs that are part of the self-determination theory. When the basic psychological needs are satisfied in an activity, a person is thought to develop more autonomous motivation (Deci & Ryan, 2000).

these two dimensions creates four types of cohesion, namely (a) attraction to the group - task, (b) attraction to the group - social, (c) group integration - task and (d) group integration - social.

Cohesion has been examined for decades in the physical activity area with a meta-analysis conducted in 1996 describing a positive effect of task cohesion on exercise adherence (Carron et al., 1996). Cohesion has been described as an important aspect of physical activity groups and it is thought to relate to many positive outcomes including adherence or attendance and satisfaction with the settings (Burke et al., 2014). Not all physical activity groups possess the same level of cohesion. Cohesion is influenced by a variety of factors, including similarity, leadership characteristics, and environmental factors such as group size (Chapter 25; Cotterill & Fransen, 2021; Eys & Brawley, 2018). Most of the research on cohesion in the physical activity domain has focused on structured groups like group exercise classes (Eys & Brawley, 2018). Although one study looked at cohesion in unstructured groups, such as people walking with groups of friends (Spink et al., 2014). In that study, adherence was related to higher levels of task cohesion and lower levels of social cohesion. With cohesion playing an important role in the dynamics of a group, researchers have looked at how to develop cohesion (Eys et al., 2019).

Developing cohesion through team-building is one strategy that has been used to promote physical activity participation (Eys et al., 2019). Some of the earlier work involved fitness class instructors' team-building with their group exercise classes (Spink & Carron, 1993). Researchers held a workshop for fitness instructors and guided them in creating a list of team-building strategies that they would implement in their own fitness classes. Examples of strategies focused on the group environment (e.g., neon shoelaces, slogans for the class), group structure (e.g., norms such as group goals), and group processes (e.g., partner work; Carron & Spink, 1993). In this early research, classes with team building had higher levels of task cohesion (attraction to the group-task) as well as fewer dropouts than the control classes (Spink & Carron, 1993). This teambuilding approach has been used in a variety of settings including fitness classes, physical activity clubs for youth, and exercise settings with older adults (Eys, et al., 2019). At the center of this team-building approach is having the leader identify strategies that will work in their setting for the following areas (a) group distinctiveness (e.g., developing a group name, t-shirt), (b) individual positions (e.g., spots for different intensities), (c) group norms (e.g., standards for work ethic or achievement), (d) individual sacrifices (e.g., asking individuals to help others), and (e) interaction and communication (e.g., incorporating partner work; Burke et al., 2014).

Social Identity and Self-Categorization Theory

Social identity is another factor related to the group that has the potential to influence an individual's behavior (Stevens et al., 2019). Social identity describes the identity that is formed when an individual derives part of who they are as a person (e.g., their self-concept) from being part of a specific social group (Tajfel, 1981). For example, someone may identify that being a member of a running club is part of who they are. They may describe themselves as part of a weight-lifting club and that identity is central part of who they are as a person. This concept of social identity has been receiving increasing attention in physical activity settings with it being investigated in organized running groups (Stevens et al., 2019) and exercise groups (Dunlop & Beauchamp, 2011; Steffens et al., 2019). In exercise group members, identifying with the group has been associated with higher attendance and effort exerted within the exercise classes (Steffens et al., 2019). Self-categorization theory is a related theory that focuses on factors that contribute to perceiving oneself as part of a group and identifying with other group members (Beauchamp, 2019). Beauchamp (2019) describes the potential importance of social identity and self-categorization in the physical activity context to promote physical activity adherence. Given the potential of social identity in influencing physical activity adherence, researchers are starting to examine how leadership behaviors and other group factors (e.g., groupness or cohesion) may relate to the formation of social identity (Eys et al., 2019).

Learning Exercise Five

Think about the settings where you have exercised with other people. How did being part of a group influence your experience? What is it you liked or did not like about being part of a group?

Enhancing Social Support and Social Influences

Interventions that promote social support have been shown to be effective, especially when used alongside other interventions that incorporate behavioral components such as goal setting and behavior contracts (Heath et al., 2012). There are numerous strategies to increase social support in efforts to promote physical activity. Some examples of social approaches include buddy systems, creation of walking groups, and establishing contracts between leaders and participants (Heath et al., 2012). These social strategies have been explored in families, worksites, communities, clinical settings, and schools (Heath et al., 2012).

Many physical activity interventions incorporate some aspect of social support as part of the intervention whether it is involving family, friends, or being conducted with a group. In a review of 26 randomized control trials, 22 of those studies included some aspect of social support as part of the intervention (Howlett et al., 2019). On average, these interventions had a positive effect on physical activity behavior and on maintaining that behavior change following that intervention. In another review of interventions that included both diet and physical activity for those at risk of type 2 diabetes, the inclusion of social support was one of the strategies that improved the effectiveness of interventions (Greaves et al., 2011).

One way to facilitate social support is to incorporate it as part of physical activity groups. For example, one study targeted social support through a variety of interpersonal strategies, including small group discussions about physical activity-related ideas and sharing experiences about how to get support and overcome barriers (McMahon et al., 2017). This study also included friendly comparisons of physical activity based on activity monitors as part of its interpersonal strategies (McMahon et al., 2017). Those who received this added interpersonal interaction reported more physical activity (McMahon et al., 2017). As described earlier, a common type of intervention used in physical activity settings is the team-building approach (Burke et al., 2014; Spink & Carron, 1993). This approach involves enhancing the group dynamics through targeting the group distinctiveness, structure, norms, individual positions and sacrifices, as well as interaction and communication (Burke et al., 2014). With team-building, the goal is to develop group processes like cohesion with the intent to increase adherence and attendance. Another group-based intervention that has received quite a bit of attention is the group-mediated cognitive behavioral intervention (Brawley et al., 2014). This approach uses group-dynamic principles to build the group and teach cognitive-behavioral strategies such as goal setting, barrier management, and self-monitoring. The key distinction with this approach is that the individual is weaned off the group so that they can become independent exercisers at the end. The group-mediated cognitive-behavioral intervention has been examined with a variety of populations and settings including cardiac rehabilitation, older adults, individuals with knee osteoarthritis, and postnatal moms (Brawley et al., 2014). Across these numerous studies, positive effects were seen for the group-mediated cognitive-behavioral approach for adherence (i.e., increasing physical activity levels), improving self-efficacy, and physical functioning (Brawley et al., 2014). There is a wide variety of strategies for using social support from others or peers to promote physical activity and many of these approaches appear successful (Heath et al., 2012). Some of these strategies may be promoting interactions through physical activity groups, buddy systems, group discussions, and phone networks (Heath et al., 2012).

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Measuring Social Influences

Questionnaires are the most common tool for measuring social influences such as social support, parental influences, and group cohesion. A common social support questionnaire is called the Social Support for Exercise Survey that assesses support received from family and friends (Sallis et al., 1987). Example questions include whether family or friends: *exercised with me, discussed exercise with me,* and *helped plan activities around my exercise.* A newer measurement tool called the Physical Activity and Social Support Scale has been developed to assess different types of social support (Golaszewski & Bartholomew, 2019). This measure includes separate subscales that capture emotional, companionship, instrumental, informational, and validation support. For parental influence, a new measurement tool called the Parenting Practice Item Bank has been created to capture the three conceptualized parenting strategies described earlier, namely autonomy support, structure, and neglect and control (Mâsse et al., 2020). One of several tools to assess cohesion is called the Group Environment Questionnaire, which assesses the four dimensions of cohesion in a variety of sport and exercise groups (Carron et al., 2002). Although questionnaires are frequently used, there are some limitations of this form of assessment, including a potential self-report bias.

There have been several emerging strategies for assessing social influences including social network approaches (e.g., Prochnow et al., 2020), direct observation of social influences (e.g., Collins & Feeney, 2004; Herbison et al., 2020), and using “big data” from databases (e.g., Carpenter & Amaravadi, 2019). Social network approaches involve individuals describing the networks they are involved in (Prochnow et al., 2020). This may involve having individuals report about people in their networks (e.g., report on family, friends, classmates) or surveying an entire social network (e.g., a classroom at school, or a group exercise class). These networks can be evaluated for a variety of characteristics such as the number of connections a person has, the number of connections within a network, and similarity of the people in a grouping (Prochnow et al., 2020). In a review of 28 social network studies, physical activity seemed to be an attribute that was shared *within* a grouping such that if a child's social network was physically active, they also were more likely to be active (Prochnow et al., 2020). A social network approach can be used to look at how interactions across a network of peers or family members influence physical activity behavior.

Another way to measure social influences is to use direct observations where interactions are recorded and then coded to reflect the type of influence. To gain a more objective measure of social support, researchers observed couples interacting and coded the behavior in terms of support provided (Collins & Feeney, 2004). In this study, researchers coded the type of support such as emotional support, and instrumental support in speech writing task. Audio recordings can also be used to capture the social interactions between individuals. Using an electronically activated recorder (EAR), researchers were able to explore youth hockey players' social interactions in a natural environment (Herbison et al., 2020). Recordings of interactions were then coded to classify the recordings into different types of interactions (Herbison et al., 2020). The use of observation and coding provides a more objective measure for classifying the interactions and, unlike a questionnaire, does not rely on what individuals recall or report.

Another way to gather information on social influences is to use "big data" from databases that exist through social network applications and wearable devices. One study used registered users from a web-based application that was used for creating fitness challenges, allowing people to connect with other users, participating in employer incentivized programs, or sharing results with others (Carpenter & Amaravadi, 2019). Both the number of friends reporting exercise as well as the average amount of friends' exercise were related to an individual's own reported level of exercise (Carpenter & Amaravadi, 2019). Others also used data from the Fitbit™ databases and application to look at the social networks on those applications (Stück et al., 2017). Being more active was associated with having a greater number of social ties on the network as well as those ties having a higher average activity level (Stück et al., 2017). These device-based measures and "big" datasets present an interesting avenue for future research examining social influences for physical activity, especially as the use of wearables such as smart watches increases.

The most common tools for measuring social influences are self-reported questionnaires such as scales for social support. Recently, there have been innovations in how to measure social influence including social network analyses, direct observation, as well as using big data. This increase in the diversity of ways to assess social influences will expand our understanding of how these relationships influence our physical activity behavior and our health.

Conclusion

We live in a social world and most of us interact with many people across the course of a day, whether they are family members, friends, coworkers, or even acquaintances at a gym. Given our fundamental need to belong (Baumeister & Leary, 1995), these social relationships are vital for our health and well-being (Umberson, et al., 2010). Social support refers to the resources that one perceives available or received from their social networks (Gottlieb & Bergen, 2010). There are many types of social support ranging from companionship support (e.g., being active together), emotional support (e.g., providing encouragement), and instrumental support (e.g., providing tangible assistance such as providing equipment). Receiving more social support is beneficial for participating in physical activity (Scarapicchia et al., 2017). There are several different frameworks for how social support may influence our physical activity and health. Social support is just one way that our social relationships may influence our behavior. Others, such as social norms, social control, and group processes also influence our physical activity behavior.

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Chapter 11
Strategies to Facilitate More Pleasant Exercise Experiences

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Chapter Overview

There is broad acknowledgement that how we feel during exercise is a predictor of long-term adherence. In this chapter, we describe the evidence that leads us to focus on the promotion of pleasant exercise experiences as an important strategy for long-term exercise adherence. This is followed by a discussion of modifications that can be made to exercise itself (intrinsic) and to the exercise environment (extrinsic) with the aim of influencing how people feel during exercise. Exercise intensity is the predominant intrinsic strategy that we focus on given its central role in determining our affective responses to exercise. We discuss a range of extrinsic strategies including indoor and outdoor exercise, exercising with others, virtual reality, music, imagery, and exergaming, among others. We aim to provide a broad overview of the available strategies that researchers and practitioners can implement to help foster more consistently pleasant and enjoyable exercise experiences.

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Introduction

When asking students to identify the benefits of regular physical activity, they will often recall numerous positive physical benefits of exercise such as improved cardiorespiratory and muscular fitness, and improved bone health. “Feeling good” is often a response when pressed to cite the psychological benefits of exercise, but such responses are often delivered reflexively with mantras such as “exercise makes you feel good” deeply ingrained. When probing for further critical insight, the notion of exercise inherently "feeling good" begins to be questioned. While exercise can elicit positive affective states among some, it is not a given that exercise will “feel good” for all. For some individuals, exercise is *not* a consistently pleasant experience, but it might not have to be this way. Researchers are examining different ways to positively shape how we feel about exercise.

Exercise is just one form of physical activity, but it is an effective way to achieve recommended levels of physical activity and can guard against the deleterious effects of sedentary behavior. Acquiring at least 150 minutes of moderate-intensity or 75 minutes of vigorous-intensity activity, and two bouts of muscle strengthening activities per week is achievable through structured exercise. Moreover, achieving these targets through one or two sessions per week (the so-called “Weekend Warrior”; Hamer et al., 2017, p. 2) can confer positive mental health outcomes.

As a society, we spend considerable time, effort, and financial resources to shift inactive people towards physical activity. However, if the experience of physical activity is unpleasant, then we have likely wasted much of that time, effort, and money, as unpleasant experiences are unlikely to promote long-term adherence. Efforts to engage people in physical activity will ultimately have limited impact on the broader positive outcomes of physical activity (e.g., longer lives, better quality of life, reduced financial burden on government) without long-term adherence.

A substantial portion of the literature relating to exercise interventions focuses on helping people to *initiate* exercise, whereas there is less focus on what to do once people *begin* exercising; that is, the strategies we can employ to influence how people feel *during* exercise. Perhaps many exercise professionals follow the “exercise makes you feel good” mantra without critically considering whether this is true and might believe that their job is done once they have “convinced” people to exercise. It is long established that exercise is effective at improving health but continued consideration of how we can help facilitate an enjoyable experience is needed.

One approach to exercise promotion is to understand which type of exercise an individual “likes” and advocate that they engage in that activity, but if an inactive individual does not like *any* mode of exercise (this seems possible, otherwise they would probably be doing it already), then this might be a fruitless task. Perhaps we would then fall back on the exercises that we know and suggest activities such as cycling, running, or swimming. It is very likely that an inactive person has already considered these activities and has decided against them. However, we know that these activities can be very effective at eliciting physiological changes that will lead to improved health, so perhaps we can look again at these activities and consider ways in which we can modify them to make them more enjoyable.

This chapter discusses intrinsic and extrinsic strategies to facilitate pleasant and enjoyable exercise experiences. We define intrinsic strategies as those that modify the components of exercise prescription: Frequency, Intensity, Time, and Type (FITT; see Kohl et al., 2020, p. 22). We focus on modifications to exercise intensity as it is a primary intrinsic factor that drives affective responses to exercise. Extrinsic strategies pertain to environmental manipulations of the exercise experience that fall outside of the FITT principles (e.g., listening to music during exercise). These extrinsic strategies are predominantly employed during exercise, but there are some strategies that could be implemented prior to an exercise session to influence how people feel during that session.

Photo by Mikhail Nilov from Pexels

The Importance of Pleasant Exercise Experiences

Imagine that you return from work in the evening and you have an array of choices for your activity. You could relax, browse the internet, watch television, stream movies, study, get prepared for your next day of work, or exercise. Why is it that studying and exercising are preferable for our long-term interests, but so often avoided in favor of an alternative?

During leisure-time, people often choose the activities that make them feel good and avoid activities that make them feel bad. Repeating experiences that feel good and avoiding experiences that feel bad is the basic premise of Hedonic theory (Ekkekakis & Dafermos, 2012). The pleasure and displeasure people experience has been recognized as an important predictor of behavior for millennia (see Ekkekakis & Dafermos, 2012). Although engaging in exercise may be of great benefit for our long-term health and well-being, the tendency of humans to maximize pleasure may lead them to suboptimal or nonrational decisions and behaviors (Cabanac & Bonniot-Cabanac, 2007). In the case of exercising, this tendency may result in a person choosing a sedentary, but suboptimal, alternative.

As with other behaviors, affective responses—the pleasure or displeasure experienced during exercise—are related to current and predictive of future exercise behavior (Williams et al., 2012). For example, Williams and colleagues (2012) were interested in examining the relationships between affective responses during and after short, 10-minute moderate intensity treadmill walks. During and after the walks, participants responded to the Feeling Scale (Hardy & Rejeski, 1989; see Chapter 12; Zenko & Ladwig, 2021) to indicate how good or bad they were feeling, as a measure of the pleasure or displeasure experienced. In addition, participants were interviewed about their level of physical activity behavior in the last seven days. Participants who felt more positive during exercise reported more physical activity cross-sectionally (i.e., affective responses during exercise were related to self-reported physical activity behavior measured on the same day of exercise) and longitudinally (i.e., affective responses during exercise predicted self-reported physical activity when measured six months later). Interestingly, the pleasure and displeasure experienced while participants were seated and resting after exercise was not related to physical activity behavior, either cross-sectionally or longitudinally.

These general findings were supported by a systematic review (Rhodes & Kates, 2015). Rhodes and Kates (2015) reviewed 24 studies, of which four assessed the relations between affective responses during exercise and physical activity behavior. In both adolescents and adults, affective responses during exercise were related to physical activity behavior, while the authors suggested that "the evidence does not support a relationship between postexercise affective response and subsequent physical activity performance" (p. 725). Overall, the outcomes of the systematic review supported the idea that maximizing pleasure experienced *during* exercise may be the most influential correlate of future physical activity behavior.

Memories of the Past, Decisions about the Present

When making decisions and choices about behavior—such as the decision to exercise or not—it is important to acknowledge that decision makers may be biased, and the memories of pleasure and displeasure experienced during earlier exercise episodes may be distorted through cognitive filters and other biases in memory. The Nobel Laureate Daniel Kahneman and colleagues (Kahneman et al., 1997) distinguished between several types of utility, including experienced utility and decision utility. Experienced utility can be described as the hedonic experience of an episode, for example, the affective responses during exercise[1]. An exercise experience that is more pleasant has higher experienced utility than a less pleasant (or more unpleasant) exercise session. Decision utility is inferred from the choices people are observed to make. For instance, if a person chooses a sedentary alternative such as television viewing instead of exercise, then television viewing would be said to have more decision utility. Interestingly, a large research literature suggests that decision utility is not a direct result of experienced utility. Instead, it is possible that an experience such as exercising can be remembered differently (e.g., as more or less positive than it actually was), and this remembered utility may inform predicted utility (i.e., predictions about how pleasant or unpleasant future exercise experiences will be), which in turn may inform decision utility (i.e., whether someone chooses to exercise, or not). As Kahneman and colleagues put it, the factors "that determine what people do are not pleasure and pain, but *memories* of pleasure and pain" (Kahneman et al., 1997, p. 385, emphasis added). This is illustrated in Figure 11.1, showing the theorized relations between affective responses to exercise, remembered utility, predicted utility, and decision utility. We suggest that some of the relationships depicted in Figure 11.1 may be conscious or unconscious.

Memories of an activity or event may be biased by many factors, such as the temporal characteristics of an exercise experience (described later), as well as cognitive filters and cognitive appraisals, including individual biases and cognitive appraisals about the importance of exercise (Karnaze et al., 2017), and individual differences such as personality. It is reasonable to suggest, for example, that a person with a strong optimism bias and tendency to predict future experiences will be positive will also be more likely to predict that engaging in an exercise bout will be pleasant and enjoyable. Future research is necessary to test this hypothesis. In short, cognitively mediated variables such as remembered utility (e.g., "How *did* the exercise make you feel?"), predicted utility, affective forecasts, or anticipated affective responses (e.g., "How *will* the exercise make you feel?"), and other affect-laden cognitive constructs such as affective attitudes and affective judgments may be influenced at least in part by previous affective responses to exercise experiences (also see Ekkekakis et al., 2018), but affective responses to exercise are not the only determinant of these cognitive constructs.

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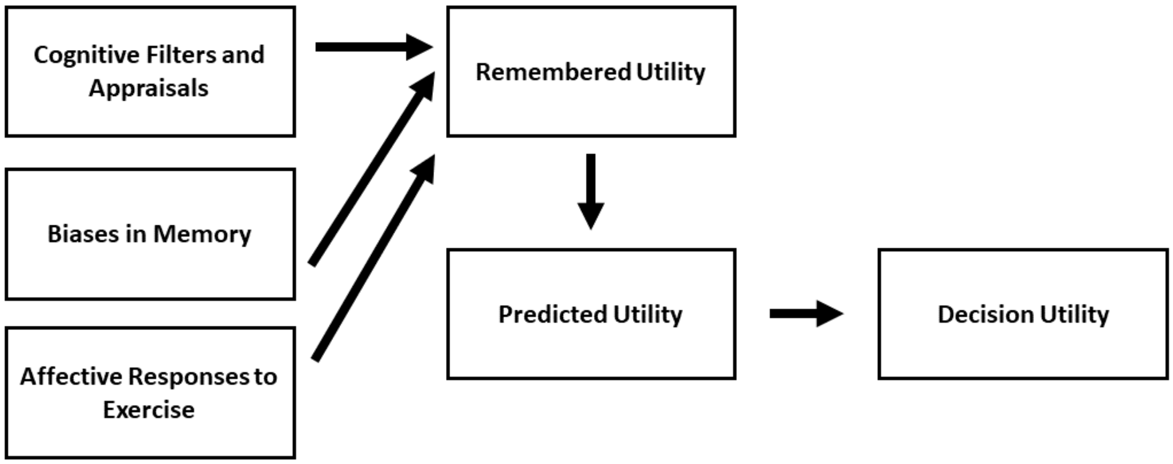
[1] When "utility" of exercise is conceptualized as the pleasure or displeasure associated with exercise, as is the case in this chapter, the terms *remembered pleasure* and *predicted pleasure* can serve as synonyms for remembered utility and predicted utility, respectively. An additional synonym for predicted utility is *forecasted pleasure*, and *affective forecasts* are predictions about future affective experiences.

Figure 11.1

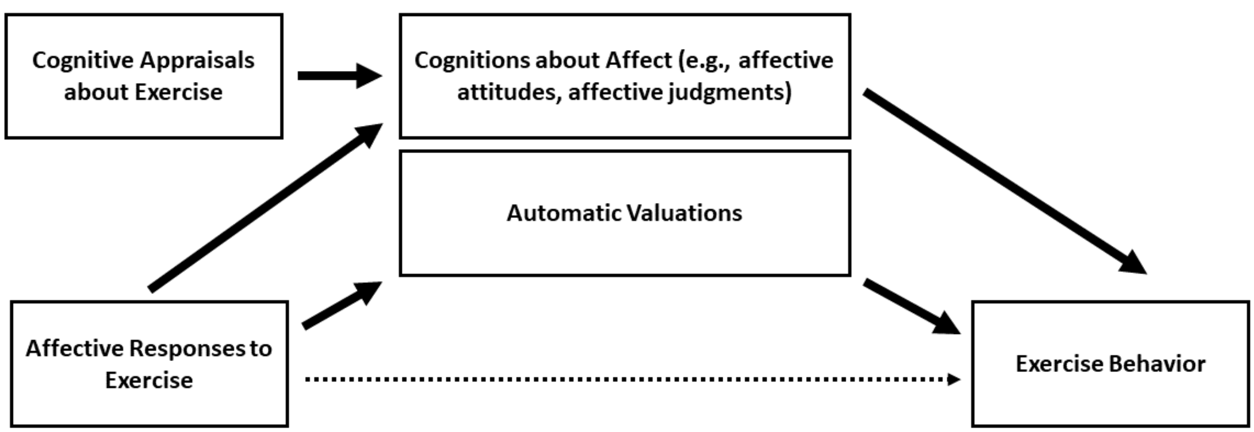
Theorized Influences of Remembered Utility, Predicted Utility, and Decision Utility



Note. Notice that affective responses to exercise, the focus of this chapter, are just one influence of remembered utility. Affective responses during exercise (an indicator of experienced utility) rarely, if ever, fully explain the remembered utility of exercise. Biases in memory and cognitive filters and appraisals also influence remembered utility.

Figure 11.2

Conceptualized Pathways in Which Affective Responses to Exercise Influence Future Exercise Behavior



The dotted line in Figure 11.2 represents the overall relationship between affective responses to exercise and exercise behavior. Several mediators of the relationship between affective responses to exercise and exercise behavior are theorized. Here, we suggest that affective responses to exercise may impact future exercise behavior through affect-laden cognitions or cognitions about affect (e.g., thoughts about whether the exercise makes one feel prideful or shameful, embarrassed or accomplished, and expectations of the increased sense of energy or euphoria one may experience after exercising). These cognitions about affect are also expected to be influenced by messaging strategies and other techniques for changing cognitive appraisals about exercise (e.g., information and media campaigns about how exercise makes people feel good, and how exercise may reduce depression).

Indeed, affect-laden cognitive constructs have been shown to relate to exercise intentions (Helfer et al., 2015) and behavior (Geers et al., 2017; Kiviniemi et al., 2007). These suggested pathways are shown in Figure 11.2 and illustrated by the boxes labeled "Cognitive Appraisals about Exercise" and "Cognitions about Affect".

Automatic Affective Valuations

We also adopt the theoretical predictions of the affective-reflective theory of physical inactivity and exercise (Brand & Ekkekakis, 2018; Chapter 4, Brand & Ekkekakis, 2021). According to affective-reflective theory, automatic affective valuations (Figure 11.2) are automatic positive or negative associations with physical activity or exercise. The positivity or negativity may be the "result of repeated experiences of emotions mediated by cognitive appraisals (e.g., pride, embarrassment) or a result of repeated exercise experiences of core affective reactions not necessarily mediated by cognitive appraisals (e.g., sense of physical reinvigoration, pain, bodily discomfort)" (Brand & Ekkekakis, 2018, p. 54). In turn, automatic affective valuations serve as a predictor of physical activity or exercise behavior. Therefore, based on the affective-reflective theory, automatic affective valuations serve as a link and mediate the relation between affective responses to exercise and exercise behavior (see Figure 11.2). Taken together, it seems imperative that practitioners should maximize the pleasure experienced during exercise because affective responses to exercise are predictive of future exercise behavior; this relationship is likely mediated by cognitions about affect and automatic affective valuations.

Learning Exercise One

Describe why having an exerciser experience exercise as pleasant or unpleasant is important, and how the *changing the experience of exercise* might influence behavior differently than providing information and education about the various benefits of exercise (e.g., improving cardiovascular health, reducing risk of disease).

Strategies to Facilitate More Pleasant Exercise Experience

How, then, can exercise professionals who understand hedonic theory and the importance of affective responses to exercise do their best to ensure that pleasure is maximized, and displeasure is minimized? Messaging strategies designed to give information about the benefits of exercise are thought to promote exercise behavior through cognitive appraisals (see Figure 11.2). To fully target affective responses to exercise, one must make the experience of exercise more pleasant (Ekkekakis et al., 2018). Here, we describe two broad strategies that are (a) focused on intensity (an Intrinsic factor) and (b) focused on situational and environmental (Extrinsic) factors.

Intensity and Affective Responses to Exercise

The dual-mode theory (DMT; Ekkekakis, 2005; 2009a) suggests that affective responses to exercise are influenced by cognitive factors, such as appraisals about exercise, goals, and perceptions of accomplishment, and interoceptive factors, such as physiological responses to exercise. According to the DMT (Ekkekakis, 2009a), when intensity is "moderate" (i.e., below the lactate threshold or ventilatory threshold), exercise is "consistently beneficial and it is essential for subsistence activities (hunting and gathering) and promotes the healthful effects of exercise without seriously challenging the maintenance of homeostasis or raising the risk of injury or exhaustion" (p. 82). "Heavy" exercise intensity is characterized by intensity that is slightly above the lactate threshold or ventilatory threshold to the level of critical power, and exercise intensity beyond this point is considered “severe” (Ekkekakis, 2009a; also see Ekkekakis et al., 2005b). It is important to note that moderate, heavy, and severe exercise intensities in this context do not necessarily correspond to the definitions of moderate- or vigorous-intensity exercise according to the American College of Sports Medicine (e.g., 64–76% of maximum heart rate for moderate intensity; Garber et al., 2011). Instead, the domains of moderate-intensity, heavy-intensity, and severe-intensity correspond to levels of challenge to physiological homeostasis.

Since exercise at moderate intensities is “consistently beneficial” from an evolutionary perspective, moderate-intensity exercise is expected to result in pleasant affective responses for most people (Ekkekakis et al., 2005b). Exercise in the heavy domain is neither consistently beneficial nor dangerous, and therefore affective responses in the heavy domain are often highly variable, with cognitive factors being more closely related to affective responses during heavy exercise (Ekkekakis et al., 2005b; Ekkekakis, 2009a). Finally, exercise in the severe domain is associated with several physiological threats to homeostasis, including continuously rising blood lactate, decreased availability of energy resources, and, if prolonged, potential muscle damage (Ekkekakis et al., 2005b). Like moderate exercise, severe exercise is adaptationally significant. Whereas moderate exercise is considered to be adaptive, severe exercise is considered to be maladaptive and dangerous if prolonged. The DMT suggests that exercise at severe intensity is associated with displeasure for most people (Ekkekakis et al., 2005b; Ekkekakis, 2009a). The tenets of the DMT are well-supported in the literature (for a review, see Ekkekakis et al., 2011). Overall, the DMT (Ekkekakis, 2005; 2009a) suggests that practitioners should be cautious about prescribing exercise that is in the range of severe intensity; practitioners also take a risk when prescribing exercise that is in the heavy domain. These intensities are expected to elicit either (a) homogenous, consistent feelings of displeasure (severe intensity) or (b) heterogenous, mixed feelings of displeasure and pleasure (heavy intensity). To illustrate, Zenko and Ekkekakis (2019) had 95 participants exercise at a heavy intensity (i.e., at the intensity corresponding to the ventilatory threshold for each participant) while reporting their affective responses. Compared to affective valence (i.e., pleasure-displeasure) assessed shortly before exercise, 61.1% of participants felt less pleasant during exercise, and 25.2% of participants felt more pleasant. Put differently, prescribing heavy-intensity exercise may make some people feel worse, and, according to the DMT, prescribing severe-intensity exercise is expected to make most people feel worse, and ultimately may increase the risk of dropout.

Ekkekakis and colleagues (2011) suggested that the likelihood of exercise intensity to elicit pleasure or displeasure should be a primary consideration for practitioners, alongside exercise safety and exercise effectiveness. So how can exercise professionals prescribe intensity for pleasure, especially in the absence of equipment to assess the lactate threshold or ventilatory threshold for each client or patient? Promising strategies include allowing the exercisers to choose or self-select their own exercise intensity, using pleasure as a guide for prescribing intensity, and structuring the pattern of exercise intensity in a way that is expected to elicit positive remembered and predicted pleasure.

Self-Selected and Affect-Guided Exercise Intensity

In a review, Ekkekakis (2009b) noted that, when allowed to self-select their own exercise intensity, most (but not all) people select intensities that are both physiologically beneficial and not expected to elicit displeasure (also see Williams, 2008). Allowing people to choose their own exercise intensity may have other benefits that promote exercise adherence. For example, doing so may enhance autonomy (Vazou-Ekkekakis & Ekkekakis, 2009), one of the basic psychological needs proposed by self-determination theory. See Chapter 2 (Rebar et al., 2021) and Chapter 3 (Quested et al., 2021). It may also simplify the practitioner’s job of determining individual differences in preferences, recognizing that some people prefer and tolerate higher levels of exercise intensity more than others (see Ekkekakis et al., 2005a). Some students and professionals reading this, for example, may realize that they prefer high-intensity interval training and vigorous exercise experiences. However, students and professionals should, at the same time, consider that "preferences for me do not mean preferences for thee." Prescribing exercise programming that we like but our patients or clients dread would not be advisable.

Williams and colleagues (2015; 2016) provided compelling experimental evidence in support of self-selected exercise intensity, or what they called self-paced exercise. In a randomized controlled trial, participants were enrolled in a six-month exercise program and randomly assigned to either (a) moderate-intensity exercise, based on heart rate (64–76% of maximum heart rate) or (b) self-paced exercise, in which the participants could choose their own intensity but were asked not to exceed 76% of their maximum heart rate as a safety precaution. All participants were insufficiently active and either overweight or had obesity. In addition, mode was not self-selected. All participants were asked to walk for their exercise. The self-paced exercisers walked about 26 more minutes per week than the exercisers who were prescribed moderate-intensity exercise (Williams et al., 2015). In another study, based on the same intervention, it was found that the self-paced exercisers had more positive affective responses to exercise, and these more positive affective responses mediated the relationship between the type of exercise program (i.e., self-paced vs. moderate intensity) and exercise adherence (Williams et al., 2016). In other words, allowing participants to self-select their own walking intensity evidently resulted in more positive affective responses to exercise, which in turn resulted in greater exercise adherence.

Another, more direct method of prescribing exercise that results in positive affective responses may be to simply guide exercisers to choose an intensity that feels good. This is affect-based, affect-regulated, or affect-guided exercise (Ladwig et al., 2017). Although experimental evidence linking this strategy to increased adherence is lacking, preliminary results requiring replication and extension appear promising (Parfitt et al., 2012; Zenko et al., 2020). With this approach, researchers or practitioners could use the Feeling Scale (Hardy & Rejeski, 1989) or other measure of affective valence as a guide to instruct exercisers to select only intensities that allow them to feel pleasant (i.e., more positive than neutral). This would, ideally, prevent participants from feeling unpleasant during exercise.

Restructuring Exercise Intensity

Researchers have also started to test the effects of restructuring exercise intensity to create more pleasant memories of exercise. Recall that remembered pleasure or remembered utility may be biased and not completely dependent on the overall average pleasure experienced during an episode of exercise. Instead, certain temporal characteristics may have disproportionate influence on how an exercise experience is remembered. Some of these characteristics include the end, or final moment of an experience, the peak, or most intense moment of an experience, and the trend or slope of an experience (i.e., whether an experience becomes more positive or more negative as time progresses; Ariely & Carmon, 2000; Kahneman et al., 1993). To illustrate how the “end” rule might influence the remembered pleasure or remembered utility of an experience, imagine that you’re enjoying dinner with friends and hosting a party at your house. For several hours, you enjoy conversation and company and are having a great experience overall. However, just as the dinner party is ending, one of your guests knocks over a fragile and sentimental family heirloom. The heirloom is destroyed just as guests are leaving your house. On average, you experienced pleasure for several hours. However, the end rule would suggest that the final moment of the dinner party—which was very unpleasant—disproportionately influences your overall memory of the experience. Now, you may recall the dinner party to be unpleasant, despite the fact that you experienced more pleasure than displeasure throughout the party.

Applied to exercise, the importance of the peak-end rule and the trend or slope suggests that experiences should have a more pleasant “peak” moment, end on a positive note, and improve throughout an experience (i.e., if participants start exercise feeling unpleasant, you should ensure that they feel more and more pleasant as exercise progresses). Zenko, Ekkekakis, and Ariely (2016) tested some of these concepts by having participants either (a) start at a high intensity and end at a low intensity (thus starting from an unpleasant exercise intensity and ending at a more pleasant exercise intensity), or (b) start at a low intensity and end at a high intensity (thus starting from a pleasant exercise intensity and ending at an unpleasant, very challenging exercise intensity). Supporting the research on the trend (and to some extent, the end), the researchers found that exercisers who decreased intensity over time (and increased pleasure) remembered the experience to be more pleasurable, predicted future exercise experiences to be more pleasurable, and enjoyed the exercise more. Remembered pleasure and predicted pleasure were measured about 15 minutes, 24 hours, and seven days following exercise. The slope of pleasure (i.e., how much the exercise experience became more or less positive over time) explained 35–46% of the variance in remembered and predicted pleasure. These findings suggested that the trend of an experience—the slope of pleasure—was a major influence on how the experience of exercise was remembered.

While Zenko et al. (2016) tested this concept in the context of aerobic exercise (i.e., using a cycle ergometer), Hutchinson et al. (2020) replicated the findings in the context of resistance exercise. This time in a within-subjects design (where participants repeated both conditions), participants performed a resistance-training circuit that either increased or decreased in training load. In the decreasing-intensity condition, participants performed one circuit at 75% of their 1-repetition maximum, followed by one circuit at 65% of their 1-repetition maximum, and ending with 55% of their 1-repetition maximum. The pattern was reversed in the increasing-intensity condition. As expected, participants felt progressively more pleasant in then decreasing-intensity condition and reported more pleasure following exercise. The decreasing-intensity condition also resulted in more exercise enjoyment and remembered pleasure (both shortly after and about 24-hours after exercising).

It is likely that context matters here. For example, Stuntz and colleagues (2020) examined patterns of perceived exertion (also see Chapter 13; Hutchinson, 2021), feelings of accomplishment, and affective responses in the context of a practice session for college athletes. Importantly, the authors concluded that change in perceived exertion and change in pleasure did not predict remembered pleasure. Instead, feelings of accomplishment mediated the relation between change in exertion and change in remembered pleasure. When the athletes exerted themselves more and felt more accomplished, they also experienced greater remembered pleasure. Thus, the pattern of intensity is not the only predictor of remembered pleasure and remembered utility. As mentioned previously, individual cognitive appraisals or cognitive filters also play a role in shaping the memory of an experience. The research by Stuntz and colleagues (2020) suggests that cognitive appraisals of accomplishment may be particularly important for athletes in sporting contexts. Further research should continue to examine under which conditions the end, peak, and trend of an experience do and do not predict remembered pleasure, predicted pleasure, and ultimately exercise adherence.

Learning Exercise Two

You have just read about how intensity influences affective responses to exercise. Your task here is to design an exercise session to maximize pleasure and minimize displeasure by regulating exercise intensity. How do you do it? Justify your response.

Extrinsic Strategies

In the context of this chapter, an extrinsic strategy concerns manipulation of the exercise experience outside of frequency, intensity, duration, and type. In practice, strategies are often combined to create interventions, and in many instances more than one strategy is included in a research study which can make isolating the effects of a specific strategy difficult. For example, a person attending a spin class could experience several extrinsic factors: the music played, the other participants in the class, the instructor, the room set up (e.g., mirrors, lighting), and each would influence a person's responses to the spin class. This is in addition to intrinsic factors such as exercise intensity, and other factors previously mentioned in this chapter. The interaction of these factors leads to difficulties in predicting responses to such situations. Nonetheless, researchers have sought to understand the affective responses to extrinsic strategies that could be employed during exercise.

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Indoor and Outdoor Exercise

For a moment, consider the physical environments in which you exercise. Are there blossoming trees, flowering plants, the scent of freshly cut grass, and birdsong? Are there mirrored walls, grey-metal machines, human body odors, and a local radio station playing in the background? The physical environment in which we exercise intuitively seems an important factor in determining our experience.

The environment in which people exercise is complex and includes numerous different sources of information (e.g., scenery, weather). However, the dichotomy of indoor or outdoor exercise can be useful when trying to understand affective responses to the physical environments where people exercise. Green Exercise is "activity in the presence of nature" (Barton & Pretty, 2010, p. 3947) and a review article by Gladwell et al. (2013) proposed that Green Exercise could be a powerful tool against physical inactivity. A study by Rogerson et al. (2016) sought to control for mode and intensity of exercise while examining the effects of a green outdoor setting, compared to a built indoor setting. Twelve participants cycled on an ergometer that was situated on a sports field or in a windowless laboratory with basic fixtures and fittings. The results of 15-min cycling at 50% heart rate reserve in these environments did not indicate any differences in enjoyment of exercise. Similarly, Turner & Stevinson, (2017) did not find that outdoor exercise promoted greater pleasure during high intensity exercise. They compared a 6km near-maximal intensity run on an indoor treadmill to a trail run through a large woodland area and found that Feeling Scale scores did not differ during or immediately after the ~15min run.

There has been support for the assertion that outdoor exercise leads to more positive affective responses. Lacharite-Lemieux et al. (2014) demonstrated that a 12-week outdoor exercise program comprising both aerobic and resistance components led to greater engagement with exercise and adherence in a sample of 23 postmenopausal women. Participants in this study also reported greater pleasure during outdoor exercise but this analysis did not include all exercise sessions as part of the program. Further work has explored the effects of outdoor exercise in women (e.g., Krinski et al., 2017;

Plante et al., 2007). Krinski et al. (2017) asked women with obesity to walk at a self-selected pace on a laboratory treadmill and on an outdoor athletic track and found that not only did participants walk further outdoors, they also reported greater pleasure during their walk. An important point to note was that pleasure declined from baseline in both indoor and outdoor conditions (a pattern previously reported in women with obesity by Ekkekakis et al., 2010), but the decline was not as sharp during outdoor walking. In a further study demonstrating the efficacy of outdoor exercise, a study with undergraduate women revealed that self-paced walking on a college campus was more enjoyable than walking on a treadmill in a health club (Plante et al., 2007). Focht (2009) compared an outdoor self-paced walk to a laboratory treadmill walk and found that both environments resulted in positive changes in core affective valence from baseline, but outdoor exercise yielded higher Feeling Scale scores, and that greater enjoyment was derived from the outdoor walk.

Consider again the outdoor environments that you might exercise in. There might be an outdoor run in the suburbs, a parkour circuit in a city center, a cycle ride in open countryside, or a swim in a reservoir. It seems plausible that each of these outdoor environments would elicit a different response as they each have different characteristics. Researchers have sought to examine different outdoor environments during exercise in attempts to further understand the role they might play. An early study in this domain explored different outdoor settings by comparing a park run to an urban run with 12 regular runners (Bodin & Hartig, 2003). The park run, through a large nature reserve, did not translate to significant differences in emotional response. In a different research design to many in this field, Dunton et al. (2015) measured affective responses during physical activity using ecological momentary assessment[2] and this captured participants exercising as they naturally would. The outdoor environments in the Dunton et al. (2015) study included at-home outdoors, at a park or trail, or other outdoor locations, but insufficient data for each of these outdoor categories prevented detailed analysis for each category. Nonetheless, outdoor exercise across these different environments resulted in less negative affect than indoor exercise. The benefits of a more "extreme" outdoor exercise environment have also been examined and a comparison between a coniferous forest and an urban park revealed that the more extreme outdoor environment of the forest led to greater pleasure reported immediately after exercise (Pasanen et al., 2018). There appears some preliminary evidence that not all outdoor exercise is the same, with some environments more effective at eliciting positive affective responses than others. However, the existing evidence is scant and there is a need to explore this topic with a greater range of outdoor environments considered. There are studies exploring different outdoor environments (e.g., Green Exercise, Blue Exercise), but the outcomes in these studies are often not captured with dimensional measures of affect or measures of enjoyment, and these outcomes are of central concern in this chapter.

Comparisons between indoor and outdoor exercise are popular but there have been equivocal findings regarding affective responses during exercise. A systematic review by Lahart et al. (2019) supported the view that acute bouts of outdoor exercise have favorable affective responses compared to indoor exercise but concluded that low quality evidence pervaded the field, and that further rigorous research is required.

Purposefully Selected Visual Stimuli

While the evidence for outdoor exercise compared to indoor exercise is tentatively positive, it is not always possible for people to exercise outdoors. Consequently, researchers have sought to

[2] Ecological momentary assessment allows participants to report thoughts, feelings, and behaviours close in time to the experience. As a method, it allows for more externally valid studies compared to lab-based studies as participants can continue with their usual routines. Prompts are provided to the participants to record what they have been doing and their psychological responses to it.

understand the effects of bringing the outdoors, indoors. Research into the effects of showing digital images and videos of the natural environment to people exercising indoors is an attempt to bring the benefits found in some outdoor exercise studies, to indoor exercise. Watching point-of-view video footage of traveling through a national park while cycling on an ergometer was not found to increase pleasure compared to a control condition (Jones et al., 2014). However, when the video footage was combined with a motivational music playlist, there were significant positive effects on pleasure compared to a control condition. The video footage played by itself (without motivational music) was not rated as any more pleasant than the control condition and it was postulated that the unnatural presentation of nature (e.g., without the other sensations of nature such as the wind in your face or hearing the rustle of leaves) was the reason why.

Beyond videos of natural environments, researchers have sought to understand the efficacy of other visual stimuli during exercise. Watching and listening to music videos while running on a treadmill led to greater pleasure when compared to listening to the music without the video, and a control condition (Hutchinson et al., 2015). Bigliassi and colleagues (2019) administered a range of visual stimuli (e.g., movie scenes and television series) based on participants preferences and found that, when delivered with auditory stimuli, pleasure was increased during a 10-min self-paced recumbent cycling task.

The video footage presented by Jones et al. (2014; see Figure 11.3), Hutchinson et al. (2015), and Bigliassi et al. (2019) was delivered to participants via a projection in front of the participant or on a television screen. It is apparent that visual stimuli by itself has been the subject of few studies, and the scant evidence available to date suggests that visual stimuli by itself has limited capacity to positively influence how we feel during exercise. Watching videos (e.g., music videos, or traversing natural landscapes) is common for many exercisers and has been implemented in gymnasia and on cardio exercise equipment for many years. However, recent advances in technology have permitted researchers to more easily examine the effects of visual stimuli delivered in a more immersive style.

Figure 11.3
Laboratory Set-Up for Showing Digital Footage of Nature While on a Cycle Ergometer

Note. Image credited to Dr. Leighton Jones

Virtual Reality and Immersive Environments. The recent emergence of low-cost consumer level headsets (e.g., Samsung Gear VR, Oculus Rift) has led to a resurgence of interest in how virtual reality and immersive environments can be used in an exercise context. While this new wave of research is in its infancy, there appears to be some use for the technology. Researchers have sought to use the headsets for two different types of visual stimuli: to display visual stimuli (e.g., music videos) in a more immersive way but lacking interaction, and as a means to display a “computer-simulated environment that aims to induce a sense of being mentally or physically present in another place” (Neumann et al., 2018, p. 183). This section focuses on recent understanding of virtual reality and pertains only to those studies that use a head-mounted display. Neumann et al., (2018) noted in their systematic review that although the term “virtual reality” was used in many studies, it was typical that researchers would use a computer screen or projector with participants. The recency of head-mounted displays being more available for exercise research means there are presently few studies in this area, though this number is growing.

Extending the lineage of work exploring digital images of nature while exercising indoors, Calogiuri et al. (2018) used a Samsung Gear VR headset to compare a 10-min walk along a river bank against video footage of the same walk observed in the head-mounted display. Participants walked on a non-motorized treadmill while viewing a 360° video but found the “real life” walk along the riverbank more pleasant and enjoyable. Alongside the quantitative measures of the exercise experience, participants also provided qualitative feedback about the experience. The issue of cybersickness was raised and this is likely a significant issue for exercise–VR researchers to overcome if the technology is to be used effectively; feeling nauseas and positive affective responses are not common bedfellows. The mode of exercise implemented in this study is also worth considering because the complete visual obstruction of the treadmill has been raised by Neumann et al. (2018) as hazardous and impractical. The comparison of “virtual nature” to “real nature” can have some use in enabling a greater understanding of the extent to which the benefits of real nature can be recreated. However, the benefit of virtual nature during exercise does not seem to be in replacing outdoor exercise, but rather when outdoor exercise in pleasant environments is not possible or feasible. Perhaps continued exploration and comparisons of different types of visual stimuli delivered through head-mounted displays, as opposed to their “real life” counterparts, will prove a fruitful endeavor.

In a change of mode from treadmill exercise, other studies using head-mounted displays have used cycle ergometers to explore the possible benefits during exercise. A study with inactive and overweight adults using a Samsung Gear VR during stationary recumbent cycling demonstrated efficacy for a highly immersive condition (Jones & Ekkekakis, 2019). A comparison between a control condition (no stimulus), watching music videos on a television screen while listening to the music through speakers (low-immersion), and watching the music videos in the head-mounted display while listening to the music via headphones (high-immersion) showed that being highly immersed increased pleasure during exercise. Bird et al. (2020) also used cycle ergometry and a Samsung Gear VR to examine whether a virtual cycling game (with or without a motivational music accompaniment) promoted a pleasant exercise experience. Their findings indicated that during a short bout of exercise (6-min), the virtual cycling game (Cycle: Le Tour by VirZOOM) with and without motivational music promoted greater pleasure and enjoyment than a control condition.

The application of VR and head-mounted displays during exercise has largely involved “traditional” modes of exercise to date (i.e., treadmill and cycle ergometry). However, the application of these emerging technologies with pre-existing modes of exercise might be doing a disservice to the possibilities that these technologies offer. The application of VR while exercising using newly developed devices such as omni-directional treadmills or the Icarus Pro flight simulator might permit exercisers and practitioners to re-imagine what is possible during exercise. Dębska et al. (2019) offered some preliminary data in support of using VR and newly developed equipment to facilitate physical activity, but further rigorous research is required to understand the efficacy and suitability of such devices for exercise. This topic area appears ripe for extensive future research and there are opportunities for collaborative work between industry and academics.

Photo by mali maeder from Pexels

Learning Exercise Three

The exploration of virtual reality during exercise is in its infancy and offers numerous opportunities for researchers. For this creative learning exercise, design a research study wherein you test the efficacy of a newly created virtual environment using an exercise mode of your choosing. Ensuring a robust research design can be challenging, but the additional challenge here is deciding what that virtual reality environment will be and how it will link to exercise. Try to think beyond what has been examined so far and create a new virtual world or task that would be ideal for a pleasant exercise experience.

Music

So far in this chapter we have mentioned music alongside visual stimuli, but there is a more extensive literature exploring the effects of music singularly. Music is arguably the most popular accompaniment to exercise and is a topic that garners considerable interest from the public and researchers. The past decade has seen a marked increase in the quantity and quality of music in sport and exercise literature and a recent meta-analysis by Terry et al. (2020) included 139 studies. The meta-analysis serves as a landmark paper in this topic area and would be a suitable starting point for any research on this topic. The role of music in a sporting context is discussed in Chapter 23 (Karageorghis et al., 2021), and this section introduces the use of music in an exercise context.

Music can be applied prior to exercise but the carry-over effects into exercise are not well understood. There are very few studies exploring whether listening to music beforehand can improve how people feel during exercise. Karageorghis et al. (2018) were interested in whether listening to different combinations of loud/quiet and fast/slow tempo music prior to an isometric contraction task (using a handgrip dynamometer) influenced how people felt immediately after the physical task. The loud and fast music (80 decibels and 126 beats per minute [bpm]) resulted in the highest affective valence scores following the task. Other work has examined the use of music before physical tasks, but without assessing affective responses (e.g., Crust, 2004). Pre-task music warrants closer research attention because influencing affective states prior to exercise might have beneficial effects for responses during exercise, but at present it appears that the most efficacious way for music to influence how people feel during exercise, is to listen during exercise.

Listening to music during exercise can be divided into two different applications: synchronous and asynchronous. Synchronous application is when an exerciser *consciously* moves in time to the beat of the music, whereas asynchronous is when there is *no conscious* synchronization between physical movement and the musical beat. In a synchronous music study, Karageorghis et al., (2009) asked 30 exercisers to walk to exhaustion on a treadmill while striding in time with a musical beat. The music tracks were all 125bpm and participants were asked to stride in time with the music "so that the foot of their dominant leg came into contact with the treadmill belt in time with the first beat of each bar" (Karageorghis et al. 2009, p. 25). A playlist of motivational music tracks, rather than motivationally neutral tracks, applied synchronously, resulted in the highest reported pleasure during the task compared to a no-music control condition. A study examining the effects of synchronous music use during circuit training revealed less negative affect with motivational and motivationally neutral music selections in female exercisers only (Karageorghis et al., 2010). The music tracks for the muscular endurance-type activities were slightly slower than the treadmill walking activity, with 120bpm deemed appropriate to match a suitable movement rate for circuit training exercises (e.g., standing squats). While these studies offer some support for applying music synchronously, the application of synchronous music has additional practical considerations. Establishing a suitable tempo for movement is highly dependent on the task and the individual; the two studies described here included healthy young adults but appropriate tempo for different populations might be different. Applying music asynchronously to exercise does not require the same practical considerations as matching music beats to human movement patterns.

A theoretical model proposed by Karageorghis (2016) described the antecedents, moderators, and consequences of music use in sport and exercise. Musical factors (e.g., tempo, rhythm, lyrics, idiom) form the antecedents and these are thought to be hierarchical in nature whereby tempo is the most influential musical factor over the consequences (e.g., positive affective states) of listening during an exercise task. On this premise, a lineage of work explored the role of tempo in understanding asynchronous music liking and affective responses across a range of exercise intensities. In their 2014 article, Karageorghis and Jones showed that music tracks ranging in tempo from 95 to 160 bpm resulted in greater pleasure compared to not listening to music across exercise intensities ranging from 40%–90% heart rate reserve (HRR). However, it was the "medium" tempo condition (115–120bpm) that elicited the most pleasure across the exercise intensities. This indicated that regardless of whether exercise intensity was low, moderate, or high, medium tempo music was the most suitable for their sample of young, healthy, and active participants. An important point to note is that pleasure was significantly lower at 90%HRR regardless of condition (in line with theoretical predictions), but the pattern of responses to the music conditions across intensities was consistent. In other words, all conditions led to decreases in pleasure as intensity increased, but medium tempo music remained the most pleasant condition compared to the other conditions. However, the recent meta-analysis by Terry et al. (2020) found that music tempo did not significantly moderate affective responses, and additional work could be undertaken to further understand the role of tempo in determining affective responses.

Beyond explicit examination of music tempo, studies by Elliott and colleagues (Elliott et al., 2004; Elliott et al., 2005) examined the influence that an asynchronous application of motivational music had on affect during moderate-to-high intensity cycle ergometry tasks. The studies found a consistent result; music enhanced in-task affect compared to the no-music conditions. Although previous literature has found a diminished effect of asynchronous music at very high exercise intensities, several studies have explored the effects of listening to music asynchronously during high-intensity interval training (HIIT) and sprint-interval training (SIT). Stork et al. (2015) played music throughout a SIT session and found that self-selected motivational music did not significantly improve pleasure compared to a no-music control condition. Contrastingly, Stork et al. (2019) found that a motivational music playlist did elicit more pleasure over the course of a SIT session compared to a no-music control. As demonstrated by these results, the possible role for music during very high-intensity exercise is not fully understood.

The most recent addition to the music and exercise literature is *respite music*. Respite music is listening to music only during the rest periods of an interval exercise session and preliminary evidence suggests some benefit for this type of application. Listening to fast-tempo music (125–135bpm) during 3-min recovery intervals between 5-min treadmill exercise bouts was shown to increase pleasure compared to a no-music control condition (Jones et al., 2017). Similarly, Karageorghis et al. (2021) found that pleasure increased during the exercise bouts and recovery periods when listening to medium tempo music (120–125pm), despite only listening to music during the recovery periods. However, listening to music only during the recovery periods appears less effective than playing music throughout an entire HIIT session (Jones et al., 2020). A consistent pattern in music and HIIT studies is that affect declines over the course of a HIIT session, but in some instances, music can attenuate that decline.

Listening to music post-exercise (*recuperative music*) has received comparatively less research attention than in-task applications yet offers some promise in regulating affective states immediately after exercise. There is typically an *affective rebound* following demanding exercise whereby people experience a positive affective response immediately upon cessation of exercise (Ekkekakis et al., 2011). Karageorghis and colleagues (2018) found that slow, sedative music (~71bpm) augmented this affective rebound over a 30-min period post exercise.

The extensive evidence base for applying music in an exercise context has provided a foundation for larger scale projects; however, such projects have not yet been conducted and the most significant next step for music and exercise research is to understand the role that music might play in determining continued engagement in exercise.

Exergaming

Combining computer games with physical activity—known as exergaming—has proved to be a popular strategy with many people, and a lucrative strategy for technology companies such a Nintendo and Microsoft. While Nintendo had significant commercial success with their Wii console, researchers have sought to understand whether exergames can be successful in positively changing how we feel during and after physical activities. The literature examining exergaming is vast and a common outcome measure is energy expended, or exercise intensity, with several review articles demonstrating that exergames, or active video games, can result in activity considered moderate-to-vigorous (e.g., Sween et al., 2014). Alongside energy expenditure, enjoyment is a frequently measured outcome, but the measurement of enjoyment in this field includes a wide range of instruments and the measurement of in-task affect is uncommon.

The Wii Fit has frequently been used as a way to examine exergames; Garn et al. (2012) asked college-age students to engage in several exercises on the Wii Fit (e.g., Ski slalom) and participants reported that the experience was enjoyable. Examining a bespoke cycling game, McGloin and Embacher (2018) showed a relationship between enjoyment and "desire to ride again" (p. 498). However, there is a severe methodological limitation in those two example studies as there is no matched-control condition. For example, Garn et al. asked participants to report their enjoyment following bouts of exercise on a Wii Fit compared to responses based on the question stem "When I am physically active…". This comparison between enjoyment of specific Wii fit exercises and a hypothetical bout of physical activity undermines the usefulness of the findings relating to enjoyment. Further, McGloin and Embacher (2018) did not examine enjoyment compared to cycling without the game. There have been few studies examining affective responses compared to a matched-control condition (e.g., Li et al., 2018). A comparison between Wii Fit exercises (e.g., Wii Bowling) and traditional exercises (e.g., indoor bowling) demonstrated more positive emotions following the exergaming condition using the Positive and Negative Affect Schedule (PANAS; Li et al., 2018). However, conceptual issues with the suitability of the PANAS have been raised previously (see Ekkekakis, 2013).

There appears to be a pattern of positive affective responses associated with exergames (measured with myriad approaches), but there is limited evidence demonstrating affective responses during exercise. As was described earlier in the chapter, it is the affective responses during exercise that appears most predictive of future engagement. To further understand the in-task responses during exergames, researchers could seek to collect core affective responses *during* game play. A recent meta-analysis indicated that active video games do not increase physical activity in young people at short-term follow-up (Oliveira et al., 2020), and it could be suggested that further examination of affective responses during exergaming might help to explain why.

Exercising with Others

As mentioned earlier in this chapter, there are several concurrent factors that influence affective responses when exercising. Studies that have explored the influence of exercising with others have often done so in combination with other strategies. An example of this is an examination of different types of partners when exergaming. Feltz et al. (2014) asked participants to complete exercises in the presence of virtual partners (human, a nearly human-like humanoid, and a hardly human-like software generated partner) or a no-partner control. There were no differences found in enjoyment between the conditions. Further, while participants worked harder in the experimental conditions, they did not report less enjoyment. The role of a virtual partner during a rowing task in virtual reality was examined by Murray et al. (2016) and was not found to influence in-task pleasure or enjoyment. There does not seem to be strong evidence to support the use of digital partners during exergaming or virtual activities if the aim is to enhance affective outcomes. Similarly, there does not appear strong evidence for exercising with "real" partners. For example, Rogerson et al. (2020) showed that running either individually or with a small group (4–5 others) in an outdoor environment did not lead to any changes in total mood disturbance, but they did not assess core affective responses during exercise or enjoyment afterwards. Plante et al. (2007) did measure enjoyment of women exercising alone or with others and found no differences in enjoyment across both indoor and outdoor exercise. Moreover, exercising with a friend during indoor cycling did not garner greater enjoyment than cycling without a friend (Plante et al., 2011). This is not to say that exercising with others does not lead to greater pleasure or enjoyment, just that it appears scant research has directly explored this. While numerous studies have explored other benefits of exercising with others, there are very few that have included responses pertaining to pleasure–displeasure and enjoyment.

The wider role of social support as a determinant of physical activity has received significant attention. It is generally regarded as an important factor towards initiating and maintaining physical activity and exercise programs. However, there are fewer studies showing the direct effects of exercising with others on affective responses and further examination of this would bolster the evidence base for exercising with others as an effective strategy.

Imagery

The use of imagery in sport and exercise psychology is extensive and it remains a popular and effective tool in the sport and exercise psychologist's toolbox (see Chapter 20; Rymal & Hill, 2021). There is also evidence that it can be effective at positively shaping our exercise experiences. In two studies by Stanley and Cumming (2010a, 2010b), the efficacy of *enjoyment imagery* was demonstrated in participants exercising at moderate intensities on cycle ergometers. Enjoyment imagery comprised of asking participants to recall an exercise experience they found "really enjoyable", and to recreate this as vividly as possible (including the sounds, colors, other people present). The imagery script played during the exercise encouraged participants to "experience again in the present the sensations associated with that time" (p. 585, 2010b). The results indicate this strategy can positively influence in-task pleasure and enjoyment measured post-task. This was further demonstrated by Tempest and Parfitt (2013) who reported greater pleasure in participants listening to an enjoyment and energy-focused imagery script at an exercise intensity proximal to the ventilatory threshold, compared to a control condition. As with other strategies described in this section, imagery appears to have limited benefits at higher exercise intensities as participants in the Tempest and Parfitt (2013) study reported no differences at exercise intensities above the respiratory compensation point.

Compared to some of the other strategies in this section, imagery represents a "low-tech" approach and might be more suitable in a variety of situations. While the imagery script in these studies was delivered via a recording, it could be delivered "live" with likely similar outcomes. The studies described here included young students (~20 years old) as participants, but enjoyment imagery might also have a role to play with other sub-groups of the population and with those were technology-intensive approaches (e.g., VR) might not be entirely suitable.

Mindfulness

Mindfulness can represent a "no-tech" strategy and has been explored as an option for enhancing pleasure during exercise. Most of the strategies described in this chapter seek to promote a dissociative focus, but a mindful approach offers a different path to a pleasant exercise experience. Mindfulness and physical activity are discussed further in Chapter 14 (Cox & Ullrich-French, 2021). The role that mindfulness might play in enhancing affective responses to exercise has only recently begun to be examined. In a study where insufficiently active people were assigned to either a mindfulness condition, a podcast condition, or a "self-monitoring" condition, there were no differences in Feeling Scale scores between the mindfulness and podcast conditions (Gillman & Bryan, 2020). Both conditions were more pleasant than the associative self-monitoring condition, and this is in line with previous literature describing that a predominant focus on bodily sensations (associative focus) elicits more negative affective responses (e.g., Lind et al., 2009). In a similar study exploring the relative merits of mindfulness compared to a condition promoting dissociation (music) and a control condition, there were no statistically significant differences in pleasure reported during the self-paced exercise (Cox, Ullrich-French, Hargreaves, et al., 2020). The intensity of the self-paced exercise might help to explain the lack of difference between the experimental conditions and the control condition; the intensity ranged from ~35%HRR to ~55%HRR. This lower intensity exercise did not likely pose a challenge to regulating affect, and there is diminished "need" for additional strategies at such intensities (Lind et al., 2009) as affective responses are less likely to decline in this range with normal weight exercisers.

The capacity of mindfulness to alter feelings during exercise has also been examined without comparison to other strategies. A mindful treadmill walking condition elicited greater pleasure than a control condition (Cox et al., 2018), and a mindful yoga session resulted in greater remembered pleasure than a neutral yoga session (Cox, Ullrich-French, Cook-Cottone, et al., 2020). Bigliassi et al. (2020) found a mindful approach to be more pleasurable and enjoyable than a "mindless" condition, and control condition, during a 200m self-paced walk in a park. While mindfulness does not require an electronic device, many of the studies to date have used mindfulness scripts delivered using electronic devices (e.g., iPod). Mindfulness has been described in terms of trait- and state-like qualities, and it might be that individuals with higher trait mindfulness are able to achieve greater pleasure from utilizing this strategy during exercise. Similar to imagery, it is a technique that might require prior training to be effective and further examination of how applicable these approaches are for "naïve" exercisers would shed further light on this strategy.

Other Strategies

The strategies described in this chapter are not exhaustive and there have been other attempts to purposefully influence how people feel during exercise. For example, Pottratz et al. (2020) used subliminal primes (e.g., happy, pleased, joyful) within music videos while participants walked briskly on a treadmill. The music videos with the primes (i.e., words displayed for 16ms every 10s) led to participants reporting more pleasure compared to the music videos without primes. The efficacy of watching music video during exercise has previously been demonstrated (e.g., Hutchinson et al., 2015; Jones & Ekkekakis, 2019) and the additional effects of subliminal primes warrants further research attention.

Other novel strategies include asking exercisers to alter their facial expressions (e.g., smiling or frowning; Brick et al., 2018; Philippen et al., 2012), to wear a transcranial direct current stimulation device (Baldari et al., 2018), and rinse their mouth with water rather than drink it (Shaver et al., 2018). However, the initial evidence on these strategies does not suggest they are particularly effective at improving how we feel during exercise.

Conclusion

This chapter has described how pleasant exercise experiences are of critical importance for adherence. Exercise intensity, a fundamental component of exercise, is a central determinant of affective responses to exercise, and we have described different ways in which exercise intensity can be manipulated to promote more pleasant feelings. We described several strategies (e.g., virtual reality, music, and imagery) that can be considered in addition to the fundamentals of exercise and highlighted some key experimental work supporting their use.

There are several strategies (e.g., imagery) that have not received a great deal of research attention regarding their capacity to positively influence pleasure–displeasure and enjoyment, but there is a foundation for these to be built on. There remains tremendous potential for innovative and creative strategies and it is hoped that those described herein represent only the start of the endeavors to promote more consistently positive exercise experiences.

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Chapter 12
Affective Responses to Exercise: Measurement Considerations for Practicing Professionals

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Chapter Overview

We provide guidance for the measurement of affective responses to exercise for practicing professionals. Affective responses include the pleasure and displeasure experienced before, during, and after acute bouts of exercise. Example vignettes at the beginning and end of the chapter provide illustrations of contrasting measurement approaches. In this chapter, we briefly describe hedonic theory applied to exercise behavior. Then we distinguish between the similar, but distinct, psychological constructs of core affect, emotion, and mood before discussing measurement considerations, including measure selection, timing and measurement frequency, individual variability, and the importance of neutral measurement technique. Next, we provide guidance for the measurement of remembered pleasure and forecasted pleasure. Finally, we present a hypothetical example using improved measurement techniques to illustrate how concepts from this chapter can be applied to a realistic scenario. Readers can apply this chapter to diverse settings, including, but not limited to, personal training, coaching, wellness programs, cardiac rehabilitation, occupational therapy, and physical therapy.

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Affective Responses to Exercise

Affective responses refer to the pleasure and displeasure that an individual experiences (Ekkekakis et al., 2008). A person may feel pleasure (good) or displeasure (bad) before exercise, more or less pleasure or displeasure during exercise, and pleasure or displeasure following exercise. An exerciser's affective responses may fluctuate frequently during exercise, and these changes are motivationally relevant. It is, therefore, critical that exercise professionals consider the pleasure experienced during exercise as an essential component of the exercise prescription, in addition to its safety and effectiveness (Ekkekakis et al., 2011; Ladwig et al., 2017). This chapter is intended to serve as a brief introduction to the measurement of affective responses to exercise so that both current and future practicing exercise professionals can improve the probability that their clients and patients have experiences during exercise that are pleasant, safe, and effective. Readers are encouraged to seek additional resources to improve their understanding of the measurement of affective responses to exercise, and a list of recommended further readings is provided at the end of this chapter.

Measuring Affective Responses in an Exercise Setting: An Example Vignette

To illustrate a new concept, it may be helpful to begin with an example of what should *not* be imitated. This example can then be revisited to illustrate how various concepts could be more appropriately applied. Here, we present a realistic scenario that should not be recreated. As you progress through this chapter, we hope that the weaknesses of this approach become clearer. Near the end of this chapter, we will present an example of another realistic scenario demonstrating better, evidence-based measurement techniques. Our goal is to allow readers to understand not only *how* to measure affective responses to exercise but *why* these measurement techniques should be chosen. *To avoid confusion, let us be clear*: The following vignette demonstrates flawed or misguided measurement practices. Though many of the decisions in the following vignette may seem reasonable at first glance (and you may have seen them employed by others in the field), careful consideration of the concepts discussed in this chapter should reveal ample room for improvement.

Poor Measurement Technique: A Vignette

Pat walked into the student fitness center, with the excitement of a new semester, and the goal to start an exercise program to improve his health. Pat is 19 years old and has never been a regular exerciser. In fact, Pat perceives the fitness center as if it were an alien planet. Pat meets with his personal trainer, Terry, a senior exercise and sport science major. Terry appears very fit, wearing a tight, sleeveless shirt that reveals his muscularity. In addition to assessing Pat's health history, cardiorespiratory fitness, and muscular fitness, Terry mentions that he is interested in measuring how Pat feels during exercise.

Terry: We're going to measure your affective responses to exercise.

Pat: Affective responses? What does that mean?

Terry: We're going to find out how exercise makes you feel. "Affect" is basically another way of saying your "emotions" or "mood". Exercise has been shown to make you feel better.

Pat: Sounds interesting... What do you need me to do?

Terry: Before we start, I want you to complete this survey, called the Physical Activity Affect Scale (PAAS; Lox et al., 2000). The PAAS measures how exercise changes your mood and emotions. Then, you will complete an exercise session at a moderate intensity for 20 minutes. After you're finished, you will complete the PAAS again, and we'll see how the exercise made you feel.

Pat: Why are we using this scale?

Terry: The PAAS (Lox et al., 2000) has been used to measure affective responses in many other exercise studies, and, just like the name suggests, it is a measure of affective responses to physical activity.

During the exercise session, a few of Pat's classmates walked into the fitness center. Some of them noticed he was completing exercise testing, and this made Pat feel uncomfortable, judged, and discouraged. Pat felt anxious about how his body and exercise performance looked to his classmates while he was exercising. After completing the exercise bout, Terry smiled and congratulated Pat for doing a good job before giving him the Physical Activity Affect Scale to complete a second time. To Terry's surprise, compared to baseline, Pat's responses indicated less positive affect, more negative affect, less tranquility, and more fatigue following exercise. Terry concluded that the exercise session must have depressed Pat's mood. Because Pat reported feeling worse after moderate-intensity exercise, Terry concluded that this intensity may not be a good component of an exercise prescription for Pat.

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Hedonic Theory

Hedonic theory posits that affective responses and memories of these responses have motivational value, such that people typically seek to repeat experiences that are pleasant and avoid those that are unpleasant. Humans likely seek to maximize pleasure and minimize displeasure because of its survival value. That is, feeling good often indicates that the action or experience will increase the odds of survival, while feeling bad may indicate increased risk of danger that could lead to injury or death (Panksepp, 2008). Cabanac (1992) theorized that the "maximization of pleasure, and the minimization of displeasure, not only leads to useful behavior, but is also the answer to motivational conflicts" (p. 174). Applied to the context of exercise, hedonic theory suggests that people are more likely to participate in exercise that leads them to experience pleasure and avoid exercise that makes them feel displeasure. Importantly, hedonic theory may help to explain why people often dropout from exercise programs, despite the many well-known health benefits of physical activity.

Especially over the past two decades, hedonic theory has seen increasing theoretical (Brand & Ekkekakis, 2018; Ekkekakis, 2014; Ekkekakis & Dafermos, 2012) and empirical support among exercise scientists. For example, Williams and colleagues (2008) found that affective responses during exercise predicted future exercise behavior. In their study, participants completed a graded submaximal exercise test, where the exercise intensity became progressively more challenging over time. Affective valence, or, the pleasure and displeasure experienced by the exerciser, was measured at baseline (prior to the start of exercise), and every two minutes during exercise. Affective valence was also recorded when participants reached the moderate-intensity domain. Interestingly, the researchers observed “considerable variability” in affective responses. Specifically, 27.0% reported more pleasure during moderate-intensity exercise compared to baseline, 43.2% reported no change in affective valence, and 29.7% reported feeling less pleasure (p. 237). Afterwards, the researchers found that participants who experienced more pleasure during exercise also reported more exercise six- and 12-months later. A few years later, Williams and colleagues (2012) studied the relationship between affective responses to walking and subsequent physical activity. The researchers reported that the extent to which individuals experienced pleasure during walking was related to their future physical activity, whereas affective responses following the walk (i.e., during period of rest afterward) were unrelated to later physical activity behavior.

The relationship between affective responses to exercise and future physical activity behavior was further clarified in a systematic review by Rhodes and Kates (2015). The authors showed that the prevailing evidence suggested affective responses during exercise were related to future physical activity, while affective responses measured following exercise were not (this line of research is also discussed in Chapter 11 by Jones & Zenko, 2021). Taken together, the most recent evidence suggests that practitioners should be skilled in measuring affective responses during exercise so that they are better able to help their clients or patients discover exercises that are pleasant. Having these skills will also allow the exercise professional to monitor affective responses and adjust programming if a client or patient is experiencing displeasure and, consequently, at increased risk of dropping out.

Core Affect, Emotion, and Mood

Although the terms affect, emotion, and mood are often used interchangeably by both researchers and the public, each represents distinct, but interrelated, psychological constructs (Ekkekakis, 2012, 2013). Practitioners should understand and appreciate the distinctions between these constructs to avoid mistakenly confusing them and choosing an inappropriate measurement approach. On a related note, achieving clarity and understanding the distinction between these constructs may “also be valuable from a therapeutic perspective” (Beedie et al., 2005, p. 848). In other words, if an exercise practitioner encounters a client with a mood disorder (e.g., depression), the practitioner will be able to recognize that measuring affective responses to acute exercise is unlikely to provide useful information about changes in the mood of this client. On the other hand, if a practitioner uses techniques to measure specific emotions (e.g., anger, pride), then some changes in core affect may not be detected due to the inability of the measurement techniques to capture them (i.e., the absence of a change in anger or another specific emotion does not imply the absence of a change in core affect).

Core Affect

Core affect is a combination of pleasure-displeasure (i.e., affective valence) and how activated, or "worked-up" one feels (Russell, 1980; Russell & Barrett, 1999). Put another way, “core affect is a neurophysiological state that underlies simply feeling good or bad” (Russell, 2009, p. 1259). Core affect is omnipresent, always accessible to consciousness, but nonreflective; this means that one does not need to "think about it" to experience it (Russell, 2009). At any given time, a person experiences some combination of pleasure-displeasure and activation (i.e., feeling worked-up/activated or not). These core affective feelings are universal to all humans and present from birth (Barrett et al., 2007). Core affect forms the basic foundation for what we experience as moods and emotions, and, it is unlikely that humans would experience these higher-order mental processes without it.

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Emotion

In contrast to core affect, emotion requires cognitive appraisal, or, a subjective interpretation of an environmental stimulus (Lazarus, 1982). Emotions have been referred to as “cognitively elaborated affective states” (Clore & Ortony, 2008, p. 629). In contrast to core affect, emotions are *always* about "something" the individual is experiencing, either directly or indirectly. Emotions are often complex and involve core affective responses (e.g., whether the individual feels pleasure or worked-up), the cognitive appraisal of a situation or stimulus (e.g., “is this feeling or experience good or bad for me?”), bodily changes (e.g., increased heart rate, the feeling of "butterflies in the stomach"), vocal and facial expressions, and action tendencies (i.e., a connection between emotion and behavior, such as experiencing anger and engaging in problem-solving behavior; Davidson, 2003; Ekkekakis, 2012, 2013; Ellsworth, 2009; Lauckner, 2015). Moreover, while core affect is constantly accessible to consciousness, emotions are less frequent and more transient, lasting from seconds to minutes (Ekkekakis, 2013). For example, an unexpected shove from a stranger may cause an angry emotional reaction if the individual being shoved cognitively appraises the situation as a potential risk to their social status or well-being. On the other hand, physical contact between friends may be met with a happy or amused emotional reaction if the friends cognitively appraise the contact as friendly and/or nonthreatening. Examples of emotions include anger, guilt, love, and pride (Ekkekakis, 2013).

Mood

Moods share much of the same complexity as emotions but are longer lasting and their antecedents can be more ambiguous. In contrast to emotion, individuals often cannot identify precisely what led them to their current mood state (Ekman, 1994). Sometimes, a transient emotional experience, such as an angry argument with a spouse or partner, can lead to a general irritable mood state that could last from hours to days. Other times, the antecedents for moods may be cumulative or diffuse (Morris, 1992, 1999). For instance, people may report feeling depressed because they see little hope for the future after receiving a seemingly unending accumulation of unhappy or disheartening news (i.e., cumulative). On the other hand, others may perceive that the reasons underlying their depressed mood are the collective effects of *everything* that has happened and is currently happening in their life (i.e., diffuse). Examples of moods include irritation, joyfulness, cheerfulness, and grumpiness (Ekkekakis, 2013).

The Measurement of Affective Responses to Exercise

Up to this point, we have briefly described how hedonic theory relates to exercise behavior and we have distinguished the concepts of core affect, emotion, and mood (for a more comprehensive review, see Ekkekakis, 2013). In the following sections, we focus on several methodological considerations for practitioners seeking to measure affective responses to exercise. Specifically, we emphasize measure selection, the timing and frequency of measurement, expected individual variability in affective responses to exercise, reducing measurement bias, and considerations for decreasing measurement error.

Measure Selection

How should an exercise professional choose which measures or instruments to use? There are two general approaches to selecting measures to assess affective responses to exercise. The first is by far the easiest and involves choosing a measure that "has been used by others before." However, as is often the case, the easiest approach is not necessarily the best approach. Alternatively, Ekkekakis (2012, 2013) outlined a three-step approach to measure selection. The first step involves choosing whether one wants to measure affect, mood, or emotion. As described earlier, these are three related, but distinct, psychological constructs. In the second step, the exercise professional should choose a conceptual model that is appropriate for the construct identified in the first step. The final step involves choosing a measure based on the adopted conceptual model and psychometric considerations, such as evidence of validity and reliability among people with similar characteristics (e.g., age, sex, health status) to the client of the exercise professional. We endorse this approach, and strongly recommend further examination of readings on these topics (Ekkekakis, 2012, 2013; Ekkekakis & Zenko, 2016).

For example, let’s imagine an exercise professional who is interested in measuring core affective responses to exercise. Which measure or measures should be used? There are many possibilities, and some are more appropriate than others. In this scenario, the first step is completed. The exercise professional identified *core affect* as the psychological construct to be measured. Sound understanding of the differences between core affect, emotion, and mood is necessary to complete this step. Further, if a practitioner chooses to measure a specific emotion, then a complete understanding of that specific emotion is required. If, for example, a practitioner is interested in assessing *guilt*, then they should understand how guilt is different than *shame* (Miceli & Castelfranchi, 2018).

The second step requires the exercise professional to adopt a theoretical conceptualization of the construct identified in the first step (in this example: core affect). Earlier, we completed this step by adopting the conceptualization proposed by Russell and colleagues (Russell, 1980; Russell & Barrett, 1999). Accordingly, core affect is a combination two independent (i.e., orthogonal) dimensions, namely pleasure-displeasure (sometimes called affective valence) and activation (sometimes called arousal). Further, the dimension of pleasure-displeasure is considered to be bipolar (Russell & Carroll, 1999). The justification and support for this conceptualization, known as the circumplex model of affect (Russell, 1980) has been discussed elsewhere in greater detail (e.g., Ekkekakis, 2008, 2012, 2013). We encourage students and readers to consult with this literature for a more complete understanding of the theoretical underpinnings of the circumplex model of affect.

In the third step, a practitioner should select a measure that aligns with the conceptual model that was adopted (in this example, the circumplex model of affect; Russell, 1980). This conceptual model suggests that the exercise professional should choose one measure that corresponds with the dimension of activation, and a separate measure corresponding with pleasure-displeasure. Here, there are several candidate measures such as the Felt Arousal Scale (to measure activation; Svebak & Murgatroyd, 1985) and the Feeling Scale (ranging from "I feel… *very bad* to *very good"*; Hardy & Rejeski, 1989) or Empirical Valence Scale (ranging from *most unpleasant imaginable* to *most pleasant imaginable*; Lishner et al., 2008) to measure pleasure-displeasure. Notice how pleasure-displeasure is considered to be bipolar (Russell & Carroll, 1999) and the Feeling Scale and Empirical Valence Scale are both bipolar, indicating conceptual alignment.

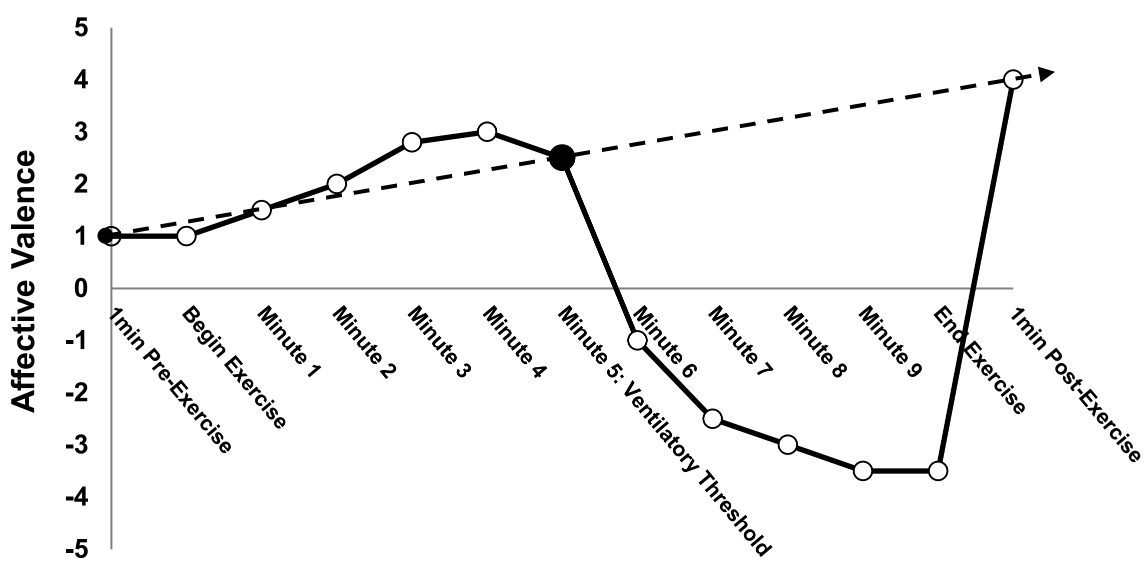
Practitioners should consider the available psychometric evidence supporting its validity and reliability among individuals similar to their clients. Furthermore, practitioners should make practical considerations, such as the timing and frequency of measurement. For example, administering a 15-item questionnaire multiple times throughout an exercise session might be irritating and cause a large burden on participants (and could lead to them reporting feeling worse because of it). The candidate measures described in this section are all single-item scales that can be used repeatedly during an exercise session with little burden on the exerciser. This is advantageous because it provides the exercise practitioner latitude to choose to measure affective responses multiple times throughout an exercise session. We discuss this highly impactful consideration, next.

Timing and Measurement Frequency

The timing and frequency at which exercisers are asked to report their affective responses during exercise can profoundly influence the interpretations of those collecting the measurements. For example, analyses of affective responses only prior to and following exercise often suggest that people "feel better" after exercise, regardless of the intensity of exercise. However, when affective responses are also collected during exercise, it becomes clear that how one feels during exercise is far from universal (Backhouse et al., 2007; Bixby et al., 2001; Hall et al., 2002; Parfitt et al., 1994). Many exercisers report increased pleasure (or less displeasure) during low- to moderate-intensity exercise. In contrast, when exercise moves beyond moderate intensity, some exercisers report feeling better, while others report feeling worse. Finally, when exercise intensity is near maximal, most exercisers report feeling worse (Ekkekakis et al., 2005, 2011). However, regardless of how the exercisers reported feeling during exercise, within a very short time after ceasing near-maximal-intensity exercise (i.e., seconds to minutes), many people exhibit an "affective rebound", where they report feeling better (Box et al., 2020; Ekkekakis et al., 2005, 2011). As it turns out, one of the most common maxims of exercise science, that "exercise makes people feel better", may be partly attributable to suboptimal measurement timing and frequency. Importantly, practitioners who assume that affective responses to exercise are universal may create situations where their clients experience increasing displeasure during exercise but report feeling better afterwards simply because the unpleasant exercise experience has finished. If these and similar instances of displeasure during exercise are experienced repeatedly, it may reduce the probability that the exerciser continues to adhere.

Therefore, to achieve a clearer understanding of the affective responses to exercise of a client, we recommend that measurement of affective responses occurs frequently before, during, and after exercise (see Ekkekakis et al., 2020) When measuring pleasure or displeasure during exercise, a practitioner assesses how the exerciser feels *right now*, at the moment, to measure the moment-to-moment changes in the *experienced pleasure* or displeasure of the exerciser. For example, in addition to reading appropriate instructions to familiarize the client or patient, a practitioner using the Feeling Scale (Hardy & Rejeski, 1989) might ask the exerciser “How do you feel *right now*?” at regular intervals. A practitioner should aim to achieve a good balance of limiting burden (i.e., not asking too many questions) but also achieving an accurate representation of how the client feels during exercise. To balance burden with measurement accuracy, the time between measurement instances can and should be increased or decreased based on the mode, duration, and intensity of the exercise. For example, to most faithfully measure how one feels during a one-hour, steady-state bicycle ergometer test, it may make the most sense to measure the affective responses of a client at five-minute intervals (i.e., when affective responses are expected to be relatively stable). On the other hand, during a graded-exercise test to exhaustion, a practitioner should consider measuring affective responses just prior to the end of each stage to adequately capture the more rapid changes in affective responses that are to be expected with short stages of exercise. Depending on the graded-exercise test protocol, this might require measurements every one, two, or three minutes. Further illustration of the importance of measurement timing and frequency during a graded-exercise test is presented in Figure 12.1.

Figure 12.1
A Hypothetical Measurement Scenario During a Graded-Exercise Test

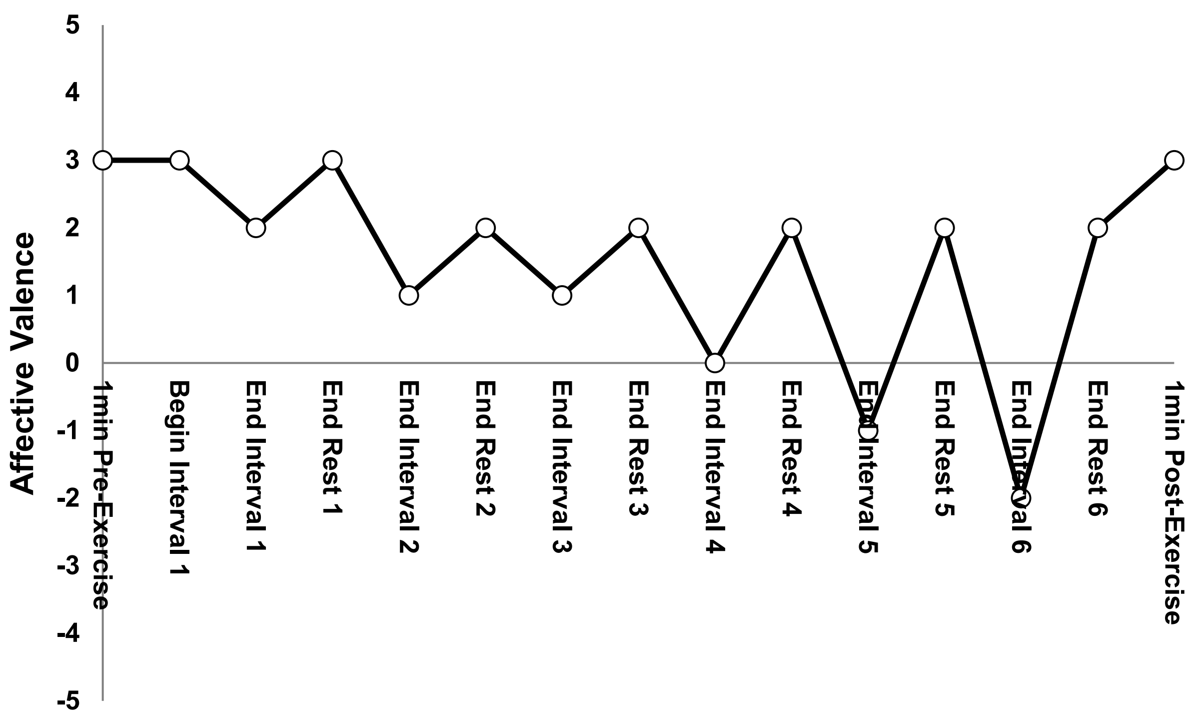


Note. A practitioner who measures affective valence only before and after exercise may conclude that the graded-exercise test to exhaustion made the exerciser feel more positive (i.e., a post-exercise value of “4”, compared to a pre-exercise value of “1”). This is illustrated by the dashed arrow. However, the reality is that the affective responses of the client were much more complex. The hypothetical client felt more positive at the beginning of the session, but affective responses rapidly became less pleasant and more unpleasant (indicated by negative values) after five minutes of exercise (around the gas-exchange ventilatory threshold), before rebounding and becoming more pleasant after the exercise had ended (possibly because the client was relieved to stop exercising). This figure is adapted from an illustration and discussion presented by Backhouse and colleagues (2007).

Another increasingly popular form of exercise, namely high-intensity interval exercise, comes with its own unique challenges for exercise professionals interested in understanding the affective responses of their clients. Because interval exercise is typically characterized by short bursts of vigorous- to supramaximal-intensity exercise interspersed with periods of low-intensity recovery, even small changes in measurement timing and frequency can obscure how well the affective responses of a client are understood. Unpleasant affective responses typically rebound following cessation of vigorous-to maximal-intensity intervals (Box et al., 2020). Therefore, to best capture the range of affective responses experienced during the frequent ups-and-downs of interval exercise, exercise professionals should ensure that their measurement timing and frequency also faithfully represents the anticipated patterns of affective responses to interval exercise. Specifically, each measurement of affect during interval exercise should be completed as close to the end of each interval as possible, as opposed to the beginning, middle, or afterward (Decker & Ekkekakis, 2017). Measurements only at the beginning or middle of intervals may not capture the anticipated peaks and valleys of affective responses during each interval. Furthermore, if measurements of affective responses about the exercise interval are solicited during the subsequent rest interval, the rapid affective rebound effect of resting may bias the interpretation of the affective experience of the client. This would also render the measure as one of *remembered pleasure*, or how pleasant or unpleasant one felt previously, rather than experienced pleasure (i.e., pleasure experienced *at that moment).* Examples of appropriate and problematic timing and frequency of measurement of affective responses during interval exercise are illustrated in Figures 12.2 and 12.3, respectively (also see Box & Petruzzello, 2021).

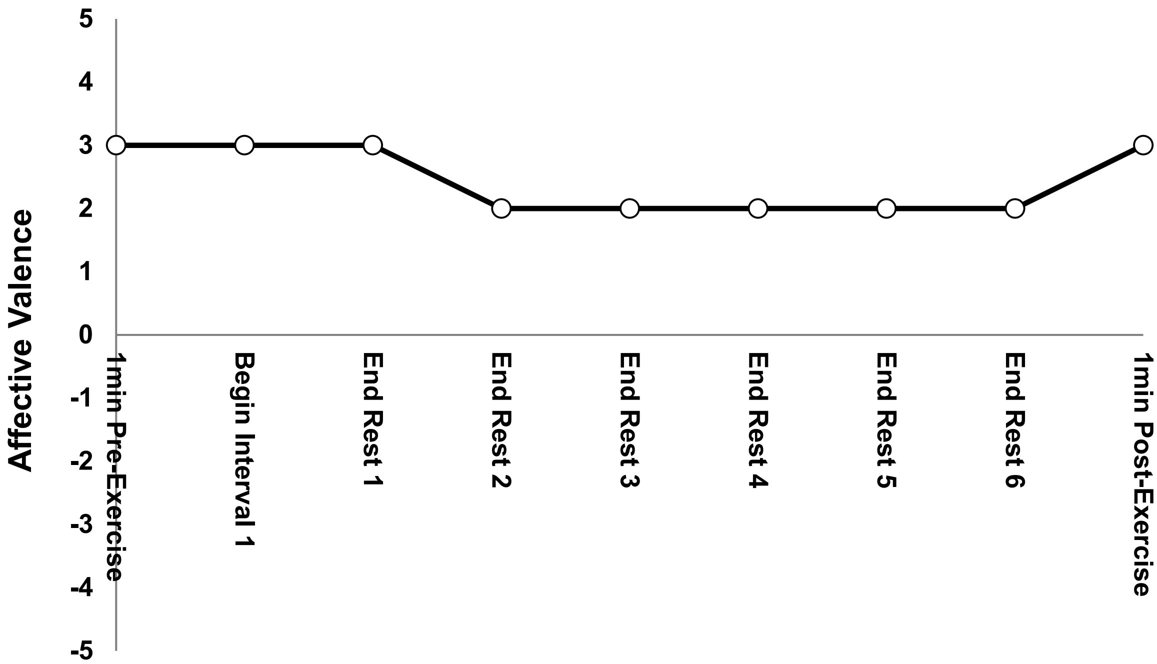
Figure 12.2

Appropriate Measurement Timing and Frequency During an Interval Exercise Session



Note. It is likely impossible to collect data at the precise end of each interval. However, to capture accurate data, practitioners should aim to measure as close to the end of each interval as possible. For example, 10-seconds before the end of each interval will help to improve the accuracy of the representation of the exercise affective experience. Using this approach, the exerciser appears to have highly variable affective responses to exercise (i.e., many affective rebounds during rest periods, and affective declines during intervals) and appears to experience negative affective valence toward the end of the exercise session (measured during Interval 5 and Interval 6). In this example, the practitioner measured affective responses consistently during both rest and interval periods.

Figure 12.3
Problematic Measurement Timing During the Same Interval Exercise Session



Note. In this case, measurements were collected at the beginning of exercise and during each rest interval of the same exercise session illustrated in Figure 12.2, obfuscating the true variability of affective responses throughout the interval exercise by missing the peaks and valleys of affective responses. Using this approach, the exerciser appears to have much more stable affective responses to exercise and appears to never experience negative affective valence.

Individual Variability

As reviewed earlier, individual variability in affective responses is to be expected, especially around the transition from moderate-to vigorous-intensity (i.e., near the ventilatory threshold; Ekkekakis, 2009; Ekkekakis et al., 2005, 2011). This dose-dependent variability is also discussed further in Chapter 11 by Jones and Zenko (2021). For example, in a seminal study by Van Landuyt and colleagues (2000), participants exercised for 30 minutes at 60% of their estimated VO_2 max, or maximal oxygen consumption. According to the American College of Sports Medicine (Garber et al., 2011), this corresponds to a “moderate” exercise intensity. Core affect was assessed during exercise using the Feeling Scale (Hardy & Rejeski, 1989) and the Felt Arousal Scale (Svebak & Murgatroyd, 1985). On average, there was no change in pleasure or displeasure during exercise, while activation increased. However, when the researchers examined individual differences in affective responses, they noted that 44.4% of participants felt increasing levels of pleasure during exercise, 14.3% exhibited essentially no change, and 41.3% felt less pleasant. Practically, these results suggest that it is prudent to analyze changes in affective responses during exercise on both the individual and group level, as opposed to just at the group level. If, for example, Van Landuyt and colleagues (2000) only assessed affective responses at the group level, they would have incorrectly concluded that exercise elicited essentially no change in the pleasure or displeasure experienced by the participants. However, because the researchers analyzed affective responses within each individual, we now know that some people will feel more pleasure during moderate-intensity exercise, while others will report feeling less.

Neutral Measurement by the Exercise Professional

The measurement fidelity of exercise affective responses can also be influenced by the person doing the measurement. When an exercise professional solicits affective responses from a client, their demeanor can subtly (or sometimes, clearly) bias the affective responses of the client. For example, simply smiling, nodding, thanking, or telling a client "good job" after receiving ratings on a measure may be interpreted by clients that the response is the one the exercise professional prefers them to make. In this situation, the exercisers may continue to rate their affective responses in this manner because they think it will make their trainer happy (i.e., provide the "socially desirable" response versus their true feelings). Exercise professionals who wish to collect accurate measures of affective responses to exercise among their clients should do their best to ask questions in a non-leading manner with neutral facial expressions and tone of voice. Whichever tone of voice and facial expression the professional adopts should be used consistently throughout exercise so that subtle changes in demeanor do not unduly influence the affective responses of the client.

Photo by Cliff Booth from Pexels

Environmental and Situational Considerations for Reducing Measurement Error

The effects that the exercise environment and individual situations can have on affective responses should be considered by exercise professionals. For example, the concept of affect can be, as with many psychological constructs, difficult to comprehend. If the person being asked about affect does not understand what is being asked, it is unlikely that they will provide data with any value. Therefore, using standardized instructions for measures, as well as asking whether the concept makes sense to the individual, can help to reduce instances of measurement error. One way that exercise practitioners can check for comprehension is to ask exercisers to explain what it is they are being asked to report. If there is a lack of understanding, the practitioner can try to clarify the concept further.

The presence of music and video can also influence how individuals perceive exercise (Lind et al., 2009; Jones et al., 2014). It has been demonstrated that when exercise is at the light- to moderate-intensity range, music and/or video can help the individual to dissociate, or distract, from the bodily sensations associated with exercise (e.g., increased breathing rate, lactate accumulation). Put another way, having a distraction, such as music and video, can help to attenuate unpleasant feelings during exercise. For some, if the same exercise intensity is performed without music and video, their exercise affective responses may not be the same as if they were in the presence of the distracting audiovisual stimuli. Therefore, exercise professionals should consider these effects and use distractors carefully and not as a means to mask displeasure during exercise.

Some people may find exercising in front of mirrors or others unpleasant and/or embarrassing, as they perceive (whether real or imagined) that their bodies are on display and are being evaluated by others (i.e., social-physique anxiety; Sabiston et al., 2014; also see Chapter 7 by Vani et al., 2021). Exercisers who are beginners or those with low motor skillfulness may also experience displeasure if they feel they are being evaluated critically by others. Exercise professionals should probe for and be cognizant of these potential effects among their clients, ideally prior to beginning exercise. For some individuals, exercising alone, away from mirrors and the prying eyes of others, may improve their affective responses. Similarly, leadership style (e.g.., focusing on health vs. focusing on appearance) of exercise leaders in group fitness settings may influence affective responses to exercise (Raedeke et al., 2007).

Last, but not least, exercise environments that are too hot or cold may also impact how the exerciser feels and should be considered. A hot room may raise body temperature to the point where exercise becomes increasingly uncomfortable. At the same time, heat typically leads to more sweating (Harrison, 1986) and could exacerbate the influence of social-physique anxiety, as exercisers may perceive that they appear to others to be struggling with exercise due to their excessive sweating. In short, there are many potential environmental and situational influences on affective responses to exercise; practitioners should be mindful of these influences and aim to assess affective responses in a standardized setting.

The Measurement of Remembered Pleasure and Forecasted Pleasure

It is important to note that *remembered pleasure* (sometimes called recalled or remembered affect) and *forecasted pleasure* (sometimes called predicted pleasure) are distinct psychological constructs and use different measurement strategies from those discussed so far. Until now, we have discussed approaches appropriate for the measurement of moment-to-moment *experienced* core affective responses to exercise (i.e., how one feels at a given moment, assessed before, during, or after exercise). The measurement of remembered pleasure and forecasted pleasure is also occasionally included in research studies and may be useful to practitioners, but this requires a different approach. These constructs are further discussed in Chapter 11 by Jones and Zenko (2021).

Remembered pleasure is a retrospective evaluation about a previous affective experience. For example, several minutes, hours, or days after exercising in a laboratory or fitness center setting, you may consider asking your participant to evaluate their exercise session by responding to the question "How did the exercise session in the laboratory make you feel?" (Zenko et al., 2016). Likewise, forecasted pleasure might be assessed using the question "If you repeated the exercise session again, how do you think it would make you feel?" (Zenko et al., 2016). In both instances, the exerciser is required to cognitively appraise the exercise session and evaluate a past experience or make predictions about a future experience. This is different than moment-to-moment core affective assessments about how an exerciser feels *right now*. Since memories and predictions are susceptible to biases, it is expected that remembered pleasure of a previous exercise session will not be fully explained by moment-to-moment core affective responses measured during the actual exercise session. Likewise, it is expected that predictions and affective forecasts about future exercise sessions will also be biased and not fully explained by experienced pleasure or remembered pleasure.

For example, a pessimistic or apprehensive new exerciser may have felt pleasant during their first exercise session in their new program, but, based on a lifetime of unpleasant experiences, may predict feelings of displeasure even if they repeat the same exercise protocol in the future. On the other hand, experienced exercisers may feel quite unpleasant during their regular training session, but they may choose to adhere to their programming and repeat the exercise session the next day and may even predict that it will feel more pleasant. Put differently, perfect relationships between experienced pleasure, remembered pleasure, and forecasted pleasure are unlikely, even if the exerciser is evaluating the same exercise protocol. Indeed, Zenko et al. (2016) found that salient aspects of an exercise session (slope of pleasure, or the rate and direction of affective responses experienced during exercise) explained about 46% of the variance in remembered pleasure assessed about 15 minutes after the exercise session ended. Remembered pleasure, in turn, explained about 70% of the variance in forecasted pleasure, indicating that about 30% was explained by other factors.

Measuring Affective Responses in an Exercise Setting: An Example Vignette Revisited

Now it is time to return to the vignette featuring our friends, Pat and Terry, from the start of the chapter. In contrast to the previous vignette, the following example highlights evidence-based principles and techniques of the measurement of affective responses to exercise that should be emulated. It is important to acknowledge that these are not the *only* ways to measure affective responses to exercise. Instead, our goal is to demonstrate how to carefully consider measurement choices based on the best evidence currently available.

Better Measurement Technique

Pat walked into the student fitness center, with the excitement of a new semester, and the goal to start an exercise program to improve his health. Pat is 19 years old and has never been a regular exerciser. In fact, Pat perceives the fitness center as if it were an alien planet. Pat meets with his personal trainer, Terry, a senior exercise and sport science major. Terry wears comfortable exercise attire that does not overly accentuate his figure. In addition to assessing Pat's health history, cardiorespiratory fitness, and muscular fitness, Terry mentions that he is interested in measuring how Pat feels during exercise.

Terry: We're going to measure your affective responses to exercise.

Pat: Affective responses? What does that mean?

Terry: We're going to find out how exercise makes you feel. Specifically, I am interested in core affect, and I will be assessing how the pleasure and displeasure that you experience during exercise changes from moment-to-moment. At some moments, you may feel better, and at other times, you may feel worse.

Pat: This sounds interesting. What do you need me to do?

Terry: I will be administering the Feeling Scale (Hardy & Rejeski, 1989) multiple times, before, during, and after you exercise. This will allow me to have a more comprehensive understanding of your affective experience.

Pat: Why are we using the Feeling Scale (Hardy & Rejeski, 1989)?

Terry: That is a great question. Although there are many potential measures available, I am adopting the conceptualization of core affect proposed by Russell and colleagues (Russell, 1980, Russell & Barrett, 1999). This suggests that core affect is comprised of two distinct dimensions, namely affective valence, which is a bipolar dimension ranging from displeasure to pleasure (Russell & Carroll, 1999), and activation or arousal. Since I am most interested in the pleasure and displeasure that you experience, I will be using a measure that corresponds to this dimension. The measure ranges from *very bad* to *very good* and appears to have acceptable psychometric properties in people your age. It also has practical strengths that make it acceptable for our purposes. If I was interested in measuring a distinct mood state, such as your level of *depression*, I would take an entirely different approach.

Before Pat begins exercising, Terry reads the standardized instructions of the Feeling Scale to Pat and checks for comprehension. During the exercise session, a few classmates came to the fitness center and this made Pat feel uncomfortable, judged, and discouraged. Pat felt social-physique anxiety, embarrassment, shame, and guilt when others were present (for further reading about these concepts, see Chapter 7; Vani et al., 2021). Terry made note of this observation, and when analyzing Pat's affective responses, Terry discovered that Pat reported pleasure during exercise until the classmates joined. Thankfully, the multiple assessments of affective valence allowed Terry to identify this pattern. In the presence of classmates, Pat's showed increasingly unpleasant affective responses. In addition to considering how the exercise stimulus itself made Pat feel, Terry considered the environmental and social context of the exercise session (i.e., exercising in the presence of others). Terry made another appointment with Pat so that his affective responses to exercise could be assessed in a private setting. Terry was careful not to assume that every one of his clients would have a similar pattern of affective responses to exercise. Terry recognized that, unlike Pat, others may thrive and relish the opportunity to "show off" while exercising in front of others.

Conclusion and Recommendations for Professional Practice

As exercise and sport professionals, we understand that exercise is a many-splendored thing (Ekkekakis & Dafermos, 2012). Therefore, our overarching purpose is to guide as many individuals to experience these splendors as possible. At the same time, until, as a field, we discover and implement methods to meaningfully increase physical activity among the general population, we will not have achieved our purpose. If we continue to fail to achieve this goal, there may be fewer opportunities for those pursuing careers as exercise professionals and the growth of our field may stagnate, or worse, deteriorate. Based on the evidence-base outlined in this chapter, it is becoming increasingly apparent that affective responses to exercise are a critical, but often overlooked, influence on exercise adherence. Given the ease with which measures of affective responses to exercise may be administered to clients, we suggest that, in addition to focusing on safety and effectiveness, practitioners should consider whether their clients experience pleasure during the prescribed exercise (Ekkekakis et al., 2011; Ladwig et al., 2017). Using this "affect-based" exercise prescription methodology may help new and returning (i.e., those who were once active but have been chronically sedentary) exercisers experience moment-to-moment pleasure as they begin an exercise regimen. Maximizing pleasure during exercise may increase the odds that clients remember the experience as pleasant, which, in turn, could improve their affective forecast of how they will feel repeating the exercise behavior. Careful consideration of all of these factors may increase the odds of exercise adherence.

In the preceding sections, we attempted to provide a framework to disseminate affect-based exercise prescription into regular practice among exercise professionals. Although affective responses are a complicated psychological construct to comprehend, we believe that considering the following steps will help current and future practicing professionals to rapidly incorporate this approach into their day-to-day interactions with clients:

1. First, remember that affective responses are highly variable between individuals. Therefore, it is unlikely that your clients (especially those who are chronically sedentary, unfit, or have obesity) will feel the same pleasure during exercise as students immersed in the study of exercise or sport science.

2. Always be cognizant that both (a) the way you present yourself to your clients and (b) the exercise environment can influence how your clients feel. There is a reasonable likelihood that you, an exercise professional, will be more physically fit than your clients. These discrepancies in fitness may be intimidating to some clients, so try not to draw attention to it (e.g., wearing sleeveless or revealing attire, demonstrating movements that are far beyond the skill or fitness level of your clients). In addition, some clients may prefer to exercise alone versus in the presence of others. Assessing client preferences and then subsequently acting appropriately based on those preferences may help to improve the affective experiences of your clients.
3. Frequently measure the affective responses of your clients and consider modifications based on these data. If you discover a client experiences displeasure during a certain exercise intensity, duration, and/or modality, changes to make the experience more pleasant may be necessary. These may prove to be simple, (e.g., such as reducing intensity or duration) or more complicated, such as when the modality itself is causing displeasure (e.g., non-weight bearing exercise may be more pleasurable than weight-bearing exercise for clients with excessive body mass or other biomechanical limitations). In other cases where exercise intensity is light-to-moderate, audiovisual stimuli may provide a distraction that could render mildly unpleasant exercise as more pleasant. Some modifications will require creativity from the exercise professional to ensure that the client experiences exercise as pleasantly as possible. At the same time, the extra effort committed to help a client discover what exercises maximize their pleasure could pay off for the exercise professional in the form of improved adherence, and, therefore, a more successful and consistent client base.

Learning Exercises

1. What are the differences between affect, mood, and emotion?

2. Describe the three-step process of measure selection proposed by Ekkekakis (2012, 2013).

3. Imagine that you're measuring affective responses to exercise. The exerciser is using a treadmill for 30 minutes. When, and how frequently do you measure affective responses? Which measure(s) do you use? Justify your responses.

4. It is a common belief that "exercise makes people feel better", and this is one of the many benefits of exercise. How would you respond to someone who tells you that "exercise makes people feel better"? Justify your response.

5. What are some methods you could use to help make your client feel better during exercise (also see Jones & Zenko, Chapter 11)?

Further Reading

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Chapter 13
Perceived Effort and Exertion

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Chapter Overview

Perceptions of effort and exertion during physical activity provide a subjective estimate of the workload and play an important role in effort-regulation and tolerance. Such perceptions depend on a complex array of factors including afferent feedback from the working organs, muscles, and joints; subjective perceptions of force, resistance, or strain; psychophysiological perceptions of breathlessness and arousal; psychological components such as motivation, determination, and task-aversion, as well as input from the brain's central motor command system (Hutchinson & Tenenbaum, 2019). The subjective experience of effort and exertion is unique to an individual and can be influenced by a variety of psychological factors. Psychological skills and strategies can also be used to manage sensations of effort and exertion, leading to improved performance and a more positive psychological experience of exercise.

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Defining the Concept

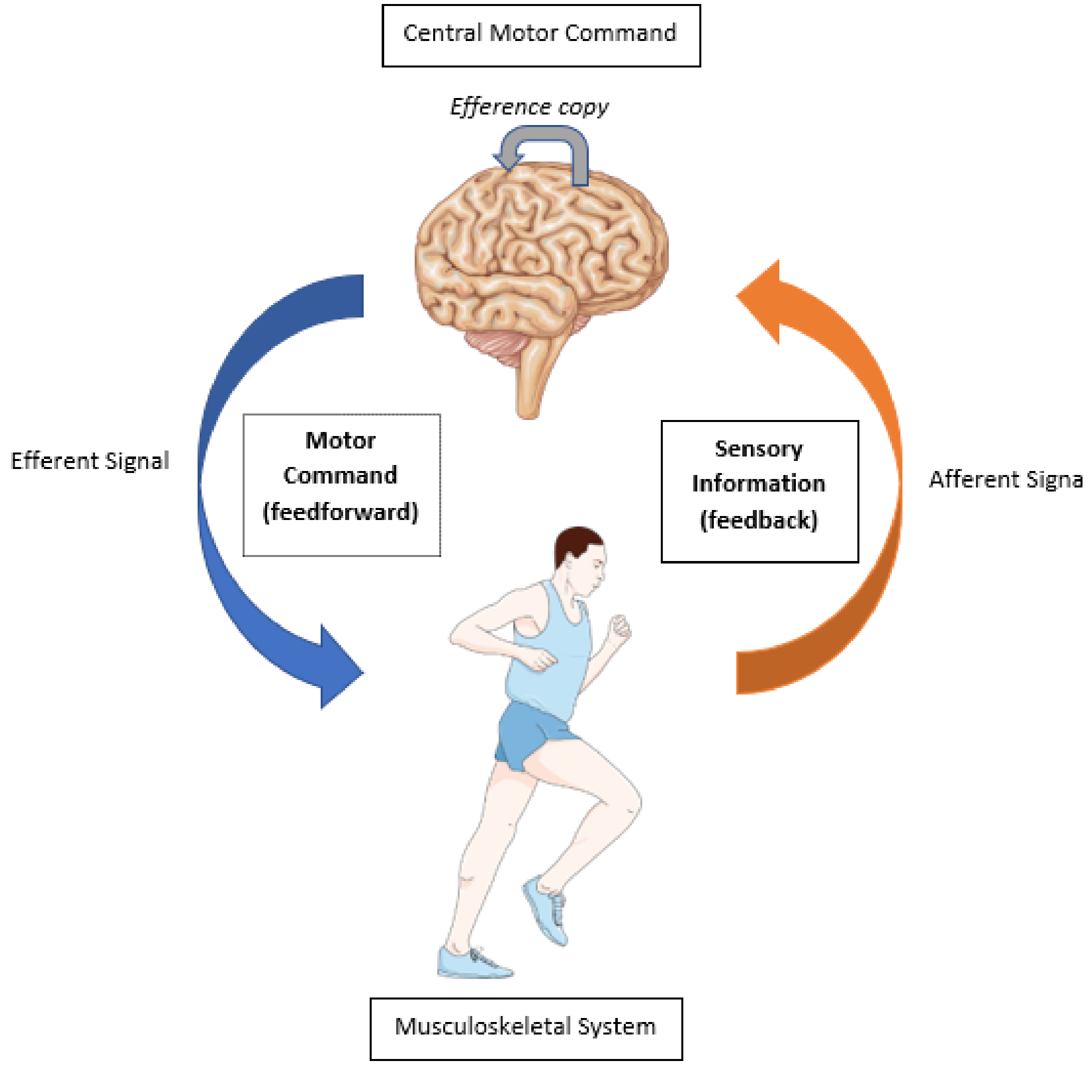
The terms *effort* and *exertion* are often used interchangeably, although they are different (but related) constructs. The term *perceived exertion* was first introduced by Swedish psychophysicist Gunnar Borg in the 1960s as subjective complement to the objective responses (e.g., heart rate, and force production) observed during exercise. Borg defined exertion as the "degree of heaviness and strain experienced in physical work" (Borg, 1998, p. 8) and developed a scale to measure this concept, known as the Rating of Perceived Exertion (RPE) scale. Borg conceptualized perceived exertion as a configuration of sensations stemming from the peripheral muscles, cardiopulmonary system, and other sensory organs and cues. Included within this conceptualization are psychological constructs such as motivation and affect that are viewed as an integral part of the experience of exertion. The notion of discomfort and/or fatigue was also added to later definitions of perceived exertion. Drawing from Borg's original definition, Robertson and Noble (1997) defined perceived exertion as "the subjective intensity of effort, strain, discomfort, and/or fatigue that is experienced during physical exercise" (p. 407). Although this definition is widely accepted within the field of exercise science, it is problematic in that it brings together a number of distinct concepts; concepts that are rated differently when adequately defined, such as effort and discomfort (Steele et al., 2016) or exertion and fatigue (Micklewright et al., 2017). As a result, several authors have stressed the need for greater precision in the study of perceptual responses during physical activity (e.g., Hutchinson & Tenenbaum, 2006). Specifically, it is argued that the sense of *effort* is distinct from other sensations experienced during exercise[1] (Abbiss et al., 2015; Pageaux, 2016; Smirmaul, 2012).

Effort perception (or the sense of effort) refers to the cognitive feeling of work associated with voluntary actions (Preston & Wegner, 2009). In an exercise context, *perceived effort* has been operationally defined as "the amount of mental or physical energy being given to a task" (Abbiss et al., 2015, p. 1237). In contrast to perceptions of exertion, which rely upon the integration of sensory information transmitted from the body to the brain during exercise, the sense of effort is believed to be centrally generated (by the brain) with little to no influence from afferent feedback (Marcora, 2009; 2010). See Figure 13.1. To understand this idea, consider that a voluntary action is always carried out with a certain amount of effort, in the sense that each time a motor command is initiated, or even simulated, certain mechanisms in the brain need to determine the strength of this command (Lafargue & Franck, 2008). In essence, how hard one perceives themselves to be trying at a particular task is the subjective experience of effort. Researchers have used anesthesia to block or attenuate sensory feedback during a physical task in order to demonstrate that the sense of effort is independent of afferent feedback (e.g., Marcora, 2009) although this has been a topic of some debate (e.g., Eston, 2009).

[1] Smirmaul (2012) has offered a useful example for distinguishing effort from exertion. Imagine a cyclist who, after a tough uphill climb, begins a downhill section and stops pedaling, coasting downhill solely by momentum. This cyclist will still be feeling strong sensations of discomfort associated with the uphill climb (perceived exertion), but the effort expended to coast downhill is virtually zero, resulting in low perceived effort.

Figure 13.1

Conceptual Diagram of the Origins of Perceived Effort and Exertion



Note. Voluntary movements are produced by sending motor commands from the brain to the muscles via motor descending pathways, with an "efference copy" being concomitantly delivered to sensory brain areas. This neural representation forms the basis of perceived effort. The result of the movement is feedback from sensory receptors in the peripheral nervous system, transmitted via ascending pathways to the brain. The brain then organizes this information and makes sense of this information (thus distinguishing perception from sensation) resulting in perceived exertion. Artwork in Figure 13.1 credited to Servier Medical Art by Servier under a Creative Commons Attribution License (CC-BY). Figure 13.1 is adapted from Muramatsu, K. (2020). Diabetes mellitus-related dysfunction of the motor system. *International Journal of Molecular Sciences, 21*(20), 7485, https://doi.org/10.3390/ijms21207485 under a Creative Commons Attribution License (CC-BY).

Monitoring Perceptions of Effort and Exertion

Measurement Scales

The most common instrument used to measure perceived exertion is Borg's RPE scale (Borg 1982; 1998). This 15-point scale ranges from 6 (*no exertion at all*) to 20 (*maximal exertion*), with intermediate points anchored to verbal expressions of effort such as *very light*, *somewhat hard*, and "*very hard*". The 6–20 scale was designed to parallel the heart rate (HR) range of a normal healthy male (i.e., 60–200 beats/min). Initial efforts to validate the RPE scale yielded a correlation of 0.85 between the RPE and HR (Borg, 1962). However, subsequent studies have produced a wide range of correlation coefficients for a variety of tasks and participants (Chen et al., 2002). An alternative to the 15-point RPE scale is the category-ratio (CR-10) RPE scale (Borg, 1982). This scale has a primary numerical range of 0 to 10, although a maximum intensity greater than 10 can be selected using free magnitude estimation (see Borg, 1998). The CR-10 is a general intensity scale that can be used in a variety of settings to assess other sensory perceptions, including pain, dyspnea, and ergonomic fatigue (Borg, 1998).

Alternative RPE scales to those authored by Borg have been developed and may be more appropriate for specific settings or populations. These include an RPE scale based on "repetitions in reserve" for use during resistance training (Zourdos et al., 2016), the Session RPE Scale used in the calculation of athlete training load (Foster et al., 2001), and a variety of pictorial scales designed for use in pediatric populations (e.g., Utter et al., 2002). Buckley et al. (2000) have also validated a braille version of Borg's standard 6–20 RPE scale for individuals with visual impairment.

Differentiated RPE scales have been used to distinguish between the central (cardiopulmonary) and peripheral (muscle and joint) factors contributing to an individual's RPE. Knowledge of differentiated RPE allows for greater understanding of the relative influence of central and peripheral signals of exertion to the overall RPE value (Hutchinson & Tenenbaum, 2019). The Task Effort and Awareness (TEA) scale (Swart at al., 2012) differentiates perceived exertion from *task effort*, which is defined as "the conscious mental (psychic) effort required to sustain or increase the current exercise intensity" (Swart at al., 2012, p. 42). Studies using the TEA scale have been able to shed light on the distinct contributions of perceived effort and the physical symptoms induced by exercise (i.e., perceived exertion) to the regulation of exercise intensity (e.g., Venhorst et al., 2018).

Scale Administration

Just as terminology has been used somewhat loosely and interchangeably, RPE scales have been used to assess both effort and exertion as well as related concepts such as fatigue and discomfort (Hutchinson & Tenenbaum, 2019). It is of critical importance that researchers distinguish between measures aimed at evaluating an internal sense of effort versus a perception of peripheral discomfort or exertion, and/or an integrated sum of all signals (Christian et al., 2014). Careful consideration should be given to the specific definitions provided to participants and the nature and precision of the questions asked when implementing an RPE scale. Furthermore, established principles of administration must be carefully followed to ensure the validity and reliability of the measure. These include clear and comprehensive instructions regarding the use of the scale (see Razon et al., 2012) and an opportunity for scale users to ask clarifying questions and to practice making perceptual estimates. A familiarization or learning trial is recommended prior to either rating, or prescribing, exercise intensity with RPE (Pageaux, 2016).

Estimation and Production Mode

In exercise settings, RPE is usually used in one of two modes: estimation and production. When used in *estimation mode* the client/patient provides an RPE during a prescribed exercise intensity. For example, when exercising at a given percentage of maximal HR, or during a graded exercise test. When used in *production mode* individuals are asked to produce and maintain an exercise intensity corresponding to a target RPE (e.g., moderate intensity exercise is prescribed at 12–13 on the Borg 6–20 scale; Garber et al., 2011). The production paradigm provides an alternative method by which to prescribe exercise intensity, instead of relying on a certain percentage of maximal heart rate or oxygen uptake. This is particularly useful in settings such as cardiac rehabilitation where patients may be taking HR lowering medications such as beta-blockers. In the assessment of cardiorespiratory fitness, maximal oxygen uptake (VO_2 max) can be predicted from the linear relationship between submaximal RPE and oxygen uptake. This method has been found to be valid and reliable across a number of populations and exercise modalities (Coquart et al., 2014).

Psychological Moderators of Perceived Effort and Exertion

While the experience of effort and exertion depends on task intensity, and is strongly associated with physiological measures (e.g., ventilation rate, oxygen uptake; Chen et al. 2002), there is also a significant contribution of psychological factors. Indeed, psychological factors are estimated to account for approximately two thirds of the variance in RPE among individuals working at the same relative intensity (Noble & Robertson, 1996). RPE can also be altered by experimentally manipulating psychological factors such as self-efficacy (Hutchinson et al., 2008), attentional focus (Tenenbaum & Connolly, 2008), and expected duration of exercise (Baden et al., 2004).

Dispositional Moderators

Dispositional factors operate at the trait level, not the state level. A number of dispositional factors have been examined in relation to RPE, perhaps the most common being personality variables. Findings are mixed, but largely it does not appear that ratings of effort or exertion are influenced by personality type. Studies examining a variety of personality factors such as extraversion and neuroticism (Garcin et al., 2006), Type-A personality (Dishman et al., 2001), and behavioral activation/inhibition systems (Malik et al., 2020) have all reported no significant relationship with RPE. Preference for and tolerance of exercise intensity are interrelated heritable traits (Ekkekakis et al., 2006) that have been shown to influence how people feel during exercise (Box & Petruzzello, 2020; Jones et al., 2018), however there is no evidence yet that these traits might also influence perceptions of effort and exertion (Bradley et al., 2019; Vandoni et al., 2016).

Individual differences in chronotype, or natural circadian patterns, have been found to influence ratings of perceived exertion (Vitale & Weydahl, 2017). Prior research has identified a significant interaction between chronotype and time of day for RPE, wherein higher RPE was observed during evening training for “morning-types” while “evening-types” showed higher RPE values when training in the morning (Vitale et al., 2017).

Recent scientific breakthroughs related to the genome have enabled scientists to study the heritability of subjective responses to exercise. Using identical and nonidentical twin pairs and their singleton siblings, Schutte et al. reported that genetic factors explained 29% and 35% of the individual differences in RPE during cycle ergometer and treadmill tests, respectively (Schutte et al., 2017). A future challenge to researchers is to identify the specific genes underlying the heritability of the perceptual response to exercise, to test their predictive value for the adoption and maintenance of exercise behavior, and their usefulness in personalizing exercise interventions (Schutte et al., 2017). A promising finding by Bryan and colleagues indicated that variants in the brain-derived neurotrophic factor (BDNF) gene moderate the effect of exercise on RPE. These researchers found that individuals with a specific BDNF genotype reported higher RPE in response to moderate-intensity exercise than participants with a different variation (Bryan et al., 2007).

Social-Contextual Factors

Social-contextual factors operate at the state level, not the trait level. They can be external (e.g., the social context of exercise) or internal (e.g., situational motivation), real or imagined, and conscious or nonconscious.

Environmental Influences

Both physical and social aspects of the exercise environment can affect RPE. Exercise in an outdoor exercise setting is associated with lower RPE, relative to indoor exercise (Focht, 2009; Krinski et al., 2017). This effect is likely due to increased environmental distractions outdoors resulting in a more externally oriented attentional focus (Gladwell et al., 2013). Findings on the presence of others in the exercise environment are mixed and are often difficult to separate from performance enhancing effects. Characteristics of the observer can also cause differential effects, for example among male runners, the introduction of a female observer caused a significant decrease in RPE, whereas the introduction of a male observer caused a significant increase in RPE compared to the control trial (Winchester et al., 2012).

The presence of mirrors in the exercise environment can create or exacerbate self-presentation concerns, which may influence RPE. The effect of mirrors has not been assessed on RPE directly, however sedentary women report greater levels of physical exhaustion after exercising in a mirrored (vs. non-mirrored) environment (Martin Ginis et al., 2003). This effect appears to be exacerbated when in presence of co-exercisers (Martin Ginis et al., 2007).

Performance Expectations

An individual's prediction of the expected level of effort or exertion associated with a future bout of exercise is known as *predicted RPE*. A mismatch occurs when predicted RPE is greater than actual experienced RPE which can lead to negative attitudes regarding exercise initiation and maintenance (Haile et al., 2015). Expectations of exercise duration and anticipation of an exercise end-point can also influence RPE. Specifically, participants have reported a significant increase in RPE consequent to misinformation about the expected exercise duration compared to when they were honestly informed of the correct duration of the run (Baden et al., 2014). Participants with experimentally induced positive expectations about exercise reported significantly lower perceived exertion than participants in a "no expectation" control condition (Mothes et al., 2017). This effect was moderated by physical self-concept, wherein those with a higher physical self-concept appeared to benefit more (in terms of decreased RPE) from positive outcome expectations.

The role of placebos and expectancy has been documented in many fields of research, including exercise science. McClung & Collins (2007) were able to evaluate the relative contributions of expectancy belief and actual pharmacological impact of a performance enhancing substance (sodium bicarbonate) using a balanced placebo design. Endurance athletes completing 1000m time trials reported lower RPEs *only* when they believed themselves to be running "under the influence" of the drug, regardless of whether they received the actual intervention or the placebo. This demonstrates that expectancy effects alone can influence perceptions of exertion. In a similar study, Azevedo and colleagues reported that when runners believed they received an ergogenic substance their RPE decreased, but when they were told they had received an anti-ergogenic substance their RPE increased, regardless of the actual intervention, which was a caffeine supplement in both sessions (Azevedo et al., 2019).

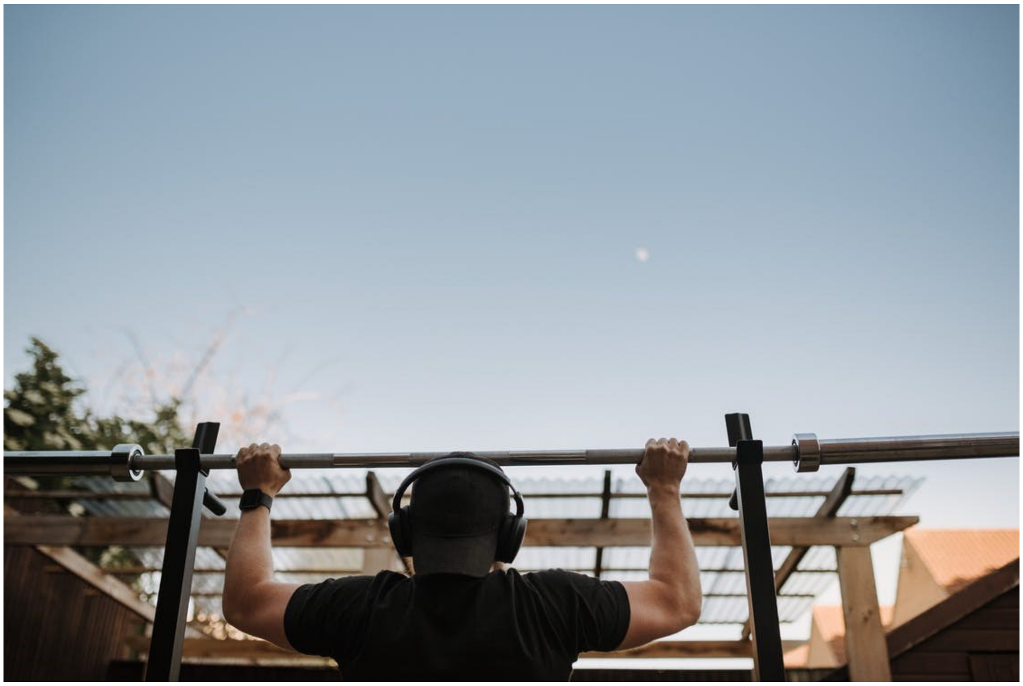
Self-Efficacy

Social-cognitive theory (Bandura, 1986) posits that the relationship between self-efficacy and subjective psychological responses is reciprocal (for more discussion on self-efficacy, see Chapter 27

[Hepler et al., 2021]). Prior research has confirmed this in the case of RPE, where individuals high in self-efficacy reported lower perceived exertion during activity than those with low self-efficacy, and lower perceptions of exertion, in turn, predicted higher post-exercise efficacy (Pender et al., 2002; Robbins et al. 2004). In experimental research designs, self-efficacy for a specific task can be manipulated using false performance feedback. In such experiments, increased self-efficacy led to lower perceptions of effort and exertion (Hutchinson et al., 2008; McAuley et al., 1999). Interestingly the relationship between RPE and daily physical activity has been found to be mediated by self-efficacy for exercise (Pender et al., 2002).

Managing Sensations of Effort and Exertion

Perceived effort and exertion are commonly cited barriers to exercise participation. "Physical exertion" or "feelings of physical discomfort" have been reported as the primary barrier to exercise (exceeding other barriers such as lack of time) in a variety of populations including female university students (Lovell et al., 2010) and culturally diverse adolescents and adults (Bragg et al., 2009). Moreover, sensations of effort and exertion can lead to aversive affective responses to exercise, which can create a negative association with exercise (Ekkekakis et al., 2018) and negatively impact exercise participation (Williams et al., 2008). For more discussion on the relationship between affective responses to exercise and exercise behavior, see Chapters 4 (Brand & Ekkekakis, 2021), 11 (Jones & Zenko, 2021), and 12 (Zenko & Ladwig, 2021). Consequently, interventions aimed at coping with and/or reducing perceptions of effort and exertion are likely to have a positive impact on exercise behavior.



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Attentional Focus Interventions

Exercise interventions aimed at diverting attentional focus away from sensations of effort and exertion have been effective in reducing RPE at fixed workloads (Hutchinson & Tenenbaum, 2019). On the contrary, the removal of distracting external information (via sensory deprivation) can increase perception of effort (Razon et al., 2009). The underlying premise for attentional focus interventions is that attentional capacity is fixed and limited; therefore, distracting stimuli can occupy attentional bandwidth that is critical for bringing perceptions of effort and exertion into focal awareness. It is important to note that this strategy is most effective during low-to-moderate intensity exercise. At very high exercise intensities, attentional processes are dominated by strong afferent feedback that demands attention; thus, perceptions of exertion override the distraction capabilities of external stimuli (Hutchinson et al., 2011).

A variety of attentional focus interventions have been used to draw attention away from internal task-related sensations during exercise. For example, dissociative imagery (images unrelated to the exercise task and/or related sensory inputs), has been found to significantly lower RPE when compared to associative (task-related) imagery and control (no imagery) conditions during a cycling task (Razon et al., 2014). Researchers have also explored the effect of sensory interventions, including taste and smell, on RPE but reported no significant effects (Basevitch et al., 2011; 2013; Raudenbush et al. 2001; Ritchie et al., 2016).

A recent meta-analytic review reported a significant beneficial effect of music listening on RPE (Terry et al., 2020). Appropriately selected music appears to lower RPE by approximately 10% during submaximal aerobic exercise (Karageorghis & Priest, 2012) and explosive power movements (Biagini et al., 2012), and by approximately 6% during strength testing (Silva et al., 2020). When workload is not fixed, music can have an ergogenic, or work-enhancing, effect with no associated increase in RPE (e.g., Waterhouse et al., 2010). The combination of audio and visual stimuli (e.g., music and video) can lower RPE when compared to control and sensory deprivation conditions (Bigliassi et al., 2019; Hutchinson et al., 2015) although this combination does not appear to be significantly superior to music alone (Hutchinson et al., 2015). The content of the audiovisual stimuli is an important consideration; pleasant audiovisual stimuli appears to reduce RPE whereas RPE is actually increased in the presence of unpleasant audiovisual stimuli (Barreto-Silva et al., 2018). See Chapter 23 for more discussion on the effects of music in sport (Karageorghis et al., 2021).

Advances in technology have facilitated recent interventions in the realm of virtual reality and *exergaming*, which refers to the combination of exercise with a computer-simulated interactive game. Initial investigations show promising effects, for example a sample of college students reported significantly higher RPE during a traditional exercise biking session compared with a VR-based exercise biking session (Zeng et al., 2017). Similarly, among active adults, exergaming using XBOX Kinect™ was associated with significantly lower RPE than traditional gym-based exercise despite no difference in mean HR (Barry et al. 2016).

Mindfulness represents an alternative attentional approach to coping with and/or reducing perceptions of effort and exertion (see Chapter 14 for more discussion on mindfulness and exercise [Cox & Ullrich-French, 2021]). Drawing upon an intentional and nonjudgmental awareness of the present moment (Kabat-Zinn, 1990), a mindful intervention targets the development of mindful acceptance of internal sensations, as opposed to diverting attention away from such sensations. Salmon et al. (2010) proposed several advantages to mindfulness-based attention allocation during sustained physical activity, including enhanced awareness, decreased emotional reactivity and improved attentional control. To date, there has been little empirical research on the impact of mindfulness on RPE, although one study indicated a small-to-moderate positive effect, where participants felt like they were not working as hard when they were in the mindfulness condition relative to control (Cox et al., 2018). In a second study, participants reported more accurate RPE (i.e., self-ratings better matched physiological indices of exertion) following a brief mindfulness training intervention (Meggs & Chen, 2021), supporting the notion of improved awareness as an outcome of mindful attention (Salmon et al., 2010).

Mental Skills

The use of mental skills training (MST), also called Psychological Skills Training (PST), is extensive in sport psychology, but less so in exercise psychology. Mental skills in sport have been broken down into basic skills (self-talk, relaxation, goal-setting, and imagery) and advanced skills, which primarily comprise self-regulatory strategies (Hardy et al., 2010). See Chapter 20 for more discussion on psychological skills training (Rymal et al., 2021).

Basic Mental Skills

Self-talk, and in particular motivational self-talk, has been shown to influence perceptions of effort and exertion. Blanchfield et al. (2014a) assessed the effects of motivational self-talk (vs. no-intervention control) on RPE and endurance performance in a constant-load cycling time-to-exhaustion test. The self-talk intervention significantly reduced RPE during the test despite an 18% increase in time-to-exhaustion. Additional studies have reported greater power output with the use of motivational self-talk with no corresponding change in RPE, which infers a perceptual benefit of motivational self-talk (Barwood et al., 2015; Hatzigeorgiadis et al., 2018).

Relaxation training is often incorporated as part of MST interventions in sport, although in exercise settings it is more commonly studied relative to exercise recovery. For example, the use of sedative music during recovery from an exhaustive cycling task was associated with greater decreases in RPE when compared to a no-music control group (Jing & Xudong, 2008). Interesting research exploring the effects of deliberately adopted facial expressions during exercise has consistently shown increased effort perception when frowning in comparison with consciously relaxing and/or smiling (Brick et al., 2018; Philippen et al., 2012).

The role of goal setting in managing sensations of effort and exertion has received limited empirical investigation. However, qualitative research has revealed that goal setting is used by endurance athletes as a way to remain focused on the task in order to cope with painful sensations of exertion (Kress & Statler, 2007). Mental imagery has also been used to cope with exertive sensations. Both dissociative imagery (Razon et al., 2014) and motivational imagery (Giacobbi et al., 2018) have been reported to lower RPE during brief exercise tasks. Mental skills are often combined as part of a comprehensive MST program. In one such example, a program comprising goal setting, arousal regulation, mental imagery, and positive self-talk produced improvements in running performance without a corresponding increase in RPE (Barwood et al., 2008).

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Self-Regulatory Strategies

Broadly, self–regulatory strategies describe particular processes that are engaged in order to achieve a goal. *Cognitive reappraisal* is a self-regulatory strategy which involves reevaluating emotional stimuli to augment or reduce their emotional impact (Gross, 2007). When instructed to utilize cognitive reappraisal, endurance runners reported lower perceived exertion than when provided no instruction (Giles et al., 2018). Evaluating an exhaustive exercise task as a challenge rather than a threat was associated with marginally lower perceived exertion in the presence of significantly increased power output on the task (Wood et al., 2018). If-then planning, sometimes known as *implementation intentions*, refers to a self-regulatory strategy for goal-directed behavior that follows an if-then format (e.g., "If Situation X occurs, then I will perform Behavior A, but if Situation Y occurs, then I will perform Behavior B"). The feasibility of if-then plans to manage perceptions of effort and pain have been explored with mixed results (see Bieleke et al., 2020). Interestingly, ironic effects were reported by Bieleke and Wolff (2018) who observed a steeper increase in RPE among "if-then" participants during a static muscular endurance task and significantly higher RPE in the final 10% of the task relative to control group participants. In this study, the implementation intention instruction prompted participants to ignore sensations of exertion and keep going; it is possible that a more proactive plan might yield different results.

Nonconscious Interventions

A great deal of human functioning is rooted in nonconscious or implicit processes (Bargh, 2006). Dual-process models of behavior have highlighted the importance of impulsive, sometimes nonconscious, influences on exercise behavior (see Rebar et al., 2016 for review). An emerging body of evidence indicates that nonconscious processes are amenable to manipulation in an exercise setting (Hutchinson & Tenenbaum, 2019). In particular, *priming*, which refers to the activation of mental processes through environmental stimuli, can influence a variety of processes and behaviors, including RPE. In a series of experiments, Blanchfield et al., (2014b) assessed the effect of subliminal priming on RPE and effort tolerance during a cycling task. Subliminal primes refer to stimuli that are presented but not perceived consciously. In the first study, participants persisted longer on the time-to-exhaustion task and had significantly lower RPE when they were primed with happy faces compared to sad faces. In the second study, subliminal priming with action words (e.g., "energy" and "go") facilitated a significantly lower RPE during the same cycling test despite no significant difference in objective performance between conditions. A later study by Pottratz et al. (2020) embedded positively-valenced subliminal affective primes into music video. This condition yielded significantly lower RPE and more positive affective responses when compared to music-video (no prime), music, and control conditions.

Optical flow patterns play an important role in locomotion and the perception of movement speed. Parry et al. (2012) manipulated optic flow in cyclists using projected video footage of a cycling course that either represented their actual cycling speed or was varied by ±15% to appear slower or faster (unknown to the participants). Both absolute RPE, and RPE normalized for power output, were significantly lower in the slow optic flow condition, which was also associated with a shallower increase in RPE gradient over the 20km trial.

Practical Implications

From an applied perspective, RPE is widely used as an adjunct to objective physiological measures (e.g., heart rate) during maximal exercise tests and can be used to predict exercise capacity from responses to submaximal exercise tests. RPE is also used as a method of exercise prescription (i.e., target RPE) and a way to monitor exercise intensity in individuals participating in endurance and team sports, cardiac rehabilitation, and fitness training programs. The RPE scale can be applied in nonexercise settings as well, for example to evaluate work demands in occupations involving physical effort. As RPE is strongly correlated with a variety of physiological variables, the RPE scale can be an informative tool to assess overall exertion perception and complement objective measures. However, human perceptions are complex and nuanced and a variety of psychological factors can influence RPE ratings and should be taken into consideration. Care must be taken in the correct administration of the scale; in particular clarity of terminology (e.g., effort v exertion) is important to the validity of the measure.

Conclusion

Perceptions of effort and exertion are common in daily life (e.g., climbing a flight of stairs or lifting a heavy object). Such perceptions are important in the maintenance of homeostasis and play an important role in regulating our physical activity behaviors. These behaviors may range from regulating one's pace during endurance competitions to adopting a sedentary lifestyle (Marcora, 2010). Perceived effort is considered an inverse correlate of physical activity (Bauman et al., 2012) and a source of exercise-induced displeasure and avoidance (Ekkekakis et al., 2018). Consequently, interventions that can reduce perceptions of effort and exertion should have a positive impact on exercise behavior. Interventions that draw attention away from exertive sensations, such as music and exergaming, appear to be effective, as does a mindful approach. Mental skills which can be taught and developed show promise and evidence from MST interventions in sport should be translatable to exercise settings. Non-conscious interventions represent a novel (if controversial) approach to managing RPE.

Learning Exercises

1. Exercisers can establish a *preferred RPE*, which corresponds to their preferred training load. How might a preferred intensity (vs. prescribed intensity) exercise protocol impact affective and motivational variables? Would you expect any effect on exercise adherence?

2. Nonconscious interventions, such as priming, can have a positive influence on the exercise experience (e.g., lowered RPE, improved affective valence). Discuss the ethical implications of using these techniques as a means to promoting exercise engagement.

Further Reading

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Chapter 14
Mindfulness in Physical Activity

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Chapter Overview

Mindfulness refers to being fully present in the moment; attending to the sights, sounds, thoughts, and physical sensations as they come and go. In recent years, exercise psychology researchers have become interested in understanding how the particular qualities of mindfulness shape physical activity experiences and outcomes. Research findings show the potential for mindfulness to support more pleasurable exercise experiences and exhibit more positive embodiment. Evidence also shows that engaging in various forms of mindful movement (e.g., walking, yoga) may support positive mental health outcomes, engagement in healthy behaviors, and the development of trait mindfulness. Mindfulness also fits well with current theories of exercise motivation and is linked with key motivation variables such as need satisfaction and autonomous forms of motivation. Mindfulness-based interventions even suggest that helping individuals develop mindfulness skills may be an effective strategy for increasing physical activity behavior. Thus, mindfulness has demonstrated its relevance to many of the topics that are of interest to exercise psychology researchers, from motivation to mental health to body image.

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Why Be Mindful While Moving?

Although research on mindfulness has grown rapidly over just the last few decades, mindful forms of movement have a long, rich history. Today, this long tradition of mindful movement is merging with contempory research methods to produce new knowledge of the potential benefits of being mindful during physical activity. Current definitions of mindfulness tend to include two key parts. The first part relates to awareness of and attention to present-moment experience, rather than thinking about the past or the future (Bishop et al., 2004; Brown & Ryan, 2003). Present-moment experiences can include one's thoughts, emotions, physical sensations or environment. For example, as you mindfully walk along a beach, various thoughts, the sound of waves crashing, and the feeling of smooth, wet sand giving way beneath your feet might naturally pass in and out of conscious awareness. Alternatively, you may choose to sit on the beach to watch the sunrise focusing all of your attention on that visual stimulus. Both this focusing of attention and open awareness are ways of directing attention mindfully.

The second part of the definition relates to attitude or the characteristics of present-oriented attention. It is not enough to simply be present. One must also be open, accepting, nonjudgmental and even curious about the things that are passing in and out of awareness. Without this second part of the definition, one is not truly being mindful. This definition highlights the nature of mindfulness as an experiential state. One can be more or less mindful on a moment to moment basis and this reflects one's level of *state mindfulness*. We can assess mindfulness as a state or we can examine it as is more commonly done, as a trait. *Trait mindfulness* refers to one's tendency or general disposition to be mindful throughout one's day or across situations. As one might expect, higher levels of trait mindfulness predict higher state mindfulness, but they have also demonstrated independent effects when predicting certain outcome variables (Brown & Ryan, 2003). With these definitions and distinctions in mind, we will first explore examples of mindful movement and why being mindful during physical activity matters for one's experiences in the moment as well as longer term outcomes. We will then explore the role that mindfulness might play in motivational processes within contemporary physical activity motivation theory and describe physical activity interventions.

Learning Exercise One

Check your recall and write down the two key parts of the definition of mindfulness. Next, let's put mindfulness into action during a walking exercise. You can walk inside your home or outside, for a long time or just a few moments. While you are walking, see if you can apply mindful attention to all of the sensations of walking. This could include the movement of your arms, the contact between your feet and the ground and how it changes throughout each step, or muscular contraction in your legs, etc. Allow each sensation to arise in your awareness and then allow it to fade away. If it is really challenging to stay present with the sensations of walking, select just one focus of attention (e.g., your feet) and keep coming back to this target when you become distracted. How did this experience feel? What was difficult about it? What did you learn about yourself?

What is Mindful Movement?

During mindful movement, participants intentionally bring their attention to the experience of moving their body with an attitude of acceptance and nonjudgment that is characteristic of mindfulness more generally (Asztalos et al., 2012). This might include their breath, physical sensations, thoughts, and emotions. Moving mindfully requires deliberate, conscious attention be brought to the experience of moving. Popular forms of mindful movement include walking, tai chi, yoga, qi gong, Feldenkrais, and pilates. Research on the effects of yoga has grown more rapidly than research on other forms of mindful movement, perhaps due to its rapid acceleration in popularity among the general public. In both 2012 and 2017, yoga was the most commonly used complementary (i.e., outside of traditional Western medicine) health approach in adults in the United States (Clarke et al., 2018). From 2012 to 2017, the use of yoga in the last 12 months increased from 9.5% to 14.3% in adults. The growing popularity of yoga makes it accessible to both practitioners and researchers alike. Researchers who have studied mindful forms of movement have been largely interested in how it can be used as an adjunct therapy to support mental and physical well-being. More recently, researchers have dived more deeply into the psychological processes that occur when individuals are moving mindfully.

Experiences During Mindful Movement

One of the questions of most interest to researchers is how being mindful while moving impacts the nature of the movement experience. When moving mindfully, individuals not only direct their attention to their present-moment experience but are also open and accepting of whatever emerges in that experience. Alternatively, when individuals engage in physical activity and are not being mindful they might be thinking about the past or the future, judging some aspect of their experience (e.g., pain, ability, performance), thinking about what they look like while exercising, contemplating their exercise goals, or listening to music. Researchers are interested in how being fully present in one's body while engaging in physical activity impacts one's experiences while moving. Two areas that have received recent attention are the degree of pleasure experienced and how one experiences or inhabits their body while moving. In the sections that follow, we will explore the research evidence that reveals the way mindfulness can shape the movement experience.

Affective and Emotional Experiences

Some of the most compelling evidence of the benefits of mindful movement is that people simply feel good doing it. This is often captured by measuring participants' affect or distinct emotional states (e.g., content, sad, irritated) either while they are participating in physical activity or retrospectively (i.e., recalling it after the fact). Affect refers to how people feel (e.g., good or bad; Ekkekakis & Petruzzello, 2000). It is the experiential piece of emotions such as anxiety or joy, but does not have to be derived from a specific emotion per se. In several studies, researchers have observed a relationship between mindful states and affective responses during physical activity. In a study that used experience sampling at random times throughout the day, college students' moving, standing, and sitting behaviors as well as their negative affect (i.e., stress, anxiety, and generally feeling bad) were assessed in the moment over a fourteen day period (Yang & Conroy, 2018). Students experienced less negative affect during movement-based activities than when sitting or standing. Negative affect was also lower when participants were more mindful than usual while engaging in physical activity. Thus, a synergistic effect was observed where being mindful amplified the positive influence of physical activity on negative affect. In a different approach, Mackenzie et al. (2014) assessed participants' focus of attention and affect across an 80-minute yoga class. Throughout the yoga class, simultaneous increases were observed for both an associative focus of attention (i.e., focus on the present moment) and positive affect. Thus, the more focused they were on moving in the present moment, the better they felt. Finally, in a study testing the effects of mindful walking, participants' state mindfulness and positive and negative emotions were assessed multiple times a day using experience sampling methodology (Gotink et al., 2016). Results showed that state mindfulness and emotions experienced during mindful walking prospectively enhanced each other in an upward spiral. That is, state mindfulness in one moment positively predicted positive emotions in the next moment sampled. Similarly, positive emotions positively predicted state mindfulness in the next moment sampled. Therefore, the more participants focused their attention on the here and now throughout the study, the more pleasant their experience became. Overall, being attentive to the experience of moving in a nonjudgmental and accepting way appears to support positive affective and emotional experiences.

Learning Exercise Two

Recall a time when you were engaging in physical activity in a purely joyful, playful, and just plain fun way. Some of you might have to think way back to when you were a kid at the playground. Close your eyes. Try to recall everything you remember about that experience. What did you see, hear, smell, taste and feel? How did the experience make you feel? Write down everything you can remember. What aspects of mindfulness were a part of that experience? How can you recreate those experiences now?

Embodied Experiences

Mindfulness also plays a key role in how we experience living in our bodies, referred to as embodiment (Piran & Teall, 2012). Although embodiment can be defined in different ways, broadly speaking, it refers to our connection with our bodies. Piran (2016) further discusses how experiences of embodiment can be positive or negative along five different dimensions including body connection and comfort, agency and functionality, attuned self-care, experience and expression of bodily desire, and inhabiting the body as a subjective site. Overall, positive embodiment is described as “positive body connection and comfort, embodied agency and passion, and attuned self-care,” whereas negative embodiment is defined as “disrupted body connection and discomfort, restricted agency and passion, and self-neglect or harm” (Piran, 2016, p. 47). On the one hand, Piran discusses in her developmental theory of embodiment (DTE) how multiple factors contribute to negative embodiment, such as the way many cultures emphasize the importance of women’s physical attractiveness and evaluate them based on often unrealistic societal standards. This objectification of women’s bodies can cause them to dissociate from their physical experiences. On the other hand, she outlines the factors that support positive embodiment, which include immersing oneself in joyful physical activities. Full immersion in the act of moving one’s body is consistent with the way that mindful movement is described. Unsurprisingly, engaging in mindful forms of movement is associated with positive experiences of embodiment. In the next two sections, we will explore some of the research evidence connecting mindfulness to the dimensions of embodiment that have received more research attention: body connection and comfort and inhabiting the body as a subjective site.

Body Connection and Comfort. Qualitative investigations of individuals who participate in various forms of mindful movement highlight how the movement helps them feel more connected to their body or greater integration between mind and body. Many such studies have been conducted with yoga participants across different age groups and special populations (e.g., cancer survivors; those with chronic pain). These participants talk about how yoga increases their awareness of thoughts, feelings, emotions, and sensations (e.g., Cramer et al., 2013; Goncalves et al., 2016). With this greater awareness, they are able to be more present and decide how best to respond. For example, Dittman and Freedman (2009) interviewed women ages 22 to 72 years who practice yoga regularly. They reported an increased awareness and connection with their body due to practicing yoga. This connection helped them feel more grounded or present in their bodies and they were better able to listen and respond to their bodies’ needs. Although it may seem simple, responding to one’s needs like resting when tired or drinking water when thirsty is not as natural when experiencing disconnection from one’s body.

Furthermore, they liked, respected, and appreciated their bodies more which is consistent with quantitative studies linking yoga participation to higher body appreciation (Cox et al., 2019; Halliwell et al., 2019). That is, during the course of yoga participation over a period of weeks, increases in the degree of love, respect, and appreciation women have for their bodies have been observed. The breath is a common focus of attention across different forms of mindful movement (e.g., yoga, tai chi, qigong) and may serve as one vehicle that fosters a close connection and comfort with one's body.

Other types of physical activity such as dance may also provide an opportunity to feel connected and comfortable in one's body. However, this is highly dependent on the type of dance. Tiggemann et al. (2014) proposed that belly dance was an embodying activity that promotes connection with one's body due to a focus on breathing and the abdominal muscles as well as concentration and emphasis on connecting to the body. To test this proposition, they compared belly dancers to those who had never participated in belly dance on embodiment-related variables. Results showed that belly dancers had significantly higher levels of body appreciation relative to the comparison group. However, it is equally plausible that individuals who are already more comfortable in their bodies choose to participate in belly dancing. Stronger evidence comes from studies that have used dance or dance therapy as an intervention. For example, in one study, researchers interviewed male and female teenagers who participated in a dance movement psychotherapy session which is focused on feeling the body move (Grogan et al., 2014). The results revealed that participants felt greater body acceptance, less self-consciousness and more connected to their bodies after the dance therapy. No doubt moving in a mindful way, whether it be through yoga, dance, or sport, provides numerous opportunities to become both aware of sensations in the body that may be reflective of physiological and emotional states and accepting of what one finds, thus contributing to body connection and comfort.

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Inhabiting the Body as a Subjective Site. Inhabiting one's body subjectively means experiencing and interacting with the world from a first-person, internal perspective (Piran, 2016). It also refers to resisting the pressure to view one's body from a third-person perspective, as an object to be judged for its external appearance. This third-person perspective is incompatible with the experience of being mindful while moving. For example, imagine dancing or doing tai-chi in front of mirrors. Perhaps you are completely immersed in the activity, bringing your attention fully to the feeling of the movement and sensation in your body. Then, you become distracted by your image in the mirror and before you know it, you are looking at yourself from an observer perspective. And because we are social creatures, seeing your own reflection likely turned into an evaluation of the image you perceived without you even realizing it. That doesn't sound very mindful does it? In an instant, you are no longer aware of your own present-moment sensations as your attention is pulled out of experiencing your body and into evaluating an external image of yourself. The phrase "dance like nobody's watching" sums up the value of resisting an external perspective and the joy that can arise from fully inhabiting your body.

We do not even need mirrors to prompt us to think about the way we appear to others from an observer perspective. Body surveillance is something people do all the time, some more than others. It refers to thinking about what you look like from a third-person perspective and it undermines inhabiting your body subjectively (Fredrickson & Roberts, 1997). Mindful forms of movement may contribute to resisting this objectifying, third-person perspective by continually drawing attention to internal experiences of physical sensations, thoughts, and emotions. At the very core of mindful movement *is* inhabiting the body subjectively, from an internal perspective. Research evidence shows that through yoga participation, women start to value and appreciate the functionality of their bodies more and an emphasis on outward physical appearance can decline (Dittman & Freedman, 2009). This reflects a shift from an objectifying to embodied perspective. In support of such a shift, body surveillance has been found to decline over the course of participation in a yoga class over time (Cox et al., 2017; 2019; Impett et al., 2006). Further, an explanation for these shifts was documented in a study showing that when participants were more mindful during yoga class, they engaged in less body surveillance (Cox et al., 2017). And remember those belly dancers (Tiggemann et al., 2014)? They too reported significantly lower body surveillance compared to those who had not belly danced. Thus, being mindful while moving appears incompatible with an objectifying perspective of the self and may help promote inhabiting the body subjectively over time. Overall, engaging in mindful movement is associated with pleasant physical activity experiences and a positive state of embodiment.

Learning Exercise Three

Recall a time when you felt quite self-conscious engaging in physical activity. Maybe you were looking in the mirror frequently or thinking about the other people around you observing you. What did that experience feel like? What thoughts were going through your head? What do you notice about the way it feels to exercise or move when you are thinking about your outward appearance or others judging you? Finally, how could you bring your attention inward to the experience and sensations of moving your body?

Outcomes of Mindful Movement

Mindful forms of movement or physical activity have also been linked to a number of mental and physical health benefits as well as other healthy behaviors. We know that mindful movement, like physical activity more generally, is associated with a wide range of physical health outcomes. In line with an exercise psychology perspective, here we will discuss some of the psychological and behavioral outcomes associated with mindful movement.

Trait Mindfulness

At a very basic level, participating in mindful movement can be an effective strategy for increasing overall levels of trait mindfulness. Presumably, any activity in which an individual is being mindful is enhancing one's ability to be mindful in general. Kiken and colleagues (2015) provided evidence of this from participants in an 8-week Mindfulness-Based Stress Reduction Program (MBSR; Kabat-Zinn, 1990). Each week of the program, they assessed participants' levels of state mindfulness during a meditation exercise. What they found was that growth in state mindfulness over the eight weeks of the program contributed to growth in trait mindfulness. Similarly, engaging in various forms of mindful movement over time has been associated with increases in trait mindfulness. In one study of college students, increases in trait mindfulness were observed over the course of 16 weeks of yoga participation (Cox & McMahon, 2019). In another study, college students participated in taijiquan, a martial art that originated in China, twice a week for 15 weeks (Caldwell et al., 2011). The students who participated in taijiquan classes, increased significantly in trait mindfulness whereas those in a comparison class that involved similar levels of physical activity did not. The physical sensations that we experience while moving may provide a more tangible, dynamic, and interesting focus of attention relative to sedentary or breath-based forms of mindfulness practice. Mindful movement has been shown to be more effective than seated mindfulness practices for supporting the development of trait mindfulness (Carmody & Baer, 2008). Thus, mindful movment may not only provide a more accessible and attractive entry point for engaging in mindfulness practices, but may even be more effective than seated practices for developing trait mindfulness.

Mental Health

The cultivation of mindfulness while moving may lead to better mental health benefits than either seated forms of mindfulness (Hunt et al., 2018) or physical activity that is not mindful (Asztalos et al., 2012). The positive link between physical activity and mental health indicators is well-established (e.g., McDowell et al., 2019; Rebar et al., 2015); however, combined with acceptance and detachment from one's thoughts, emotions, and other experiences, mindful physical activity may enhance the positive mental health benefits of physical activity alone. There is no shortage of empirical evidence linking mindful forms of movement such as tai chi, yoga, and mindful walking to positive mental health or psychological well-being. For example, older adults in a 6-month tai chi program experienced increases in positive affect and well-being and decreases in negative affect, depression, and psychological distress (Li et al., 2001). In another study, adults with high psychological distress demonstrated large reductions in stress over the course of a 4-week mindful walking program (Teut et al., 2013). And in yet a different form of mindful movement, yoga participation, has consistently been linked to the reduction of physiological markers of stress (e.g., cortisol; Pascoe et al., 2017) and overall psychological well-being in youth (Noggle et al., 2012) and adults (Hartfiel et al., 2011) alike. Thus, there is robust support for the psychological benefit of engaging in a range of mindful movement at all ages.

Mindful movement may also be more effective for supporting positive mental health compared to various seated forms of mindfulness practice. MBSR (Kabat-Zinn, 1990) is one of the most popular and widely researched mindfulness programs. It includes both seated (e.g., meditation) and movement-based forms of mindfulness like yoga and walking and is consistently linked to reductions in stress and other indicators of psychological well-being (e.g., Shearer et al., 2015). However, given the known psychological benefits of mindfulness in general, it is unclear to what degree mindful movement may be responsible for the positive outcomes associated with MBSR programs. In one study hoping to disentangle the various elements of MBSR, college students were randomly assigned to one of five conditions: a) mindfulness and meditation alone, b) yoga alone, c) yoga with mindfulness and meditation training, d) study break with snacks and therapy dog , or e) no treatment control for four weeks (Hunt et al., 2018). At the end of the intervention, only the yoga alone and yoga plus mindfulness/meditation groups had significantly lower anxiety and negative affect compared to the no treatment control group. The results of this study provide some initial evidence that there may be a synergistic effect when movement is combined with mindfulness. Moving mindfully could provide an optimal combination for supporting positive mental health. However, much more research is needed that provides direct comparisons among different types of physical activities, seated mindfulness practices, and mindful movement practices.

Healthy Behaviors

Other potential beneficial outcomes of engaging in mindful movement include health behaviors. As with other areas of research on mindful movement, most of this work has been conducted on yoga participants. Individuals who participate in yoga on a regular basis report that it has promoted healthy habits in the areas of eating, physical activity, sleep, and engaging in relaxation (e.g., Watts et al., 2018). For example, in one study, young adults reported that their yoga practice motivated them to eat healthier and be more mindful of what they are eating; they also reported increased healthier cravings and less emotional eating (Watts et al., 2018). Furthermore, yoga motivated them to be more active outside of yoga and provided them with the skills to try other forms of physical activity. Other studies have found that yoga participants are able to use what they learn in yoga to engage in stress reduction strategies outside of yoga and better respond to their needs with self-care (Galentino et al., 2012; Goncalves, et al., 2016; Rhodes, 2015). One of the most frequent examples yoga participants give is using the breathwork they learn in yoga to respond to stressful situations in their daily lives.

The relationship between mindful movement and healthy behaviors may be due to increases in attunement with the self that occur when being mindful. Through increased awareness of what the mind and body feel like, individuals can better discern how best to respond to and take care of one's self. This attuned self-care is also one of Piran's (2016) five dimensions of embodiment. In a study of adults with chronic neck pain, participants talked about how increased body awareness from yoga helped them better see the connection between their behaviors and their well-being (Cramer et al., 2013). Therefore, mindful movement activities may support health and well-being directly as well as indirectly by supporting additional healthy behaviors.

Is Mindful Movement Motivating?

Although mindful movement is not new, we are just now documenting the many benefits of the practice of mindful movement related to physical activity motivation and behavior. As research is catching up with the practice, we are seeing more and more evidence to support how mindful movement can play a role in motivational processes. As a research topic, mindfulness and motivation is in its infancy. However, there is at least one theoretical model that incorporated mindfulness within a broader description of motivation and well-being more than forty years ago. Self-determination theory (SDT; Ryan & Deci, 2017) is one of the most widely used theoretical frameworks on motivation and well-being across many disciplines and domains. SDT is referred to as a macro-theory, which means that it is a framework that is intended to be applied across all people and domains to holistically describe, explain, and make predictions about human well-being. Below is an overview of key aspects of SDT that are most relevant to mindfulness.

Key Details of Self-Determination Theory Explained

To understand how mindfulness might play a role in motivational processes, it is helpful to understand how motivation is conceptualized within SDT (see Ryan & Deci, 2017; Chapter 3, Quested et al., 2021). Motivation is described as multi-dimensional, reflecting the different ways we regulate our behavior. There are different types of motivation that represent different reasons why people engage in a particular behavior. The focus is on the underlying reasons that energize or regulate behavior and these reasons are presented as falling along a continuum ranging from volitional or autonomous reasons to externally controlling reasons. Amotivation reflects lacking a reason for doing an activity and represents an absence of autonomy. Theoretically, individuals who are amotivated may be acting rather mindlessly given the unintentional nature of their behavior. On the other hand, intrinsic motivation represents the highest degree of autonomy. Intrinsic motivation represents engaging in a behavior, such as exercise, for the rewards gained solely from the act of exercising. These rewards that are inherent to the activity itself can include enjoyment, satisfaction, and challenge, among others. This type of motivation represents the purest form of motivation because it is completely self-regulated (autonomous) and derived from the activity itself; for example, "I exercise because I enjoy the feeling of the movement". Intrinsic motivation naturally aligns with a mindful state as one is paying attention to the experience itself.

In the middle of the continuum, there are four types of motivation regulations that represent engaging in a behavior for reasons that emanate from sources external to the activity. Each of these types of extrinsic motivation represent progressively lower degrees of autonomy. The external and controlling nature of these types of motivation reflect potential barriers to being present and accepting of one's experience. The most autonomous of the extrinsic regulations is integrated regulation, which represents an integration of the activity as congruent with one's sense of self or identity; "I exercise because I identify as a healthy and active person". Next is identified regulation, which is still autonomous because it represents engaging in a behavior because it is of personal value and importance; "I value the benefits of exercise". A somewhat more external and more controlling regulation is introjected regulation, which reflects internalized rewards, pressure or guilt; "I exercise because I feel bad about myself if I don't". Finally, the most controlling form of motivation, external regulation, represents external rewards or punishments; "I exercise because my physician tells me I have to". The distinctions between the different types of behavioral regulations highlight the varying degrees of autonomy and external control. The process by which a behavior can become internalized or integrated within an individual's sense of self and consistent with one's values is where mindfulness may play a role in motivation.

There is substantial support linking autonomous motivation, and intrinsic motivation in particular, with long-term physical activity behavior (Teixeira et al., 2012). Teixeira et al. conducted a systematic review analyzing the results of 66 studies with a consistent trend across studies that supported the important theoretical connection between intrinsic motivation and sustained physical activity behavior. What this evidence shows is that the most effective and consistent ways to sustain physical activity behavior are to internalize the behavior to be consistent with one's sense of self and one's values and to fully enjoy the experience of being physically active. Conceptually, such experiences are consistent with being mindful. SDT outlines that there are ways to support the internalization process to shift more controlling regulations to become more autonomous. A vast amount of research has addressed the role that social and contextual factors (e.g., coaches, exercise instructors) play in supporting or undermining autonomous regulations, with an emphasis on ways that basic psychological needs are fulfilled. Feeling competent, autonomous, and socially related are core psychological needs that lead to optimal psychological functioning and serve as a primary mediator between social influences and autonomous motivation and psychological well-being more broadly (Ryan & Deci, 2017). We know quite a bit about the types of behaviors of significant others that support or undermine psychological needs and impact physical activity motivation. However, there are other ways that psychological needs, and autonomous motivation are fulfilled. Mindfulness is an intra-individual factor that may provide a different type of pathway to psychological need fulfillment.

Theoretical Explanation for the Role of Mindfulness

While there are important inter-personal influences such as the exercise instructor and environment on these motivational processes, there are also intra-personal factors involved. Intrapersonal factors are those that are within the individual. Mindfulness represents an understudied, but conceptually supported intra-personal process to consider in physical activity motivation (Brown & Ryan, 2003). In 1980, Deci and Ryan described how mindfulness may play a key role in the internalization process to support autonomous motivation. Let's start with what it looks like to be *mindless* from a motivation perspective. Mindlessness represents a mode of operating in reactive, compulsive, and/or habitual patterns. This means that there is no space, intention, or thought behind the action, hallmarks of amotivation and a state with potentially negative consequences. A few examples demonstrate how an absence of mindfulness is reflected in common behavior patterns. For example, experiencing a state of heightened stress may fuel a habit of scrolling distractedly through one's phone rather than following through with a planned workout. Or feeling shame when one evaluates the shape of their body in the mirror may similarly fuel a cycle of overeating rather than showing up to the gym. These patterns of behavior demonstrate a submission to negative psychological and emotional states and may interrupt acting from one's core values and needs. Mindful awareness may defend against defensive or ego-involved states, which are more aligned with controlling forms of motivation that are regulated by short-term internal or external rewards and punishments (Ryan & Deci, 2017).

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When acting mindlessly (e.g., compulsive, reactive), there is a lack of space between stimulus and response (e.g., feel bad—skip workout) and no conscious thought for long term consequences. In this state individuals lack intention and connection with values and goals, which are more representative of amotivation or low autonomy (Deci et al., 2015). We have all been there before and it is frustrating to know you should exercise, you want to exercise regularly, but you just can't break the pattern of inactivity. The result is that we tend to feel bad about ourselves and we don't reap the mental or physical benefits of exercising. The desires, goals, and value of exercising may not be aligned with the behavioral patterns. This is the place where being more mindful may be helpful for facilitating more autonomous motivation.

Deci and Ryan (1980) argued that the qualities of mindfulness create the psychological space for individuals to make decisions that are more in line with their values, needs, and interests. Mindfulness encompasses qualities of open, attentive awareness of thoughts and feelings (both mental and physical) providing an important first step towards aligning goals, values, and needs with behavior. Attentiveness to one's needs (i.e., competence, autonomy, relatedness), especially when done with openness, acceptance, and nonjudgment, provides the space to identify, evaluate, and select behavior options more autonomously. Nonjudgmental awareness can, for example, open the door to constructive feedback to inform competence (ability) perceptions and avoid eliciting defensiveness, suppression, or avoidance. Mindfulness qualities can also help to regulate emotional responses by diffusing the reactiveness and compulsiveness that leads to or is fueled by more controlling forms of motivation regulation. In this way, mindfulness creates a pause, a space within which to be more deliberate. The result of this psychological space is that behavioral choices can be made with more clarity and over time can facilitate the internalization process and lead to autonomous motivation and long-term behavior.

Moving Beyond Theory: What Does the Research Show?

The conceptual description of the role of mindfulness in motivational processes is clearly outlined within the assumptions of SDT. Being mindful should facilitate the three core psychological needs which will then support autonomous motivation and physical activity behavior. If you go through your day attending to present-moment thoughts and sensations with an open attitude and allow each experience to emerge, you are more likely to feel in tune with your needs and volitional in what you are doing. This has been demonstrated in a daily diary study showing that those with higher trait mindfulness tend to have more experiences of state mindfulness during daily life and that these individuals report positive affect and more autonomous regulation for their activities (Brown & Ryan, 2003). A key finding of this study was that the state, or moment to moment, experiences of mindfulness had a stronger effect on affect and autonomous motivation and were independent of trait mindfulness. That is, having trait mindfulness tends to lead to more state mindfulness experiences, but trait mindfulness was not necessary for individuals to have state mindfulness experiences. This work provides foundational evidence demonstrating the distinct role of state experiences of mindfulness for predicting more positive affect and more autonomous regulation of behavior.

Research evidence illustrates the relationships of both trait and state mindfulness with psychological need satisfaction and autonomous motivation for exercise. Trait mindfulness has been positively associated with autonomous motivation for physical activity and negatively associated with controlling forms of motivation for physical activity (Kang et al., 2017; Ruffault et al., 2016). These findings have been based on cross-sectional research and have been of small magnitude. There is some evidence that having high trait mindfulness can strengthen the relationship between intrinsic motivation and physical activity behavior (Ruffault et al., 2016). This supports the conceptualization of mindfulness as a facilitator of internalization processes and alignment of values with behaviors. However, there is very limited exploration into these processes and trait mindfulness appears to have a relatively small impact on behavior.

An alternative approach, drawing from Brown and Ryan's (2003) work, is to focus on how the specific experiences of being mindful plays a role in physical activity motivation and behavior. If an individual experiences movement mindfully (i.e., state mindfulness), then they may feel more connected to their body and the experience of moving which may provide the opportunity to feel more empowered and satisfied with the movement itself. Conceptually, it seems then that state mindfulness is aligned with intrinsic motivation which is derived from the very experience of moving.

Greater awareness of one's feelings and sensations during movement may increase one's ability to meet their needs for competence, autonomy, and relatedness, thus facilitating the internalization process toward autonomous regulation. Mindfulness allows attention without judgment that can serve to connect one to their physical experience, which should raise perceptions of competence and foster their sense of autonomy. Imagine a high-intensity spin class where legs are burning, sweat dripping, and lungs screaming. Paying attention to these sensations without judgement allows one to better respond with what supports one's goals. For the hardcore athlete, these cues align with fitness goals and give biofeedback about performance that guides effort. For someone just starting their fitness journey, these sensations may be an indicator of overexertion which may not serve the longer-term goal of sticking with a new fitness routine. Mindful attention will aid the athlete to push themselves while directing the inexperienced spinner to pace themselves so they can finish the session and return for another day. When an exercise session is uncomfortable, a mindful approach can allow an individual to view behavioral options with more clarity and be more volitional about how to proceed in a way that also supports feelings of autonomy. There is some evidence to support this pathway. We examined state mindfulness, psychological needs (perceived competence and autonomy), and autonomous motivation for physical activity longitudinally across a 16-week yoga class (Cox, Ullrich-French, & Austin, 2020). We found that trait mindfulness predicted state mindfulness, but not psychological needs or motivation. Participants who started the yoga class with higher state mindfulness and those that increased in their experiences of state mindfulness across the 16 weeks reported increases in perceived competence and autonomy. In addition, growth in state mindfulness directly and indirectly (through need satisfaction) predicted autonomous motivation for physical activity. This study is the first to test a SDT-based process model of the role of trait and state mindfulness in physical activity motivation. This evidence supports the conceptual links laid out about how mindful movement can serve to facilitate autonomous motivation and suggests that indeed, mindful movement can be motivating.

Learning Exercise Four

You are in a high-intensity exercise class that is pushing you to your limit. You have choices. If you value and are motivated to push yourself then your response might be "bring it on". If you value overall wellness, and want to survive to return to another class, your response might be "how can I modify this so I can complete the class?". What are the ways that you might respond in this moment (i.e., emotionally and behaviorally)? Think about what is driving that response. Does the response align with your motivation, goals, and values? Does your response help you feel more competent and autonomous?

Other Important Motivational Factors: How Pleasant is Moving?

Strategies for increasing motivation to exercise need to consider the vital role of how people feel while exercising. The degree to which exercise is experienced as pleasant in the moment, referred to as core affect, is a good predictor of future behavior (Brand & Ekakakis, 2018; see also Chapter 4, Brand & Ekkekakis, 2021). We are more motivated to repeat pleasant rather than unpleasant activities, right? The extent to which exercise has pleasant feelings associated with it, the greater the likelihood of choosing to exercise again in the future and making that choice for intrinsic reasons. State mindfulness has been found to positively associate with positive affect across a range of daily activities (Brown & Ryan, 2003). That is, generally things are more pleasant when engaging in them mindfully. Being mindful may allow for a more balanced emotional state, which is a generally pleasant psychological state of equanimity, peacefulness, or contentedness. Someone completing a challenging exercise mindfully may be able to hold the negative physiological sensations in balance with feelings of satisfaction to maintain an adaptive psychological state.

In order to develop useful exercise interventions, a growing trend is to focus on how to make exercise experiences more pleasant. Many people exercise with distraction, such as listening to music, as a coping strategy to "get through it" or so they "don't feel the pain". Dissociative strategies, such as listening to music during exercise have been touted as a way to make exercise more pleasant. Although music is an effective strategy for making individual exercise sessions more pleasant, we have some evidence to suggest that intentionally manipulating mindfulness while exercising can lead to similarly pleasant exercise experiences as listening to music while exercising (Cox, Ullrich-French, Hargreaves, & McMahon, 2020). This suggests that paying attention to the physical experience of moving your body can be pleasant and comparable to listening to music. Although dissociation may serve a purpose of reducing awareness of discomfort and is motivating for many people, this can lead to a dissociation with the bodily experience of moving. While a distracted experience tends to be enjoyable, it should be more difficult to develop a strong sense of competence when one isn't fully experiencing the movement and activity itself. Thus, a dissociative focus during exercise is less likely to lead to the fulfillment of basic psychological needs and the long-term adherence through autonomous motivation. We have a lot to learn still about how to effectively apply mindfulness strategies to lead to optimal exercise experiences.

Learning Exercise Five

When you exercise to music it makes the time go by, it can be motivating and fun. Think about your experiences exercising with and without music. When you finish a workout while listening to music, how much of the experience to you remember? How connected do you feel with the sensations in your body? Your feelings of competence or achievement? Now, what about when you don't listen to music? How does the experience differ?

Moving from Motivation to Behavior: Mindfulness and Physical Activity Behavior

As discussed previously, mindful forms of movement have been linked to a variety of health behaviors. Similarly, trait mindfulness and physical activity behavior have been connected in several different ways. Those who self-report more physical activity also report higher levels of trait mindfulness (Gilbert & Waltz, 2010; Kangasniemi et al., 2014) and are more likely to engage in mindfulness practices (Strowger et al., 2018). The type of activity may be important though, as time spent doing intentionally mindful activities such as yoga are associated with higher trait mindfulness while time spent doing cardio-based exercise has been associated with lower trait mindfulness (Martin et al., 2013). This indicates that qualities of the physical activity are relevant to the role of mindfulness. It could be either that those who are generally more mindful gravitate towards mindful movement (e.g., yoga) or that the mindful movement develops the tendency to be mindful. There is not enough information to know if there is one direction of influence, although both possibilities are likely working together to mutually reinforce one another.

An added complication to the puzzle of understanding the role of mindfulness in physical activity behavior is that although there is a consistent positive association between mindfulness and self-reported physical activity, this is not the case when physical activity is assessed more objectively (e.g., accelerometer based assessment of movement; Kang et al., 2017; Kangasniemi et al., 2015). In addition, when mindfulness is context specific, or applied specifically to physical activity, it is more strongly and consistently associated with physical activity compared to trait mindfulness. So, the context matters in several ways. One can be mindful generally, but not in a specific physical activity experience. For example, someone who generally is mindful can have a bad day and be distracted during a workout.

Or, someone who isn't generally mindful can show a special interest in a physical activity and have more focus, attention, and connection while doing that activity than in other areas of their life. It is difficult to predict and understand all the factors that influence behavioral choices, but we do know that mindfulness is related to many of those factors including more autonomous motivation, positive affect, and other physical activity related perceptions (e.g., psychological needs). The relationship between mindfulness and physical activity behavior is likely indirect and the more we can uncover about the processes that might link the two, the better we can understand the role of mindfulness in motivation.

Mindfulness as an Intervention to Increase Physical Activity

Mindfulness interventions often include acceptance and mindfulness-based stress reduction approaches that teach and then facilitate the practice of mindfulness strategies. Acceptance, compassion, and mindfulness approaches share the promotion of awareness and nonjudgement toward the self. Such approaches have led to increases in physical activity (e.g., Butryn et al., 2011; Palmeira et al., 2017). In one intervention, college age women were assigned to either an educational condition or an Acceptance and Commitment Therapy (ACT) condition aimed to increase physical activity (Butryn et al., 2011). The educational condition provided information about the benefits of physical activity and ways to safely participate in physical activity. Participants in the ACT condition were taught how to defuse or separate from distressing thoughts about exercise and identify and strengthen values around exercise. Post-intervention and at a three-week follow-up, participants in the ACT condition participated in more physical activity compared to participants in the education condition. This study shows how developing mindfulness skills and using strategies to address intrinsic motivation (aligned with SDT) were effective at increasing physical activity behavior. Although this intervention targeted physical activity behavior and interventions were physical activity based in content, there was not an explicit movement component that was manipulated. Applications of mindfulness in school interventions also show that physical activity can be increased in children (Salmoirago-Blotcher at al., 2018). However, children who started this intervention with higher levels of activity showed a stronger effect of the mindfulness training. Perhaps this means that having experience with physical activity primes individuals or allows them to more easily apply mindfulness in an adaptive way. In a randomized controlled trial with healthy adults that used physical activity as a comparison group, similar amounts of physical activity were found for the MBSR and aerobic exercise conditions (Meyer et al., 2018). This study concludes that the real benefit may be in combining MBSR with physical activity. There is still much to be learned about how to most effectively incorporate mindfulness into physical activity interventions.

Conclusion

The previous sections have demonstrated how the qualities of mindfulness are relevant to key aspects of the physical activity experience as well as important health-related outcomes. Generally, when individuals are more mindfully engaged in the act of moving, the experience is more pleasant, they inhabit their bodies more fully, and have a more positive connection to their body. More broadly, engaging in mindful movement is linked to better mental health, health behaviors, and the development of trait mindfulness. Cultivating the ability to be mindful also appears to have important implications for physical activity motivation. Specifically, those who are generally more mindful or experience more mindful states during physical activity report greater autonomous physical activity motivation.

Physical activity may provide an optimal context for practicing mindfulness skills and experiencing the benefits of being mindful. Engaging in all types of movement provides a sensory activity with clear targets of focus (e.g., breath, physical sensations) as well as opportunities to resist self-judgment (e.g., body image) and thus may be an ideal forum for teaching mindfulness skills (Segal et al., 2002) or maintaining mindfulness skills previously taught (Gotink et al., 2016). Thus, there are a variety of potential practical implications from this work that could inform future interventions targeting physical activity motivation, body image, mental health, or well-being more generally. This area of research within exercise psychology is still quite new and will benefit from continuing to firmly ground investigations in theory, using appropriate control or comparisons groups in experimental designs, and paying close attention to the way that mindfulness is defined and assessed at the state or trait level. So while there is great promise in harnessing the potential for mindfulness to support adaptive physical activity experiences and relevant outcomes, we must move forward carefully and in some cases temper the excitement many of us hold for the promise of mindfulness by acknowledging our own biases. This greater awareness will allow us to move forward with more clarity as we continue to study the intersections between mindfulness and movement.

Further Reading

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Chapter 15
Exercise and Physical Activity for Depression

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Chapter Overview

Depression is a leading cause of global disease burden. Standard treatments include pharmacologics and psychotherapy; however, these treatments are not effective for everyone and are associated with several barriers and a substantial side effect profile. There is a need to identify alternative approaches that can be used to treat, or even prevent depression. Exercise and physical activity are two lifestyle behaviors that have been touted for decades as strategies used in the prevention and treatment of depression. The purpose of this chapter is to provide an overview of the scientific evidence supporting the role of these two lifestyle behaviors used in the prevention and treatment of depression. This chapter is organized by first providing insight into the burden of depression, how it is defined and diagnosed, and main treatment approaches. We then outline the scientific evidence for the role of exercise and physical activity in the prevention and treatment of depression. We also discuss plausible neurobiological mechanisms of the exercise-depression relationship and challenges associated with establishing such mechanisms. An overall summary is then provided and outstanding areas of inquiry for future research are highlighted throughout the chapter.

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Depression

Prevalence and Burden

Major depressive disorder (MDD) is one of the most common mental illnesses, with point estimates from the Global Burden of Disease Study indicating a mean global prevalence of 3.6% each year between the years 1990 and 2019 (Global Burden of Disease Collaborative Network, 2020). MDD is a leading cause of disability around the world (Friedrich, 2017) that results in a loss of work productivity and increased morbidity (Cuijpers et al., 2014; Walker et al., 2015). MDD is also highly recurrent, with about 35% of individuals experiencing an additional MDD episode within the first year of recovery (Hardeveld et al., 2010). Even after 15 years following recovery, up to 85% of individuals experience another MDD episode. Therefore, it is unsurprising that MDD often exacts profound suffering and places a staggering burden on individuals, families, and society. Indeed, the total estimated economic burden (i.e., indirect and directs costs attributed to depression) of people with MDD was US$210.5 billion in 2010, with ~US$27.7 billion in direct costs due to medical and pharmaceutical services directly related to MDD treatment (Greenberg et al., 2015).

How is Depression Diagnosed?

Current diagnostic practices rely on the *Diagnostic and Statistical Manual, Fifth Edition* (DSM-5; American Psychiatric Association, 2013) and use specific symptoms as indicators of depression to reach a diagnostic threshold. To constitute a DSM-5 MDD diagnosis, an individual must endorse five of nine symptoms that are present for a minimum of 2 weeks and persist for most of the day, nearly every day (American Psychiatric Association, 2013). In terms of symptoms, individuals must endorse at least one of two core criterion symptoms: depressed or low mood (e.g., feelings of sadness) and/or loss of interest or pleasure in almost all typically or previously enjoyable activities (i.e., anhedonia). An individual must also endorse at least four other symptoms: (a) significant unintentional change in weight or appetite; (b) sleep disturbances (defined as insomnia or hypersomnia); (c) severe psychomotor agitation (e.g., restlessness) or retardation observable by others (e.g., slowed speech or movement patterns); (d) fatigue or low energy; (e) a sense of worthlessness or excessive guilt; (f) impaired ability to think or concentrate and make decisions; or (g) recurrent thoughts of death that include suicidal ideation and/or attempts. Any symptom combination including at least one core criterion symptom and four additional symptoms constitutes a MDD diagnosis. Importantly, these above-mentioned criteria are also used to inform and issue a MDD diagnosis in the United Kingdom (National Collaborating Centre for Mental Health and National Institute for Health and Clinical Excellence, 2010).

Treatments for Depression

Clinical practice guidelines recommend the use of pharmacotherapy (i.e., antidepressant drugs), psychotherapeutic approaches (e.g., cognitive-behavioral therapy [CBT]), or a combination of the two as first-line treatments for MDD (American Psychiatric Association, 2010; American Psychological Association-Depression Guideline Development Panel, 2019; National Collaborating Centre for Mental Health and National Institute for Health and Clinical Excellence, 2010). In terms of pharmacotherapy, antidepressant drugs, namely selective serotonin reuptake inhibitors (SSRIs), are among the most prescribed medications and work by blocking the reuptake of serotonin. Other classes of antidepressant drugs are also prescribed, including serotonin and norepinephrine reuptake inhibitors (SNRIs), and norepinephrine and dopamine reuptake inhibitors (NDRIs); all of which work by inhibiting the reuptake of their targeted neurotransmitter(s), thereby increasing its availability, and altering their levels in the brain.

Despite antidepressant drugs being among the most widely prescribed drugs globally, they are not consistently beneficial. For example, in the Sequenced Treatment Alternatives to Relieve Depression (STAR*D) study, which is the largest depression treatment trial ever conducted and funded by the U.S. National Institute of Mental Health, the effectiveness of antidepressant drug treatments was examined among 4,041 patients with a MDD diagnosis (age range = 18–75 years). In both specialty and primary medical care settings, patients were exposed to a tiered approach consisting of four separate treatment levels. The trial was structured such that patients who were unable to achieve remission—defined as becoming symptom-free following treatment—at one level would then move onto the next treatment level, which could consist of either a switch to a different antidepressant drug or a combination of antidepressant drug with add-on psychotherapy.

STAR*D study results indicated that between 28% and 33% of the patients achieved remission following an initial 14-week treatment with citalopram (Trivedi et al., 2006). After multiple treatment steps, Rush et al. (2006) reported a cumulative remission rate of 67%, which was computed by summating remission rates achieved across all trial stages. As highlighted by Ekkekakis (2021), it is important to note, however, that the actual remission rate is a bit unclear given that a re-analysis of the available data from the trial resulted in a remission rate of 2.7% when appropriately accounting for patients who dropped out or relapsed and remained in the trial at the end of the original trial duration (see Pigott, 2011, 2015). Regardless of the "true" remission rate, many patients were left symptomatic or clinically depressed following the STAR*D trial, which highlights the variable and limited effectiveness of antidepressant drugs in depression treatment. Furthermore, research has shown that even among patients who achieve remission using antidepressant drug treatment, long-term outcomes are uncertain, as estimates indicate that approximately 40% of remitted patients are likely to relapse within a two-year period (Boland & Keller, 2008).

The efficacy of antidepressant drugs to treat depression was also examined in a meta-analysis of six studies that evaluated the impact of antidepressant drugs in randomized placebo-controlled depression treatment trials approved by the U.S. Food and Drug Administration. After aggregating individual patient-level data from 434 patients receiving antidepressant drugs and 284 patients in placebo groups across six separate trials, Fournier et al. (2010) found that antidepressant drug efficacy varied as a function of depressive symptom severity. Only patients exhibiting severe symptoms of depression before enrolling in the trial experienced significant pre-to-post treatment reductions in depressive symptoms compared to those in placebo control groups. Antidepressant drugs were no more efficacious in reducing depressive symptoms compared to placebo control for patients experiencing mild-to-moderate symptom severity before treatment.[1] Despite their limited efficacy, there are also several barriers associated with antidepressant drugs, such as costs and a vast side effect profile, including but not limited to nausea, vomiting, diarrhea, dry mouth, constipation, and sexual dysfunction. These side effects are intolerable (Corponi et al., 2020) and a primary contributor for treatment discontinuation and poor patient compliance (Lader et al., 2004).

Various forms of psychotherapy, including CBT and behavioral activation, are broadly used to treat MDD and have shown effectiveness in reducing depression (e.g., Cuijpers et al., 2013). In the largest quantitative review conducted on the topic, Cuijpers et al. (2020) assessed whether psychotherapeutic approaches were effective in reducing depression and whether effects differed across the lifespan. The authors compiled data from 366 randomized controlled trials (RCTs) and found that psychotherapy was generally effective, resulting in moderate-to-large depressive symptom reductions among individuals with clinically diagnosed depression of all ages, with moderate-to-large

[1] Those interested in learning more about research regarding the use of antidepressant drugs in the treatment of depression should refer to review articles and commentaries by Kirsch et al. (2008), Kirsch (2014), Kirsch (2019), Möller (2008), and Turner et al. (2008).

effect sizes. As with antidepressant drugs, psychotherapy is associated with variable success rates, with many individuals often failing to adequately respond or derive antidepressant benefits to psychological treatments (DeRubeis et al., 2005). Moreover, there are several barriers to accessing psychotherapy for many individuals. Psychotherapy is costly and its effectiveness depends on some of the following: (a) availability and accessibility of mental health professionals (Olfson & Marcus, 2010); (b) characteristics of the mental health professional (Olfson et al., 2009); (c) the delivery of intervention (e.g., internet-delivered versus face-to-face versus group-based); and (d) individual preferences.

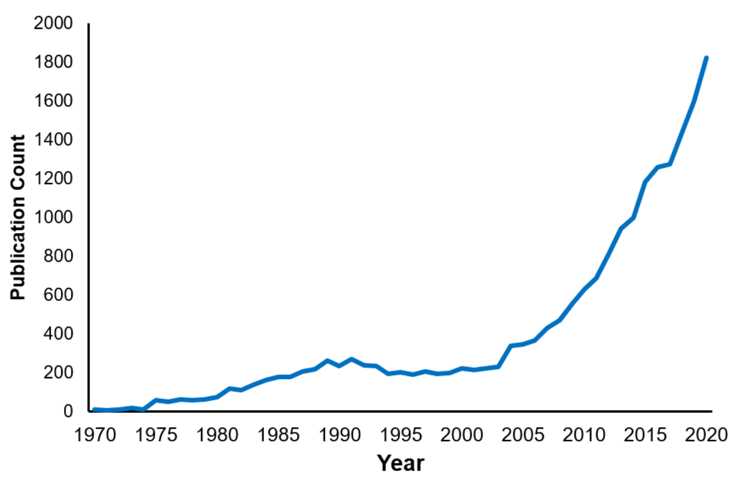
Purpose of the Chapter

Given the variable effectiveness and barriers associated with first-line treatments, there is an urgent need to identify alternative strategies or interventions that can be used to treat depression or prevent the occurrence of the disorder altogether. Exercise and physical activity are two lifestyle behaviors that have been touted for decades and even centuries in the management and treatment of depression. For example, ancient physicians and philosophers including Hippocrates (460 BCE–370 BCE), Suśruta (or Sushruta; 600 BCE) and Hua T'o from the Eastern Han Dynasty (25 CE–220 CE) recognized the importance of engaging in regular physical activity to maintain health. In particular, Hippocrates, considered by many to have been the first physician to prescribe exercise for a patient suffering from a mental health condition, believed that "eating alone will not keep a man well; he must also take exercise" (Jones, 1923; p. 229).

In the context of depression, exercise and physical activity did not gain significant traction in the scientific literature until seminal studies by William P. Morgan were published in the late 1960s to early 1970s. For example, Morgan conducted the first observational studies to indicate that patients with depression tended to have lower cardiovascular fitness levels compared to non-depressed healthy counterparts (Morgan, 1968, 1969; Morgan et al., 1970). These early efforts laid the foundation for decades of work to follow and since then, there has been burgeoning research interest in this area (see Figure 15.1), which has resulted in substantial progress toward establishing these two lifestyle behaviors as important strategies to ward off depression.

Figure 15.1

Annual Number of Research Publications on the Exercise and Physical Activity–Depression Relationship from 1970-2020



Note. The data used to create this figure were adapted from PubMed by using the search terms "exercise" OR "physical activity" AND "depression" between the years of 1970 and 2020.

In this chapter, we examine the research evidence related to exercise and physical activity[2] as prevention and treatment strategies used for depression. We will first summarize the evidence base of exercise and physical activity in the prevention of depression. Then, we will summarize the current evidence on the influence of exercise as a treatment for depression before offering insight into possible neurobiological mechanisms associated with the exercise-depression relationship. We highlight open questions that need to be explored in future research to help elucidate on the exercise, physical activity, and depression relationship throughout the chapter. Before presenting the evidence base, it is important to gain insight into how MDD and depressive symptoms are measured to understand conclusions that can be drawn from the evidence.

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Measurement of Major Depressive Disorder and Depressive Symptoms

Depression is characterized by substantial symptom heterogeneity, which makes its assessment difficult. For example, combinations of the nine DSM-5 criteria required for a MDD diagnosis results in 227 unique depressive symptom profiles (Fried & Nesse, 2015). Furthermore, Fried (2017) assessed content overlap of the seven most commonly used depression scales in scientific research and found 52 disparate symptoms, with little symptom overlap across instruments. Therefore, it is important to note that measurement of depression is a challenging endeavor because there is no single measure that can account for its complexity. MDD diagnoses are made using well-validated clinical interviewing instruments, while depression symptom severity is measured using self-report rating scales. Researchers often combine clinical interviews with rating scales to provide insight into the presence and nature of an individual's depression. For the purposes of this chapter, we provide a brief overview of some of the most prevalent diagnostic interviews and rating scales used in research to measure MDD and depressive symptoms.

[2] Physical activity is broadly defined as any bodily movement resulting in energy expenditure, while exercise is a subset of physical activity that is performed for the intention of improving or maintaining one or more aspects of physical fitness (Casperson et al., 1985).

Diagnostic Interviews

Structured Clinical Interview for DSM-5 (SCID-5)

The SCID-5 is the most widely used structured diagnostic interview for assessing the DSM-5 disorders (First et al., 2015). Clinical psychologists and psychiatrists and other trained mental health professionals use the SCID-5 to assess for the presence of lifetime and current depressive disorders and other psychiatric disorders such as anxiety disorders (see Chapter 16; Schuch et al., 2021), psychotic disorders (see Chapter 17; Fibbins et al., 2021), substance use disorders, somatic symptom disorders, externalizing disorders and trauma-and stressor-related disorders. Research suggests that the SCID-5 has excellent reliability, sensitivity, and specificity for most of the psychological disorders with high prevalence, even when the clinical interview is conducted over the telephone (Osório et al., 2019). Due to its popularity, the SCID-5 has been translated into other languages and has been used in a variety of cultures.

Mini International Neuropsychiatric Interview (MINI)

The MINI is a short, structured diagnostic interview developed jointly by clinicians in the U.S. and Europe that follows diagnostic criteria outlined in the International Classifications of Disease and DSM-5 (Sheehan et al., 1997). The MINI is typically used in research to reduce the amount of time it takes to assess and diagnose depression. Research suggests that the reliability and validity of the MINI is on par with the SCID (Sheehan et al., 1997). The MINI can be conducted within 15 minutes and can serve as a short and accurate assessment of psychopathology.

Dimensional Measures of Depressive Symptoms

Depressive symptoms have been measured using a variety of self-report rating scales. Three commonly used rating scales of depressive symptoms are described below. These rating scales assess current depressive symptoms severity over a specified time interval and aid in determining whether treatments are effective in reducing depressive symptoms.

Beck Depression Inventory, Second Edition (BDI-II)

The BDI-II assesses the presence of depressive symptoms during a two-week period using 21 items scored on a 4-point Likert scale ranging from 0-3. Higher scores indicate greater severity of depressive symptoms (Beck et al., 1996). A score of 13 or higher on the BDI-II is generally an indication of the presence of a depressive disorder and the BDI-II has shown high sensitivity and specificity when utilized as a screening tool (Lasa et al., 2000). The BDI-II has shown good internal consistency and validity across different settings and populations (Steer et al., 1999, 2000).

Hamilton Rating Scale for Depression (HRSD)

The HRSD is a reliable assessment of the severity of depressive symptoms using 17 items scored from 0-4 (Trajković et al., 2011). A total score is obtained by summing all the items together. The HRSD provides categories that indicate the severity of depressive symptoms based on the total score. For example, a total score from 0-7 indicates normal levels of depressive symptoms, 8-16 suggests mild depression, 17-23 suggests moderate depression, and a score ≥24 indicates severe depression (Sharp, 2015).

Center for Epidemiologic Studies Depression Scale (CES-D)

The CES-D was originally developed to assess the number and frequency of depressive symptoms in the general population (Radloff, 1977). The CES-D exhibits strong psychometric properties, including high internal consistency and good divergent and convergent validity (Van Dam & Earleywine, 2011). The CES-D has also been validated for use in a variety of age groups, including adolescents and young adults (Roberts et al., 1990). The CES-D has 20 items scored from 0-3. A total score is computed by summing all the items together, with possible scores ranging from 0-60. Higher scores indicate more symptoms and are weighted by frequency of occurrence during the past week. CES-D scores that are at least 16 or greater have been shown to identify individuals at risk for clinical depression (Lewinsohn et al., 1997).

In 2004, the original CES-D was revised by Eaton et al. to reflect depressive symptoms more accurately as indicated by the DSM. The CESD-R (i.e., Center for Epidemiologic Depression Scale Revised; Eaton et al., 2004) is also 20 items, with each item scored on a scale of 0-3. Higher scores reflect greater severity of depressive symptoms. Based on scoring, participants can be categorized into one of five possible depressive categories: meets criteria for major depressive episode, probable major depressive episode, possible major depressive episode, subthreshold depression symptoms, or no clinical significance. An advantage of using the CESD-R compared to other instruments is that it is free and accessible as a part of the public domain (see https://cesd-r.com/).

Exercise and Physical Activity in the Prevention of Depression

The potential for exercise and physical activity to prevent depression has been studied across a number of cross-sectional and prospective epidemiological studies. One of the earliest epidemiological studies to examine the relationship between physical activity levels and depression was conducted when Farmer and colleagues (1988) analyzed data from the Epidemiologic Follow-Up Study (1982–1984). Farmer et al. (1988) looked at the association between depressive symptomatology, as measured by the CES-D, and self-reported recreational and nonrecreational physical activity levels. Among 1,900 healthy adults between the ages of 25 and 77 included in analyses, increased depressive symptoms were related to lower levels of recreational physical activity. Interestingly, individuals engaging in little-to-no recreational physical activity were at almost a two-fold elevation in odds of experiencing increased depressive symptoms compared to those engaging in regular recreational physical activity. To determine whether recreational physical activity levels were a unique risk factor for increased depressive symptoms, the authors examined the influence of age, race, education, employment status, self-reported chronic health conditions, and household income on the relationship. After accounting for these variables, lower recreational physical activity levels still significantly related to increased depressive symptoms.

Goodwin (2003) extended this work by examining the relationship between regular physical activity levels and rates of MDD diagnoses among 5,877 Americans (~57% female) between the ages of 15 and 54 years who participated in the National Comorbidity Survey (1990–1992). Physical activity levels were assessed using a self-report item that asked participants, “How often do you get physical exercise—either in your job or in a recreational activity?”; MDD diagnoses were confirmed using a structured interview (i.e., the World Health Organization Composite International Diagnostic Interview). Goodwin found that regularly active individuals had a 25–38% reduced likelihood of having a MDD diagnosis compared to those who engaged in lower levels of physical activity. Importantly, this relationship remained significant even after accounting for important sociodemographic variables, such as age, gender, race, marital status, education, and income, suggesting that lower physical activity levels independently confer risk for MDD. There was also a significant dose-response[3] relationship between frequency of physical activity and current prevalence of MDD in the sample, such that MDD was least prevalent among individuals who regularly engaged in physical activity (8.2%) compared to those who occasionally engaged in physical activity (11.6%), those who rarely engaged in physical activity (15.6%), and those who never engaged in physical activity (16.8%).

[3] Dose-response refers to the amount of exercise or physical activity (duration, intensity, and frequency) that results in graded effects.

Gudmundsson and colleagues (2015) examined the relationship between physical activity and depression in a large-scale, prospective study of 676 Swedish women (M_{age} at baseline in 1974 = 53.4 years; SD = 0.2) followed over 32 years (1974–2005). Depression was measured using semi-structured interviews and the Montgomery-Åsberg Depression Rating Scale (Montgomery & Åsberg, 1979), which assesses the presence of symptoms and signs of depression over the past month. Physical activity levels were self-reported and measured using the Saltin-Grimby Physical Activity Level Scale (Saltin & Grimby, 1968), which indexes an individual's physical activity frequency and intensity. Four separate assessments occurred across the 32-year study in 1974, 1992, 2000, and 2005, which allowed the authors to test several hypotheses. First, the authors examined cross-sectional associations and showed that lower physical activity levels were associated with increased depressive symptoms at the baseline assessment in 1974. Next, the authors were interested in determining whether changes in physical activity levels coincided with changes in depressive symptoms over time. There was a significant relationship between physical activity levels and depressive symptoms, such that decreasing physical activity levels were associated with increased depressive symptoms over time. Lastly, the authors tested whether the relationship between physical activity and depressive symptoms was bidirectional and wanted to determine whether initial depressive symptoms could predict subsequent physical activity levels. Women reporting increased depressive symptoms at the 1974 baseline assessment reported less engagement in subsequent physical activity at later time points in 1992 and 2000, but not in 2005. This study provides evidence for a potential bidirectional relationship between physical activity and depression from a large and well-characterized sample of women followed over the span of three decades and suggests that physical activity may not only be a risk factor for depression but may also be a long-term consequence of depression.

There may be specific aspects of depression that could explain the prediction of lower subsequent physical activity from depressive symptoms. For example, one of the core criterion symptoms of depression is the loss of interest or pleasure in almost all typically or previously enjoyable activities (i.e., anhedonia). In a study by Leventhal (2012), the author examined whether anhedonia was related to physical activity participation levels in a sample of 157 undergraduate students (M_{age} = 19.9 years; SD = 1.8). Increased anhedonia was associated with lower physical activity levels, providing preliminary support for the notion that anhedonia, rather than other symptoms of depression, may be associated with lower physical activity participation. It is important to be cautious in interpreting these preliminary data. Leventhal used a normative sample of undergraduate students to examine the relationship between concurrent levels of anhedonia and physical activity. The sample was relatively homogenous in terms of physical and mental health status and was more physically active compared to the general population. Further, the causative nature of the relationship cannot be established since the study employed a cross-sectional design. Therefore, these findings are only suggestive, but provide a template for examining specific symptoms of depression (e.g., anhedonia) and whether they can explain physical activity participation in clinically depressed samples.

Other prospective studies have shown significant relationships between physical activity levels and depression. A ten-year cohort study of 424 patients with depression (M_{age} at baseline = 39.9 years; SD = 14.1; 54% female) found that higher physical activity levels were associated with lower concurrent depressive symptoms at four separate assessment points spanning 10 years (Harris et al., 2006). This evidence corroborates previous findings demonstrating that increased physical activity is associated with a reduced incidence of depression diagnoses and symptoms.

The preventive effects of physical activity on depression (i.e., symptoms and diagnoses) have also been summarized in reviews (Mammen & Faulkner, 2013; Teychenne et al., 2008). Teychenne and colleagues (2008) performed a literature review of observational and interventional research on the relationship between physical activity and depression in adults. The authors were interested in identifying the influence of physical activity characteristics (i.e., dose, domain, and physical activity setting) on depression outcomes. There were inverse associations between physical activity and the likelihood of developing depression. Even lower doses of physical activity (i.e., 1.5 hours of moderate-intensity leisure time physical activity per week) demonstrated a protective effect against developing depression. Leisure-time physical activity was associated with a decreased likelihood of depression, while there was insufficient evidence regarding the role of other physical activity characteristics on depression.

In 2013, the Mammen and Faulkner review aimed to update the findings from Teychenne et al. by reviewing high quality research, which was determined using criteria from the Critical Appraisal Skills Programme (CASP; see https://casp-uk.net/) for prospective studies. Mammen and Faulkner aimed to address three important questions: (a) do baseline physical activity levels prevent follow-up depression?; (b) is there a specific dose of physical activity that protects against depression?; and (c) do physical activity levels over time impact risk for subsequent depression?. To address their first question, Mammen and Faulkner (2013) examined studies including assessments spanning at least two separate time intervals (range of follow-up period = 1–40 years) among nonclinical community samples of women/girls and/or men/boys between the ages of 11 and 100 years. Twenty-five of 30 reviewed studies supported the notion that baseline physical activity levels protect against the incidence or onset of subsequent depression. To address their second question, the authors found that engaging in as little as 10–29 min of daily physical activity could reduce subsequent risk for depression by 10% (e.g., Lucas et al., 2011), while other research showed that being physically active just one-to-two or more times per week was associated with a 40% reduced risk for depression (Bernaards et al., 2006; Hamer et al., 2009). To address their third question, the authors found that engaging in less physical activity over time was associated with an increased risk of developing depression compared to those who either maintained or increased their activity levels over the same time frame. These findings led Mammen and Faulkner to conclude that there was sufficient support for the preventive effects of physical activity on depression, even when physical activity is performed at low levels.

A few years later, Schuch et al. (2018) conducted a meta-analysis of 49 prospective studies that included 266,939 individuals (median proportion of males = 47%) with physical activity and depression measurements at baseline and a follow-up assessments (mean follow-up period = 7.4 years; range of follow-up period = 2–15 years) across studies. The authors found that individuals of all ages (youths, working-age adults, elderly persons) who engaged in more physical activity had 16.3% decreased odds of developing future depression. These findings were observed across geographical regions around the world (Asia, Europe, North America, and Oceania) and across genders.

Exercise programs may also have preventive effects. In 2020, Hu and colleagues performed a systematic review of eight meta-analyses that comprised a total of 134 individual studies examining the role of exercise interventions in the prevention of depression. In their review, Hu et al. (2020) examined the impact of exercise on depression across the lifespan among the general population and found moderate depressive symptom reductions among children, adolescents, adults, and the elderly. Although exercise interventions decreased depressive symptoms among the general population, the authors were unable to examine whether the incidence of MDD could be prevented, as no research has specifically investigated this relationship. A notable finding was that low-intensity exercise was comparable to higher intensities of exercise in reducing depressive symptoms; however, the authors noted that this evidence is of low-quality and needs to be investigated further.

The above-mentioned evidence highlights the preventive effects of physical activity and exercise on depression and symptoms of depression; however, the following questions remain: (a) does physical activity *causally* protect against—or decrease risk for—depression; or (b) does depression *causally* reduce physical activity? These two questions formed the basis for an investigation by Choi and colleagues (2019). To answer these questions, the authors used bidirectional Mendelian Randomization

(MR),[4] a genetically informed method for establishing causality in large-scale observational studies by testing whether genetic variants in a potential underlying trait (or risk factor) are associated with an outcome of interest. In bidirectional MR, researchers can evaluate whether the underlying trait causes the outcome and vice versa. In the Choi et al. (2019) study, the authors performed MR analysis in one direction (i.e., physical activity to depression), and then performed the analysis in the opposing direction (i.e., depression to physical activity) using genetic variants associated with each trait.

Choi et al. (2019) extracted physical activity and depression data from the U.K. Biobank Study (Klimentidis et al., 2018; Wray et al., 2018) to examine relationships between physical activity and depression. Physical activity was assessed using device-based (accelerometry) and subjective (self-report) assessments and MDD was assessed using structured clinical interviews to make a lifetime MDD diagnosis, clinician-administered checklists, or medical record reviews (see Wray et al., 2018 for details). When testing the causal pathway of physical activity to depression, the authors found that each 1*SD* unit increase in accelerometer-assessed physical activity was associated with a 26% reduction in risk for developing MDD. This 1*SD* increase in accelerometer-assessed physical activity was reported as being equivalent to replacing time spent engaging in sedentary behaviors (e.g., sitting) with 15 min of vigorous physical activity, 60 min of moderate physical activity, or a combination of light and more vigorous activities. Notably, this relationship was only evident for the accelerometer-assessed measurements of physical activity, not self-reported physical activity, suggesting that measurement artifacts associated with different self-report instruments (e.g., cognitive biases, memory recall bias) could influence inferences drawn from studies examining the physical activity-depression relationship. When testing the causal pathway of depression to physical activity, the authors found no associations, regardless of how physical activity was measured. Thus, there seems to be more evidence supporting the causal pathway of physical activity to depression rather than the reverse. That is, physical activity may offer protection against the development of depression and symptoms of depression.

Overall, the available evidence indicates that physical activity and exercise are effective strategies for preventing depression. Although some research suggests that the relationship may be bidirectional (e.g., Gudmundsson et al., 2015), the study by Choi and colleagues (2019) indicates that there may be more robust evidence supporting the preventive role of physical activity on depression.

Exercise and Physical Activity in the Treatment of Depression

Initial research on exercise as a treatment for depression was conducted in the 1980s and 1990s. These findings were first summarized in a quantitative review by North and colleagues (1990) who found that exercise alleviated depressive symptoms and demonstrated comparable effectiveness—and at times increased effectiveness—to traditional treatments (e.g., antidepressant drugs and psychotherapy). A major limitation of their review was the heterogeneous composition of the patient samples. That is, the review included both nonclinical and clinical samples. Nonetheless, this meta-analysis was the first to quantitatively demonstrate the potential benefits of exercise for reducing depressive symptoms and laid the foundation for growing interest in exercise as a treatment for depression.

In the following sections, we outline the evidence examining exercise as a treatment for depression and document the potential utility for exercise to be used either as a stand-alone or complementary intervention to existing depression treatments. To date, research has examined the effects of exercise on depression using short- (acute) and long-term (chronic) interventions. Acute

[4] For additional reading on MR and how it can be used in physical activity studies to strengthen causal inferences, refer to the research by Byrne et al. (2017) and Choi et al. (2019), respectively. Zheng et al. (2017) also provide an overview of the different types of MR studies that can be used to evaluate causality in observational epidemiological studies.

interventions have focused primarily on providing short-term relief of specific symptoms, such as elevating low mood. Chronic interventions have assessed whether exercise can be used to effectively treat or resolve depression (i.e., the disorder) and reduce total depressive symptom severity. Below, we discuss the evidence related to both types of exercise interventions and their role in the treatment of depression.

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The Role of Acute Exercise in the Treatment of Depression

Acute (single bouts) exercise will not necessarily resolve an individual's depressive symptoms, but it has well-characterized effects on regulating mood and has the potential to manage symptoms associated with depression. For example, Yeung (1996) reviewed the effects of acute exercise on mood from studies conducted between the years of 1976 and 1995 and found support for acute exercise-induced mood benefits among normative, healthy samples. In 2005, Bartholomew et al. were interested in determining whether these acute exercise-induced mood benefits could generalize to clinical samples. Using a mixed within-between subjects experimental design, the authors examined the impact of a single bout of aerobic exercise on mood and psychological well-being among 40 adults diagnosed with MDD (M_{age} = 38.1 years; range = 18–55; 25 female). Twenty participants completed a 30-min bout of moderate-intensity brisk walking, while the other 20 participants completed a seated rest control condition. Mood and well-being measures were assessed at four separate time points: before the condition (i.e., baseline), 10-min post, 30-min post, and 60-min post. Compared to the control condition, moderate-intensity exercise improved psychological well-being and the mood state of vigor at all postcondition assessments.

Meyer, Koltyn, and colleagues (2016a) examined the impact of acute exercise on mood in a sample of 24 females diagnosed with MDD (M_{age} = 38.6 years; *SD* = 14.0). The authors were interested in determining whether postexercise mood improvements were influenced by exercise intensity prescription. In a within-subjects crossover design, participants performed three different exercise intensities and a seated rest control condition on separate days. Exercise intensities consisted of light, moderate, or hard and were performed at a rating of perceived exertion [RPE] of 11, 13, and 15, based on the original 6–20 RPE scale (Borg, 1998), respectively, while the control condition consisted of quiet rest on a stationary bicycle. Compared to the control condition, a single, 20-min bout of cycling, regardless of intensity, significantly improved depressed mood at 10- and 30-min following exercise cessation.

Meyer, Ellingson, et al. (2016) examined whether other exercise characteristics, such as a self-selected, preferred versus prescribed exercise intensity, would influence the postexercise mood effects. Using the same study sample as above, the authors had 24 females perform an additional 20-min bout of aerobic exercise at a self-selected, preferred intensity. Mood outcomes following the preferred exercise intensity were compared to the light, moderate, or hard intensity session that was closest in terms of RPE to the exercise they did during their preferred session (i.e., if the participants exercise at a low intensity during the preferred session, then their response to that session was compared with the response to the low-intensity during the prescribed session). Although the prescribed exercise session resulted in slightly favorable effects relative to the self-selected, preferred exercise bout, these effects were small and nonsignificant, highlighting that single bouts of aerobic exercise at any intensity may benefit depressed mood for up to 30- and 60-min postexercise.

Taken together, these findings support the idea that acute exercise can influence specific mood states (e.g., depressed mood and vigor),[5] at least in the short-term, among individuals with MDD. Given that one of the core criterion symptoms of MDD is low or depressed mood, acute exercise may be particularly effective for managing these core symptoms. Additional research has shown that acute exercise impacts other disrupted psychological processes in depression. Acute aerobic exercise can attenuate self-reported negative affect among individuals who recovered from MDD (Mata et al., 2013). Separate studies have shown that acute aerobic exercise can diminish reactivity to sad stimuli (Brush, Olson, et al., 2020) and enhance positive emotional reactivity processes (Brush, Foti, et al., 2020) among adults at risk for developing MDD (i.e., those high in depressive symptoms), respectively. Therefore, the utility of acute exercise in the treatment of depression may be most evident in the management of symptoms and psychological processes commonly disrupted in depression. Acute exercise may be most effective in managing symptoms of depression while other treatments and their effects can manifest, which can take weeks to months (e.g., Knubben et al., 2007; Legrand & Neff, 2016).

Several questions remain in the acute exercise-depression relationship. The time-course of the postexercise mood benefits are not clear. The Bartholomew et al. and the Meyer et al. studies documented benefits anywhere from 30-60 min postexercise, however, whether the effects are sustained beyond 1 hr is unknown. Studies have primarily assessed aerobic forms of exercise performed for approximately 20-30 min. Research is needed to determine how long the postexercise benefits last, whether they relate to clinical outcomes (e.g., depressive symptom reduction), and whether other exercise characteristics (e.g., modality and dose) impact the effects of acute exercise on mood among individuals with clinical depression. Further, it is unknown how acute exercise compares to other brief interventions (e.g., brief behavioral activation treatment for depression [BATD]; Gawrysiak et al., 2009; Lejuez et al., 2001, 2011) in managing symptoms of depression. Research that addresses these items can

[5] In acute exercise studies, the Profile of Mood States (McNair et al., 1971) has been the primary instrument used to assess mood in the context of depression, which has its limitations. As highlighted by Ekkekakis and Zenko (2016), the POMS was not designed to capture the global construct of “mood”. Instead, it decomposes mood into six distinct states: (a) tension; (b) depression; (c) anger; (d) vigor; (e) fatigue; and (f) confusion. There are conceivably other mood states that are not being measured by the POMS; therefore, when interpreting studies that use the POMS, it is important to note which specific mood states are altered through exercise to draw valid and accurate inferences. Refer to Ekkekakis (2013) and Ekkekakis and Zenko (2016) for a discussion on problems associated with using the POMS in exercise psychology research.

help "push the envelope" for the role of acute exercise in the treatment and management of depression.

The Role of Chronic Exercise in the Treatment of Depression

There is a long history of research examining the effects of chronic (longer-term) exercise on depression. Numerous RCTs have examined the effects of exercise for individuals with elevated depressive symptoms. There has also been an accompanying rise in the number of meta-analyses and systematic reviews on this topic (e.g., Cooney et al., 2013; Ekkekakis, 2015; Schuch, Vancampfort, et al., 2016).

In one of the most widely cited and influential RCTs, James Blumenthal and colleagues (1999) randomized 156 men and women with MDD (aged 50 years and older) to one of three conditions: (a) an aerobic exercise training program, (b) standard antidepressant treatment with sertraline (i.e., SSRI drug), or (c) combined exercise plus sertraline treatment. For the aerobic exercise training program, three, supervised sessions per week were performed over a span of 16 consecutive weeks in a group setting. Participants were prescribed walking or jogging at a vigorous exercise intensity that ranged from 70–85% of an individual's heart rate reserve (HRR).[6] Although participants assigned to the sertraline treatment alone experienced a more rapid initial antidepressant response, there were no significant differences in depressive symptom reduction between groups by the end of the 16-week trial, indicating that each treatment resulted in similar-sized reductions in depressive symptoms. Of the 156 patients who entered the trial, 60.4% of patients in the aerobic exercise training program, 68.8% of patients in the sertraline treatment condition, and 65.5% of patients in the combined exercise and sertraline treatment no longer met criteria for a DSM-IV[7]-defined diagnosis of MDD post-treatment.

The authors examined long-term outcomes following each of the three treatments in a subsequent study that followed these same patients six months post-intervention. At the follow-up visit, participants assigned to the aerobic exercise group displayed significantly lower rates of depression (~30%) compared to the other two treatment groups (sertraline: 52%; combined exercise plus sertraline: 55%; Babyak et al., 2000). At the time that this study was published and to the present day, this finding has been critically important in providing some of the strongest evidence for aerobic exercise as both a stand-alone and complementary treatment to standard antidepressant drugs. Notably, the aerobic exercise treatment group experienced lower relapse compared to participants in the other two treatment groups that included antidepressant drugs, providing the first evidence for the use of aerobic exercise to resolve depression over the long-term (6 months following the end of treatment). A limitation of this study was the lack of a placebo control group, which does not permit conclusions about the specific effects of each treatment arm. Therefore, Blumenthal and colleagues (2007) performed a follow-up investigation that added a placebo group to their previous study design. In this study, 202 participants (~76% female) diagnosed with MDD were randomized to the following groups for 16 consecutive weeks: (a) home-based aerobic exercise, (b) supervised exercise in a group setting, (c) sertraline, or (d) a placebo pill. After treatment, 41% of the participants achieved remission and all active treatment groups tended to have greater remission rates compared to the placebo pill group (home-based aerobic exercise: 40%; supervised exercise in a group setting: 45%; sertraline: 47%; and placebo pill: 31%). These studies have helped establish preliminary support for the efficacy of exercise treatment for MDD.

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[6] HRR is computed as the difference between an individual's maximal and resting HR.

[7] The American Psychiatric Association periodically updates the DSM to reflect the most current and cutting-edge research literature on psychopathology. The most recent addition (i.e., DSM-5) was released in 2013. The first version of the DSM-IV was released in 1994.

There has been a longstanding interest in determining the presence of a dose-response relationship between exercise and reductions in depressive symptoms (Rethorst & Trivedi, 2013). In 2000, a scientific symposium sponsored by Health Canada and the U.S. Centers for Disease Control and Prevention was held to determine whether a dose-response relationship exists between physical activity and multiple health-related outcomes, including depression. At the time, experts indicated that aerobic exercise programs lasting at least 6–12 weeks were consistently associated with depressive symptom reductions comparable in magnitude to those observed following antidepressant drug treatment; however, they noted that there was insufficient evidence to make definitive conclusions regarding a dose-response relationship between exercise and depression.

Dunn et al. (2005) conducted the first RCT designed specifically to assess the dose-response relationship of exercise for depression. Dunn et al. randomized 80 patients with mild-to-moderate depression severity to two different doses of aerobic exercise (7 kcal/kg/week, low dose [LD] or 17.5 kcal/kg/week, public health dose [PHD]) performed at two different frequencies (three or five days per week) or to an attention-controlled placebo group of flexibility training. Exercise intensity was self-selected by participants assigned to the exercise conditions. There was a significant dose-response effect. A greater depressive symptom reduction (47% decrease in HRSD score) was observed patients in the PHD group compared to the LD (30% decrease in HRSD score) and stretching control groups (29% decrease in HRSD score). Further, the treatment response following the PHD prescription was comparable to depressive symptom reductions that are typically observed following other depression treatments, including antidepressant drugs and CBT.

Additional evidence supporting a dose-response relationship was examined in a study examining the effects of a long-term exercise training program on depression among women (Chu et al., 2009). The authors randomized women with high levels of depressive symptoms to a low- or high-intensity aerobic exercise condition or to a stretching program for 10 weeks. Participants in the aerobic exercise groups met for one 30-40 min supervised session and then were asked to complete three-to-four additional unsupervised exercise sessions during the week. During the unsupervised sessions, participants in the exercise groups were permitted to choose their preferred mode of aerobic exercise, such as aerobic dancing, walking, or biking. This approach may have served to enhance motivation and adherence to exercise, since participants were afforded greater autonomy in their own exercise. All three groups demonstrated a significant reduction in depressive symptoms at the end of the 10-week intervention. After controlling for pre-treatment depressive symptoms (as measured by the BDI-II), depressive symptoms were significantly lower following the intervention for the high-intensity aerobic exercise group compared to the low-intensity and stretching groups, suggesting a potential dose-response effect that favors higher aerobic exercise intensity prescriptions for depressive symptom reduction.

Trivedi and colleagues (2011) extended these findings by showing that aerobic exercise training can also be effective as an augmentation or complementary treatment for patients with treatment-resistant depression. The authors enrolled patients who failed to achieve remission following at least six weeks of treatment with SSRIs and prescribed one of two 12-week exercise doses: to patients: a low dose (4 kcal/kg/week) or high dose (16 kcal/kg/week).[8] Among 126 men and women, those assigned to the higher dose of exercise showed a trend for increased remission rates compared to participants who were assigned to the lower dose of exercise (28.3% for the high-dose group compared to 15.5% for the low-dose group). Higher doses of aerobic exercise may more effectively treat depression and be a viable augmentation strategy for patients with depression who have failed to respond to antidepressant drugs.

[8] The low dose prescription of 4 kcal/kg/week is equivalent to approximately 45 min of moderate-to-vigorous intensity exercise per week, while the high dose prescription is equivalent to approximately 180 min of moderate-to-vigorous intensity exercise per week.

It is important to note that the authors found that those assigned to the lower exercise exhibited better adherence rates compared to those assigned to the higher dose. This suggests that lower doses of moderate-to-vigorous intensity aerobic exercise may be more tolerable and acceptable for individuals with depression aiming to begin an aerobic exercise program.

Most of the work on the effects of exercise as a treatment for depression has focused on the effectiveness of aerobic exercise. Indeed, a meta-analysis that aggregated findings across 25 RCTs (M_{length} = 10.29 weeks; range of RCT length = 3–32 weeks)[9] indicated large reductions in depressive symptoms following exercise compared to nonactive interventions (Schuch, Vancampfort, et al., 2016). The extent to which other exercise modalities have utility in the treatment of depression has received less attention.

Resistance exercise training is known for its many health benefits, especially for increasing muscular strength, muscle mass, endurance, and/or power (U.S. Department of Health and Human Services, 2008). Research has also examined the potential antidepressant effects of resistance exercise training. Singh et al. (1997) assessed whether 10 weeks of resistance exercise training significantly reduced depression among 32 older adults over the age of 60 years (M_{age} = 71.3 years; *SD* = 1.2) with diagnosed major/minor depression or dysthymia.[10] Intervention groups consisted of a supervised, high-intensity resistance exercise training program performed three times per week or an attention-control group. Participants in the resistance exercise group performed upper and lower body exercises for three sets of eight repetitions at 80% of an individual's one-repetition maximum (1-RM).[11] Following the intervention, participants in the resistance exercise group reported a 59% reduction in depressive symptoms compared to a 26% reduction in the attention-control group. Participants were encouraged to continue their resistance exercise regimen at least twice weekly for another ten weeks upon completing the intervention. After this follow-up period, ~73% of the participants in the resistance exercise group achieved remission, while only ~36% of the attention-control participants achieved remission (Singh et al., 2001). This evidence served as preliminary support for the antidepressant effects of resistance exercise in both shorter and longer periods of time.

Similar to the aerobic exercise literature, Singh and colleagues were interested in examining potential dose-response effects of resistance exercise training on depressive symptoms. In a subsequent study, the authors randomly assigned 60 older adults between the ages of 60 and 85 to a high (80% of 1-RM), low (20% of 1-RM), or treatment-as-usual comparator condition for eight weeks (Singh et al., 2005). High-intensity resistance exercise training resulted in larger antidepressant effects compared to the low-intensity and treatment-as-usual comparator groups. Interestingly, the authors examined the proportion of individuals who adequately responded to treatment, which was defined as a 50% reduction in the HRSD score from pre-to-posttreatment. The results revealed a 61% response rate in the high-intensity group compared to 29% and 21% in the low-intensity and treatment-as-usual groups, respectively. This evidence suggests that resistance exercise training may not only reduce depression, but higher intensities may be more effective.

Noting that the majority of meta-analyses conducted on the exercise and depression relationship has focused on aerobic forms of exercise, Gordon and colleagues (2018) aimed to address

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[9] One RCT included in the Schuch, Vancampfort, et al. (2016) meta-analysis did not report the trial length. Therefore, the mean and range of trial lengths reported include 24/25 RCTs that were included in the authors' meta-analysis.

[10] Dysthymia is no longer considered a diagnosis in the DSM-5. It was removed from the DSM-Fourth Edition (IV) and replaced by persistent depressive disorder. Minor depression was considered a Depressive Disorder Not Otherwise Specified in the DSM-IV.

[11] Resistance exercise training intensity is often based off an individual's 1-RM, which is defined as the maximal amount of weight an individual can lift in a single repetition (Garber et al., 2011).

this gap in the literature by performing the first quantitative review of the effects of resistance exercise training on depression. Gordon et al.'s meta-analysis combined effects from 33 RCTs, which included a total of 1,877 participants, and found that resistance exercise training resulted in a moderately-sized reduction in depressive symptoms, regardless of sociodemographic characteristics. It is important to note that this meta-analysis combined findings from studies that included both normative and clinical samples. When examining only those with clinical levels of depression (i.e., at least mild-to-moderate depressive symptoms), the resistance exercise training had even larger antidepressant effects compared to those with subclinical depression. There was no specific impact of type of resistance exercise training protocol on depression outcomes.

Collectively, the evidence generally supports the notion that both aerobic and resistance forms of exercise are effective treatments for depression. This has been shown in studies examining exercise training as a monotherapy or complementary treatment to other treatments, namely antidepressant drugs. The antidepressant effects of exercise are at least as comparable to antidepressant drug treatments and over the long run, there is evidence to suggest that exercise may result in more favorable reductions in depressive symptoms and disorders compared to antidepressant drugs (Babyak et al., 2000). It is important, however, for future studies to continue to examine the long-term impact of exercise on depression to fully understand how long effects are sustained. Most of the research to date has been conducted in adults with depression, while the impact of exercise training in other populations that are substantially impacted by depression, including children and adolescents, is less clear. Future studies are needed in other vulnerable populations to determine whether effects are generalizable. Overall, exercise should play an important role in the treatment of depression as a stand-alone and/or complementary treatment.

Plausible Neurobiological Mechanisms of the Antidepressant Effect

Establishing neurobiological mechanisms of the antidepressant effects of exercise has historically been challenging. Depression is characterized by substantial heterogeneity; estimates indicate that anywhere from 119 (Park et al., 2017) to 681 (Akil et al., 2018) to even 1,000 (Fried & Nesse, 2015) unique combinations of depressive symptoms could meet MDD diagnostic criteria. Research attempting to explain the mechanistic effects of exercise on depression often struggle to accommodate for the diverse symptom profiles and presentations across individuals, which makes it difficult to design studies aimed at establishing the mechanisms implicated in the antidepressant effects of exercise. In addition to the heterogeneity, exercise is associated with a wide range of neurobiological effects (see Dishman et al., 2006 for an extensive overview). When considering these factors, it is unsurprising that our general understanding of the mechanisms underlying the antidepressant effects of exercise is unclear. It is likely that exercise improves mood and other specific symptoms in the short-term and reduces depression in the long-term through numerous mechanisms because of its wide range of effects. Indeed, experts have proposed several neurobiological mechanisms (Kandola et al., 2019; Schuch, Deslandes, et al., 2016). In this section, we provide a very brief overview of some of the neurobiological mechanisms that have been assessed in acute and chronic exercise studies. We only focus on neurobiological mechanisms that are hypothesized to be implicated in the pathophysiology of depression and have been studied in relation to changes in depressed mood or depressive symptoms.

Neurobiological Mechanisms Studied in the Context of Acute Exercise

In a series of secondary data analyses, Meyer and colleagues were interested in exploring potential neurobiological mechanisms implicated in the mood-enhancing benefits of acute exercise. In three separate reports, Meyer and colleagues examined whether serum concentrations of brain-derived neurotrophic factor (BDNF; Meyer, Koltyn, et al., 2016b), endocannabinoids and related lipids (Meyer et al., 2019), and cytokines (Perez et al., 2020) could be altered by acute bouts of aerobic exercise and whether alterations were associated with acute changes in mood states. In each of these studies, blood was drawn before and within 10 min after each condition to determine changes in BDNF, endocannabinoids and related lipids, and cytokines. Specific descriptions related to each analysis are outlined below.

In Meyer, Koltyn, et al. (2016b), 24 women with MDD performed 20 min of aerobic exercise at light, moderate, and hard exercise intensities; participants also completed a quiet rest condition. While acute exercise significantly improved depressed mood and increased BDNF levels regardless of exercise intensity, these findings do not explain the mechanism, as authors failed to observe a relation between changes in depressed mood and BDNF levels. In Meyer et al. (2019), 17 women with MDD exercised for 20-min at a moderate- (prescribed exercise intensity equivalent to a RPE of 13) or self-selected, preferred-intensity of aerobic exercise (chosen exercise intensity: M_{RPE} = 12.5; range = 8.5–16). Moderate-intensity aerobic exercise significantly increased endocannabinoid levels (i.e., anandamide) and a related lipid (i.e., oleoylethanolamine). Most notably, changes in anandamide and oleoylethanolamine were associated with changes in mood states, suggesting that endocannabinoids and related lipids may contribute to the mood-enhancing effects of acute exercise in MDD. No such relationships were observed following the self-selected, preferred intensity of aerobic exercise. Differences in findings may be attributed to the substantial variability in how participants selected and performed their preferred exercise intensity, with some individuals exercising at lower intensities than others (see wide range of self-selected intensities above). This suggests that lower intensities of exercise may not be sufficient to induce changes in the endocannabinoid system, or alternatively, other mechanisms might be at play. In 2020, Perez et al. examined whether serum concentrations of interleukins (ILs) 6 and 8 and tumor necrosis factor-α (TNF-α) could be altered by a 20-min bout of aerobic exercise. Participants completed the same experimental conditions as the Meyer, Koltyn, et al. (2016a) study. Perez and colleagues found that hard exercise increased IL-6, IL-8, and TNF-α among 19 women with MDD, while the light and moderate exercise intensities failed to modulate these inflammatory markers. The authors also examined whether changes in each of these inflammatory markers related to changes in depressed mood but failed to find any significant relationships. The authors hypothesized that there is a possibility that acute increases in inflammatory markers following hard exercise could have potential for prompting chronic inflammatory adaptations; however, limited conclusions can be drawn from these studies with longer-term studies needed to test this possibility. Other limitations of these data include the secondary nature of the analyses, as well as the relatively small samples including only women.

In addition to this empirical evidence, Schuch, Deslandes, and colleagues (2016) propose other plausible neurobiological mechanisms that may be modulated by acute exercise, including increased levels of atrial natriuretic peptide, brain natriuretic peptide, copeptin, and growth hormone; however, currently, there is a dearth of evidence to make strong conclusions about neurobiological mechanisms sensitive to change through acute exercise in depression.

Neurobiological Mechanisms Studied in the Context of Chronic Exercise

Chronic exercise studies have examined potential neurobiological mechanisms associated with the antidepressant effects of exercise. These studies have focused on assessing whether changes in specific neurobiological mechanisms are associated with depressive symptom change in response to exercise treatment. To date, chronic exercise studies have focused mostly on oxidative stress markers, BDNF, and inflammatory markers.

In Schuch et al. (2014), the authors conducted a RCT evaluating the effects of exercise as an add-on treatment to treatment-as-usual on thiobarbituric acid-reactive substances (TBARS) and BDNF among 26 severely depressed inpatients. Fifteen individuals were randomized to an exercise plus treatment-as-usual condition, while the other 11 participants were allocated to a treatment-as-usual comparator condition. Participants performing the add-on exercise completed a 16.5 kcal/kg/week dose three times per week throughout their hospitalization stay. Across the hospitalization stay (exercise participants: M_{duration} = 21.63 days; *SD* = 4.5; control participants: M_{duration} = 23.82 days; *SD* = 5.7), participants in the exercise group performed ~9 total sessions. Serum TBARS levels increased for the exercise group, while no effects were found for serum BDNF levels, indicating that TBARS may be a potential neurobiological mechanism implicated in the antidepressant effects of exercise for participants with depression. It was unclear from this study whether change in TBARS was associated with changes in depressive symptom improvements. Importantly, these patients were also receiving treatment-as-usual which consisted of antidepressant drugs and/or electroconvulsive therapy. It is possible that exercise may impact serum TBARS levels when combined with other forms of treatment. Future studies specifically designed to test whether TBARS is a neurobiological mechanism of the effects of exercise for depression are needed.

Lavebratt and colleagues (2017) examined whether serum IL-6 levels could be altered by 12 weeks of exercise and whether changes corresponded to changes in depressive symptoms. In their study, 116 patients (age range = 18–64 years) completed light (*n* = 48), moderate (*n* = 36), and vigorous (*n* = 32) exercise conditions for three 60-min exercise sessions over 12 weeks. Reductions in IL-6 levels were associated with depressive symptom reductions, indicating that IL-6 may be a potential mechanism of the antidepressant effects of a chronic exercise training program. The authors did not examine other inflammatory markers or mechanisms. It remains unknown whether other mechanisms could also account for the effects.

These studies suggest that there may be a role of specific oxidative stress and inflammatory markers in the antidepressant effects of exercise training. Overall, the available data for neurobiological mechanisms of the antidepressant effects are too premature to make any definitive conclusions.

Conclusion

MDD is a prevalent and burdensome mental illness that significantly impacts individuals of all age groups across the globe. Antidepressant drugs and psychotherapeutic approaches are first-line treatments for MDD; however, these treatments are associated with several barriers, have variable effectiveness, and have vast side effect profiles. Exercise and physical activity are two lifestyle behaviors that can be used to effectively prevent and treat depression. Cross-sectional and longitudinal research indicates that engaging in regular physical activity is associated with a diminished risk of current and future depression. Even engaging in small amounts of physical activity can reduce an individual's risk for depression. A large body of evidence has examined exercise programs in the treatment of depression. Acute exercise has shown to exert powerful effects on mood and other disrupted psychological processes in depression, which may have implications for using exercise as a strategy to help alleviate or manage symptoms (e.g., low mood or deficits in positive or negative affect) in the short run. In the long-term, treatment studies have shown that aerobic and resistance forms of exercise training result in moderate-to-large effect sizes in depressive symptom reduction (Gordon et al., 2018; Schuch, Vancampfort, et al., 2016). Establishing neurobiological mechanisms of the antidepressant effects of exercise has been challenging due to the heterogeneous nature of depression and the wide range of neurobiological effects of exercise, but several mechanisms have been proposed and tested. In conclusion, research suggests that consistent physical activity can reduce the risk of developing depression and acute and chronic exercise treatment programs are efficacious in improving mood and symptoms of depression.

Learning Exercises

1. Clinicians issue a diagnosis of MDD based on the presence of at least five symptoms that are present over the same two-week time period. According to the Diagnostic and Statistical Manual, Fifth Edition (DSM-5) of the American Psychiatric Association (2013), which two symptoms are required for a diagnosis? Do both symptoms need to be present in order to be issued a diagnosis? Identify the remaining symptoms that may also be present to constitute a MDD diagnosis.

2. Can physical activity be useful in protecting against the development of depression or does depression reduce physical activity levels? What evidence is there to support your answer?

3. Can exercise be used to treat depression? What evidence is there to support your answer?

4. How does exercise compare with antidepressant drugs in the treatment of depression? What are the long-term depression outcomes of either treatment?

5. Does a specific dose of exercise elicit larger antidepressant effects compared to other doses of exercise? Use the available evidence to support your answer.

6. Most treatment studies examining the effects of exercise on depression have focused on aerobic forms of exercise. Does resistance exercise have utility in the treatment of depression? Use evidence to support your answer.

7. Several neurobiological mechanisms have been proposed to underlie the antidepressant effects of exercise. Identify at least two mechanisms that change in response to exercise. Indicate the dosage of exercise that was used in terms of type, frequency, intensity, and duration.

8. A friend of yours knows that you are taking a class in sport and exercise psychology. They have recently been issued a MDD diagnosis and are currently considering different treatment options. Your friend wants you to share your insights on how to manage and alleviate their depression. Based on the evidence outlined in this chapter, provide insight into different treatment options in terms of treatment outcomes and efficacy in reducing depression over the long-term. Which treatment would you recommend?

9. What type of exercise can individuals do in the short-term versus long-term to manage and reduce their depression? Use scientific evidence to support your answer.

Further Reading

For practical recommendations and advice for using exercise and physical activity in the treatment of depression, readers are encouraged to refer to primers by Rethorst and Trivedi (2013) and Fortier et al. (2020). Readers interested in understanding the wide range of potential neurobiological mechanisms implicated in the antidepressant effects of exercise and physical activity in the prevention and treatment of depression should refer to the Schuch, Deslandes, et al. (2016) and Kandola et al. (2019) reviews.

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Chapter 16
Physical Activity and Exercise for the Prevention and Management of Anxiety

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Chapter Overview

Anxiety disorders are a leading cause of the global disability burden. The mainstays of treatment for anxiety disorders are pharmacological and psychological interventions. Although a growing number of pharmacological treatments are available, about the half of patients do not respond adequately and require additional approaches for the prevention and treatment of anxiety disorders. Observational studies have demonstrated that physical activity is associated with a lower risk of incident anxiety at a population level. Randomized controlled trials have found that exercise, a subset of physical activity, can reduce anxiety and stress symptoms in people with anxiety disorders. The anxiolytic effect of exercise is observable following a single bout of exercise or a training program of aerobic and/or resistance training over several weeks. The mechanisms underlying the anxiolytic effects of exercise are not fully understood, but some neurobiological factors, such as changes on neurogenesis, inflammation, endocannabinoids, and regulation of the autonomic system, are potential candidates. In addition, psychological factors, such as reduction of anxiety sensitivity, increases in self-esteem, and mastery may help to explain this effect. In the present chapter, we provide an overview of the use of physical activity and exercise for the prevention and treatment of anxiety.

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Physical Activity and Anxiety

Anxiety disorders are highly prevalent disorders in most cultures across the world (World Health Organization [WHO], 2017). In 2015, an estimated 3.6% of the global population had anxiety disorders. Some variation can be seen in different countries across the world, ranging from 2.2% (Vietnam) to 9.3% (Brazil; WHO, 2017). Anxiety disorders are the sixth leading cause of global disability with considerable economic costs (WHO, 2017).

The core features of anxiety disorders include persistent, intense, and excessive fear or worry (American Psychiatric Association [APA] 2013; WHO, 1992). Each disorder has its specific presentation, but the most common symptoms of anxiety across all disorders are feeling restless, wound-up or on-edge, fatigued, irritable, muscle tension, with difficulties concentrating, difficulties in controlling feelings of worry, and sleep problems. Although anxiety symptoms are present in daily life, for a clinical diagnosis these symptoms must (a) persist for a certain period of time, which varies from disorder to disorder (e.g., 6 months for generalized anxiety disorder [GAD]); (b) cause significant problems in areas of life (social interactions, school, and work); and (c) not be a consequence of substance use. The diagnosis must be made by a psychiatrist or psychologist. In addition to the profound burden on mental health and well-being, people with anxiety disorders experience poorer physical health (Firth et al., 2019). For example, people with anxiety disorders are at increased risk of cardiovascular disease (Batelaan et al., 2016), diabetes (Smith et al., 2018), and metabolic syndrome (Tang et al., 2017). Also, anxiety disorders are associated with a 77% increase in all cause-mortality risk and a 177% increase in cardiovascular mortality risk (Denollet et al., 2009).

The main treatments for people with anxiety disorders consist of antidepressants and psychotherapies (Katzman et al., 2014). While antidepressants are typically more efficacious than placebo (de Vries et al., 2018), the benefits are mostly modest for those with mild-to-moderate symptom severity, and eventually, the benefit-risk ratio may be unfavorable for these patients due to the side effects (de Vries et al., 2018). Also, adherence to antidepressant treatments is not optimal, and dropout rates can be four times higher compared to dropout with placebo pills (Cipriani et al., 2018) mostly due to common side effects, including weight gain, increased diabetes risk, and sexual dysfunction. Some of these side effects can potentially contribute to poor physical health for people with anxiety disorders. Psychological therapies, such as cognitive behavioral therapy, have moderate positive effects for people with anxiety disorders (Carpenter et al., 2018), but without improving physical health. In addition, dropout from psychotherapies can be up to 29%, which is substantially higher than control groups (17%; Carpenter et al., 2018).

Given the considerable individual and societal burden of anxiety disorders, there is an urgent need to identify modifiable risk factors and additional intervention strategies to mitigate this burden. Emerging evidence indicates physical activity (PA) and exercise can reduce the risk of developing anxiety disorders and be useful strategies for the treatment of anxiety disorders by reducing anxiety symptoms. In the present chapter, we provide a brief overview of the current evidence for (a) the role of PA and exercise as protective factors against incident anxiety, and (b) the use of PA and exercise as therapeutic strategies for people with anxiety disorders. We highlight the use of exercise as a strategy for acute management of symptoms, the effects of different types of exercise training, neurobiological mediators between exercise and anxiety, and issues related to exercise prescription, adherence, and dropout.

Can Physical Activity Protect Against Incident Anxiety?

Incident anxiety refers to the occurrence or development of new cases of anxiety. Cross-sectional studies have shown that people with higher levels of PA present a decreased risk of having anxiety. For example, cross-sectional evidence using data from the World Health Survey, accounting for 237,964 individuals from 47 countries, demonstrated that those with low levels of physical activity were at 32% increased risk for having anxiety (odds ratio [OR], 1.32; 95% confidence interval [CI], 1.17–1.47; Stubbs, Koyanagi, et al., 2017). Also, meta-analytical findings reveal that those spending more time in sedentary behavior are 48% more likely to have anxiety, even when the analyses are adjusted for sociodemographic and health-related factors (OR, 1.48; 95% CI, 1.25–1.75; Allen et al., 2019).

A limitation of cross-sectional studies is the inability to infer directionality. However, these associations seem to be bidirectional. For example, there is a higher prevalence of low physical activity (da Silva et al., 2014; Stubbs, Koyanagi, et al., 2017) and high sedentary behavior in people with anxiety disorders (de Wit et al., 2011). Likewise, data from prospective cohort studies, which followed people free from anxiety for at least one year, demonstrate that people with higher self-reported PA levels are at 26% lower odds of developing meaningful anxiety symptoms and disorders (OR, 0.74; 95% CI, 0.62–0.88; Schuch et al., 2019). However, the evidence that PA protects against anxiety is mostly based on self-reported questionnaires that are more likely to suffer from social desirability and recall bias (Schuch et al., 2019). More recently, some evidence has shown that people with low cardiorespiratory fitness and muscular strength, two objectively assessed measures of physical capacity largely influenced by PA levels, have 60% higher risk (95% CI 1.14–2.11) of presenting anxiety compared to those with higher cardiorespiratory fitness and muscular strength (Kandola et al., 2020).

Exercise as a Treatment for Anxiety

Exercise can be used to alleviate anxiety symptoms in people with anxiety disorders. The effects of exercise on anxiety symptoms can be both acute, following a single bout of exercise, as well as chronic, following a period of weeks of intervention.

Acute Bouts of Exercise for Managing Symptoms

Current evidence has demonstrated that a single exercise bout results in a small reduction in state anxiety (Ensari et al., 2015). However, this notion has changed over the last five decades. In the 1970s, some believed that exercise would elicit increased anxiety symptoms in those prone to anxiety attacks/panic episodes (O'Connor et al., 2000). This fear seems to have been borne from an experiment conducted by Pitts and McClure (1967), who demonstrated that the infusion of sodium lactate induced symptoms of anxiety in people with anxiety neurosis. It is well-known that exercise results in an increased secretion of lactate. Therefore, the increase in lactate levels caused by exercise was thought to trigger panic attacks. This fear was reinforced because exercise results in bodily responses similar to somatic symptoms of anxiety, such as sweating, increased heart rate, and respiratory frequency. However, these findings were not supported by later evidence. A study in people with panic disorders observed only 5 panic attacks in 444 exercise bouts (1.13%) performed in the laboratory (O'Connor et al., 2000). In addition, further evidence has demonstrated that exercise is not only safe for people with panic disorders but also helps to alleviate acute state anxiety symptoms (Ströhle et al., 2009).

Exercise Training for Managing Symptoms

Diverse studies have attempted to discuss and meta-analytically synthesize the evidence on the anxiolytic effects of exercise training in healthy people (Conn, 2010), people with multiple chronic conditions (Herring et al., 2010), and people with anxiety disorders or elevated anxiety symptoms (Aylett et al., 2018; Bartley et al., 2013; Jayakody et al., 2014; Stubbs et al., 2017). Overall, small effects were observed for people with and without chronic health conditions (Conn, 2010; Herring et al., 2010). For people with anxiety disorders or elevated anxiety, there was some divergence in the magnitude and direction of the effects.

Bartley et al. (2013) synthesized data from seven randomized controlled trials and found no effect of exercise in people with anxiety disorders. However, this meta-analysis included studies comparing exercise versus relaxation plus paroxetine (Wedekind et al., 2010), strength exercises

(Martinsen et al., 1989), or cognitive behavioral therapy (Hovland et al., 2013). The inclusion of such studies in a meta-analysis is problematic because the control group "interventions" are largely effective. As such, to become effective, exercise effects would have to overcome the treatment effects of the control groups. For example, in the Wedekind et al. (2010) study, the authors compared the effectiveness of four interventions, namely (a) paroxetine + exercise; (b) paroxetine + relaxation; (c) placebo + exercise; and (d) placebo + relaxation, showing no differences between groups. However, all groups improved significantly and with a large effect on anxiety symptoms (paroxetine + exercise, Cohen's d = 2.33; paroxetine + relaxation, Cohen's d = 2.00; placebo + exercise, Cohen's d = 1.53; placebo + relaxation, Cohen's d = 1.87). In the study of Martinsen et al. (1989), aerobic exercise (walking and jogging) was compared to a combination of strength exercises, flexibility, and relaxation. At the end of the intervention, both groups improved without having any statistical differences between them. Lastly, Hovland et al. (2013) compared cognitive behavioral therapy versus exercise and found that cognitive behavioral therapy, a well-established and known intervention, is more effective than exercise for anxiety symptom reduction. The inclusion of such comparison groups likely results in a reduction of the estimated effect of exercise.

To address this, the authors explored the role of the type of control group in a subgroup meta-analysis, showing that exercise has a large effect compared to placebo or waitlist control groups. Stubbs et al. (2017) revisited the same topic in a more recent meta-analysis that included six randomized controlled trials. In this meta-analysis, studies did not include comparisons against other forms of exercise or other established treatments (e.g., antidepressants or psychotherapies). Stubbs et al. (2017) found a moderate effect of exercise on anxiety (SMD, -0.58; 95% CI -1.0, -0.76). The literature investigated the effects of exercise training in multiple anxiety disorders, and some heterogeneity in the effects can be observed across disorders. This can potentially mean that exercise may be more effective for some anxiety disorders compared to others. Due the small number of studies, it is not clear if the differences in the effects between studies are related to the diagnosis or to other methodological aspects, such as weekly frequency, exercise intensity and type, trial duration, comparison group, or other factors related to the sample, such as age, gender, symptom severity, or use of other treatments. For example, the seminal study lead by Broocks et al., (1998) found a very large effect of aerobic exercise on anxiety symptoms in patients with panic disorder. The exercise sessions were held three to four times per week, for eight weeks, while Herring et al. (2012) in another seminal study found a moderate effect of strength training, held two times per week, for 6 weeks in people with GAD. A brief summary of some existent studies by anxiety diagnosis is given in Table 16.1.

Exercise Prescription

The American College of Sports Medicine (ACSM) recommends the use of the frequency, intensity, time, and type (FITT) principle as a strategy to guide the exercise prescription (American College of Sports Medicine, 2013). However, the literature exploring how the FITT characteristics relate to the anxiolytic effects of exercise in people with anxiety disorders remains scarce.

Table 16.1
Randomized Controlled Trials on Exercise as a Treatment for Anxiety

Study	Disorder	Sample	Exercise type	Frequency/ Duration	Add-on	Control/ comparison	Mental health outcomes
Abrantes et al. (2017)	OCD	*n* = 28 exercise/ *n* = 28 control	Aerobic Exercise	1x week/12 weeks	Usual treatment	Health Education	No differences between groups (both improved)
Bischoff et al. (2018)	PD	*n* = 39 Exercise group/ *n* = 38 control	Aerobic Exercise	2x week/6 weeks	CBT	Low-intensity exercise	↓Anxiety symptoms
Broocks et al. (1998)	PD	*n* = 16 Exercise group/ *n* = 15 placebo	Aerobic Exercise	3 to 4x week/8 weeks	None (monotherapy)	Placebo pill	↓Anxiety and depressive symptoms
Gaudlitz et al. (2015)	PD	*n* = 24 Exercise group/ *n* = 23 control	Aerobic Exercise	3x week/8 weeks	CBT	Low-intensity exercise	↓Anxiety symptoms
Goldstein et al. (2018)	PTSD	*n* = 21 Exercise group/ *n* = 26 control	Resistance Exercise + Aerobic exercise	3x week/12 weeks	About 40% of participants were taking psychiatric drugs	Waitlist control	↓PTSD symptoms

Table 16.1 (continued)

Herring et al. (2012)	GAD	*n* = 10 aerobic/ n = 10 resistance/ n = 10 control	Aerobic Exercise / Resistance Exercise	2x week/6 weeks	Some patients were also using antidepressants	Waitlist control	↓Worry symptoms
MarCom et al. (2008)	PD, GAD, SP	*n* = 38 exercise/ n = 36 control	Aerobic Exercise	Unknown frequency /9–10 weeks	GCBT	Educational sessions	↓Anxiety, depressive, and stress symptoms
Plan et al. (2020)	GAD	*n* = 17 exercise/ *n* = 16 control	Aerobic Exercise (High intensity interval training)	Every second day/12 days	Stable doses of antidepressants and pregabalin were allowed	Low-intensity exercise	↓Anxiety, depressive, stress symptoms, somatic and worry symptoms
Powers et al. (2015)	PTSD	*n* = 5 exercise/ *n* = 4 control	Aerobic Exercise	1x week/12 weeks	ET	ET Alone	↓PTSD symptoms
Rosenbaum et al. (2015)	PTSD	*n* = 42 exercise/ *n* = 39 control	Resistance Exercise + Aerobic exercise (walking)	3x week/12 weeks	Usual treatment	Usual treatment alone	↓PTSD, depressive, stress symptoms

Note. Abbreviations: CBT = Cognitive Behavioral Therapy, ET = Exposure Therapy, GAD = Generalized Anxiety Disorders, GCBT = Group Behavioral Therapy, OCD = Obsessive Compulsive Disorder, PD = Panic Disorder, PTSD = Post-traumatic Stress Disorder, SP = Social Phobia

Most of the literature is based on aerobic exercises. However, a recent meta-analysis has shown that nonaerobic forms of exercise, such as resistance training, are also capable of reducing anxiety symptoms in healthy people and people with a chronic condition (Gordon et al., 2017). Early head-to-head trials comparing aerobic versus nonaerobic exercises found no difference between the two interventions (Martinsen et al., 1989). When taken together, there is evidence that both aerobic and nonaerobic exercises are effective.

The optimal dose of exercise intensity, frequency, or volume remains unclear. Most randomized controlled trials investigating this topic have shown the effectiveness of moderate-intensity exercise (Stubbs, Vancampfort, et al., 2017). Still, there is a paucity of trials investigating whether the same benefits could be achieved with lower intensities. The optimal weekly frequency and optimal weekly volume for achieving the greatest reductions in anxiety symptoms is also unclear.

In order to maximize exercise engagement and reduce dropout, clinicians and exercise professionals should consider that exercise should be rewarding and enjoyable, and autonomous motivation seems to be a key element for exercise engagement and maintenance (Vancampfort et al., 2015). Autonomous motivation leads someone to engage in exercise behavior for its own sake and intrinsic rewards, such as challenge and enjoyment (also see Chapter 3; Quested et al., 2021). Accordingly, every aspect related to the exercise prescription should consider personal preferences and make the exercise the most enjoyable. Hence, it might be viable to prescribe moderate exercise intensities or self-selected exercise intensities. For example, exercising at self-selected intensities and intensities below the ventilatory threshold are more likely to be linked to positive affective responses. In contrast, higher intensities are more likely linked to a negative affective responses in people with lower physical activity levels (Brand & Ekkekakis, 2018; also see Chapter 11 [Jones & Zenko, 2021]; Chapter 12 [Zenko & Ladwig, 2021]). In addition to intensity, it is also important to consider other personal preferences such as music listening, time of day, the presence of friends or family, and exercise setting. All these aspects should be considered and discussed with the exerciser. Including the exerciser in the decision-making process should increase the sense of autonomy (Vancampfort et al., 2015).

Potential Mediators (Mechanisms) of the Anxiolytic Effects of Exercise

Potential mechanisms underpinning the anxiolytic effects of exercise may be related to changes in biological markers and psychosocial/behavioral factors. Some biological markers are candidates to explain the effects of exercise. We do not intend to provide an exhaustive list; instead we briefly mention those with supporting evidence. It is believed that brain-derived neurotrophic factor (BDNF) potentially counteracts the impact of stress hormones on the hippocampus (Suliman et al., 2013). However, this protective mechanism seems to be impaired in people with anxiety, given that BDNF levels are reduced in this group (Carbone & Handa, 2013). Exercise, in turn, releases the secretion of BDNF in humans (Szuhany et al., 2015). A previous study has found an increase in BDNF serum levels following a single exercise bout (Strohle et al., 2010). However, no study has evaluated the BDNF response to long-term interventions in people with anxiety disorders (to the best of our knowledge). A second potential explanation is the exercise-related regulation of the autonomic system (AS) functioning. Some people with anxiety have impaired AS functioning, marked by decreased heart rate variability (Alvares et al., 2016). In turn, exercise improves AS functioning in patients with anxiety and AS dysfunction (Asmundson et al., 2013; Gaul-Aláčová et al., 2006). Lastly, the endocannabinoid hypothesis proposes that the endocannabinoid system is responsible for linking and integrating the perception of external and internal stimuli with psychological outcomes, such as anxiety, allowing the adaptation to its constantly changing environment (Lutz et al., 2015). Acutely, exercise promotes an increase on anandamide peripheral levels, an endocannabinoid in women with major depressive disorder, and this increase was associated with lower state anxiety (Meyer et al., 2019). However, there is a paucity of studies showing that long-term anxiolytic effects of exercise are related to adaptations, instead of transient increases, in endocannabinoid levels.

One potential psychosocial mechanism relates to anxiety sensitivity. The systematic and deliberate exposure to somatic symptoms, such as increased heart rate, respiratory frequency, and sweating through exercise, has been shown to reduce the fear of bodily sensations related to anxiety (Smits et al., 2008). Second, physical activity and exercise have been associated with increased self-esteem, improved self-concept, and increased self-efficacy. For example, a study with young college women demonstrated that PA is inversely associated with symptoms of social phobia, GAD, and obsessive-compulsive disorders. Among the factors that explained these associations were self-concept and self-esteem (Herring et al., 2014). Lastly, exercise might lead to an increased sense of mastery and self-efficacy, especially when associated with marked increases in physical capacity and functioning, body composition changes, or when mastering a new set of techniques (Elavsky, 2010).

Conclusions

PA can reduce the risk of anxiety symptoms and disorders in the general population. In addition, among people with anxiety, acute and repeated exercise is safe and can alleviate symptoms. Exercise also has cardiovascular and metabolic benefits that may reduce the physical health risks that are associated with anxiety disorders. The mechanisms related to the anxiolytic effects of exercise are not fully understood but likely include both neurobiological and psychosocial factors. Exercise prescription should consider the participant's motivations, expectations, barriers, and preferences to promote autonomous motivation and long-term adherence.

Learning Exercises

1. Is physical activity associated with a reduced risk of incident anxiety? What is the magnitude of the effect?
2. Does exercise induce panic attacks?
3. Can exercise be used as a complementary treatment for anxiety disorders?
4. Explain how exercise could reduce anxiety.

Further reading

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Chapter 17
Physical Activity and Severe Mental Illness

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Chapter Overview

Severe mental illness refers to a group of disorders that significantly impair a person's psychosocial functioning. Psychosocial functioning is a person's ability to engage in activities of daily life (work, socializing, and play) in a way that is meaningful. Although many other mental disorders can be severe, the term *severe mental illness* includes diagnoses of schizophrenia, bipolar disorder, and major depressive disorder. People living with severe mental illness can experience marginalization due to societal stigma in addition to poor physical health and reduced life expectancy. The impact of these disorders on a person's physical health will be explored throughout this chapter, along with the beneficial role that physical activity can play in their prevention and management.

The concept of *lifestyle psychiatry* will be explored, outlining the importance of addressing modifiable risk factors for people living with severe mental illness. In addition to physical activity, this chapter will also examine the vital role of sleep on a person's physical and mental health, the role of exercise professionals within mental health systems, and the process of integrating physical activity interventions as part of routine mental health treatment in real-world settings.

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What is Severe Mental Illness?

Many mental health conditions can be considered as *severe* for the people who experience them, as well as their support networks. However, the phrase *severe mental illness* refers to a specific group of mental health disorders including schizophrenia, bipolar disorder, and major depressive disorder, that significantly impact a person's functioning in daily life and in some cases, may be associated with a distorted sense of reality. Severe mental illness can also be defined by the length of duration and the subsequent disability it has on a person's life.

Here we outline some severe mental illness diagnoses as well as common symptoms, to provide a brief context for how physical health can be subsequently impacted and the role that physical activity can provide as part of a treatment plan. Examples of severe mental illnesses are schizophrenia, bipolar disorder, and major depressive disorder.

Schizophrenia

This complex disorder can impact a person's mental health, physical health, and cognitive function. Lifetime prevalence for developing schizophrenia affects approximately 1% of the population (Kessler et al., 2005). It can produce intense periods of psychosis and negatively impact long-term functioning. Symptoms of schizophrenia are generally divided into three broad categories: *positive symptoms*, such as hallucinations or delusions, which are "added" to someone's experience; *negative symptoms*, describing loss of experience, which can include social withdrawal, decreased enjoyment in activities, and reduced motivation; and finally, *cognitive impairment*, which is associated with changes in memory, attention, cognition, and executive function.

Bipolar Disorder

Bipolar disorder significantly impacts a person's mood or *affect* and is characterized by periods of elevated moods or *mania* where people can present with increased energy, impulsivity, and reduced sleep. This can be followed with interchanging significant depressive episodes. The lifetime prevalence for developing this disorder is approximately 0.6% (Merikangas et al., 2010). Bipolar disorder can also include experiences of psychosis.

Major Depressive Disorder

Major depressive disorder is a prevailing and debilitating mental health condition and is one of the leading contributors to the global burden of disease. Major depressive disorder has approximately a 16% lifetime prevalence (Kessler et al., 2005) and accounts for 8.2% of the global years lived with disability in 2010 (Ferrari et al., 2013). Symptoms that are commonly experienced with major depressive disorder include persistent low mood and reduced interest in activities or hobbies, in addition to poor sleep, changes in appetite, and in some cases suicidal ideation. People living with major depressive disorder may also experience declined social functioning, such as difficulties with maintaining relationships and employment.

Psychosis

Psychosis describes a group of symptoms which are experienced by people with a psychotic disorder (e.g., schizophrenia). Symptoms of psychosis impact an individual's thoughts and perceptions and are defined by a distortion in a person's perception of reality. This can include senses including smell, thoughts, visions, tactile sensations, and beliefs. Most people that develop a psychotic disorder will experience symptoms prior to 25 years of age (Morgan et al., 2012). It is important to recognize that psychosis is *a symptom of a mental disorder*, rather than an illness itself. While we do not fully understand how psychosis develops, various factors can contribute to a psychotic episode including family history, mental or physical illness, extreme stress, trauma, and substance use.

Psychosis, which is not to be confused with psychoticism, typically develops in youth or adolescence and is typically accompanied by marked decline in functioning, changes in behaviour including difficulties concentrating, sleep disturbances, withdrawing from social supports, disorganized speech, depression, and anxiety. The first episode of psychosis or *FEP* is when someone experiences psychosis for the first time. Symptoms of psychosis can include *hallucinations, delusions,* and *disordered thinking and cognition.*

Hallucinations

Hallucinations occur when someone experiences sensations inconsistent with reality. Hallucinations are most commonly auditory (e.g., hearing voices), but may also be visual (e.g., seeing shapes or figures), in tactile form (e.g., experiencing sensations or feelings), olfactory (e.g., smelling odors that are not present), or gustatory (impacting taste).

Delusions

Delusions refer to beliefs that are not based on reality and may impact individual actions or functioning. Delusions can vary depending on the individual and the illness. Delusions may, for example, be paranoid, grandiose, somatic, persecutory, or romantic in nature.

Disordered Thinking and Cognition

Speech and thought patterns may become confused and mixed-up. People may experience problems with memory and other cognitive process (e.g., concentration). This can result in people behaving or communicating differently.

Early Psychosis and Ultra-High Risk

Those with *at-risk mental states* or *ultra-high risk* refers to a group of individuals who are at high risk of developing psychosis; this is often referred to as the *prodromal period* (Galletly et al., 2016). To meet criteria for ultra-high risk, individuals may exhibit a number of factors including genetics or family history, the presence of some brief limited intermittent psychotic symptoms (BLIPS), or attenuated (sub-threshold) symptoms of psychosis (Yung et al., 2005). Youth in these categories will be diagnosed by an experienced mental health clinician using a validated assessment tool (Nelson, 2014). Early intervention is a critical period, for both physical and mental health outcomes, to improve the future well-being for youth experiencing psychosis for the first time (Shiers et al., 2014).

Health Risks for People with Severe Mental Illness

People living with severe mental illnesses face high rates of premature mortality compared to members of the general population (Baxter et al., 2016). The major contributor to this early mortality is poor physical health, often linked to non-communicable diseases. In particular, people with severe mental illness have a 1.4–2.0x increased risk of developing cardiometabolic diseases compared to people without mental illness (Firth et al., 2019). This accounts for approximately 1/3rd of the premature mortality (John et al., 2018). This is associated with higher rates of diabetes, obesity, metabolic syndrome, and respiratory complications. Additionally, people living with severe mental illness face high levels of disability, with schizophrenia being the 12th largest cause of years lived with a disability worldwide (Vos et al., 2017).

Impact of Modifiable Risk-Factors

People living with severe mental illness are at high risk of cardiometabolic disease impacted, in part, by multifactorial lifestyle risk factors including cigarette smoking, physical inactivity, consuming poor diets, and experiencing poor sleep (Firth et al., 2020).

Cigarette Smoking

People with severe mental illness are more likely to smoke cigarettes, with approximately 1 in 2 people a smoker compared to approximately 1 in 10 people in the general population (Gilbody et al., 2015). People with severe mental illness are more dependent on nicotine and have increased difficulty engaging in smoking cessation programs compared to those in the general population (Ashton et al., 2013; Malpass et al., 2009).

Physical Inactivity

People with severe mental illness are less likely to be physically active than the general population and struggle to meet recommended physical activity guidelines of a minimum of 150 minutes of moderate-intensity physical activity per week (Vancampfort, Firth, et al., 2017). There are differences in physical activity engagement between differing severe mental illness diagnoses; people with bipolar disorder engage in more physical activity than people with schizophrenia or major depressive disorder. Symptomology and medication side-effects can affect engagement (this will be explored in greater detail later in this chapter). People with severe mental illness are more sedentary than the general population and on average are sedentary between 8–12 hours of the day (Vancampfort, Firth, et al., 2017). High levels of sedentariness may be further complicated by factors associated with the mental health disorders such as social isolation and obesity (Vancampfort, Firth, et al., 2017).

Poor Diet

Compared with the general population, people with severe mental illness tend to have diets that are low in nutritional quality and have a higher caloric intake. Medication side effects can increase a person's desire to eat; desire for energy-dense, low-nutrient foods is particularly increased (Teasdale et al., 2017).

Sleep and Mental Illness

As in the general population, sleep is a significant component of maintaining good physical and mental health and represents a growing facet of mental health research (Firth et al., 2020). When sleep is impaired, it can lead to weight gain, increasing a person's risk of the development of obesity and metabolic abnormalities. For people with severe mental illness, sleep disturbances are a highlighted risk factor that can lead to the development of psychiatric symptoms in addition to the exacerbation of known symptoms. For people with a mental disorder, up to 90% report abnormal sleep behaviour, which can include difficulty initiating sleep or insomnia (Abad et al., 2005). Symptoms of severe mental illness such as paranoia can impact sleep quality (Afonso et al., 2014), and medications can impact sleep duration and as such decrease sleep quality (Correll et al., 2011). Given the prevalence of poor sleep within this population group, providing interventions that promote good sleep practices is paramount. Importantly, regular physical activity is associated with improvements in self-reported sleep quality in people with mental illness (Lederman et al., 2018).

Social Determinants of Health

High rates of early death and cardiometabolic risk are prevalent in people with severe mental illness even once lifestyle risk factors are accounted for (Hamer et al., 2008). This suggests that physical health is influenced by external factors including the provision and availability of health care, socioeconomic status, and geographical location. People with severe mental illness are less likely to have access to and engage in quality health care services compared to the general population. Social determinants of health, which includes employment and financial insecurity, homelessness, poor education, and poverty, increase a person's risk of developing mental and physical illnesses (Marmot, 2005).

Learning Exercise One

Describe some common symptoms of the main diagnoses of severe mental illness and include how these symptoms may affects a person's daily functioning.

Current Treatments for Severe Mental Illness

Clinical approaches to managing symptoms of severe mental illnesses vary according to symptom presentation, comorbidities and medical history, demographic factors, and severity of symptoms. People with severe mental illness may experience a combination of treatments including medications (typically antidepressants and antipsychotic medications), talking-based therapies (such as cognitive behavioural therapy), and occupational and social recovery therapies. Physical activity is becoming increasingly recognized as an adjunct treatment for severe mental illness, which will be explored throughout this chapter.

Impact of Anti-Psychotic Medications

The high rates of cardio-metabolic conditions in people with severe mental illness are in part due to the side-effects of antipsychotic medications that are prescribed to treat people with severe mental illness. These medications, whilst effective in reducing symptoms of severe mental illness and reducing risks of readmissions to hospital, have significant negative effects on physical health including the cardiometabolic, endocrine, and neuromotor systems.

Cardiometabolic

Weight gain is a commonly reported side effect from many antipsychotic medications, and increases a person's risk of developing metabolic syndrome, diabetes, and cardiovascular complications (Alvarez-Jimenez et al., 2008). Almost 80% of people who commence antipsychotic medication will experience clinically significant weight gain (more than 7% of their initial weight) within their first year of beginning the medication (Correll et al., 2009).

Endocrine

Abnormally high level of prolactin, or *hyperprolactinemia*, is a side effect of antipsychotic medications (Peuskens et al., 2014). This may cause unwanted side-effects such as sexual dysfunction and menstruation issues in people taking this medication (Knegtering et al., 2003).

Neuromotor

Side effects are more common of the older, first generation *typical* antipsychotics and may include muscle spasms, restlessness, and involuntary movements which can be socially stigmatizing for people it affects and can be associated with a reduced quality of life (Angermeyer et al., 1999; Briggs et al., 2008).

Learning Exercise Two

Outline how a person's physical health may be impacted if they are receiving treatment for schizophrenia.

Benefits of Physical Activity for Severe Mental Illnesses

A robust body of evidence exists documenting the bidirectional relationship between physical activity and mental health (Firth et al., 2019). In addition, physical activity is increasingly recommended as a routine component of treatment for people with severe mental illness, to protect and promote physical and mental health.

Physical activity is effective in improving cardio-metabolic health through various mechanisms including reduced blood pressure, improved glucose metabolism, and increased cardiorespiratory fitness (Henson et al., 2013). Cardiorespiratory fitness is a key risk factor contributing to the premature mortality in people with severe mental illness (Vancampfort, Rosenbaum, Probst, et al., 2015). Cardiorespiratory fitness is the ability of the heart, circulatory system, and lungs to supply oxygen to the skeletal muscles during physical activity. In the general population, improvements in cardiorespiratory fitness can reduce mortality by up to 13% and impact cardiometabolic risk reduction by 15% (Kodama et al., 2009). For people with severe mental illness, reduction in cardiometabolic risk following participation in an exercise program can occur in as little as 8 weeks of structured exercise (Firth et al., 2015; Vancampfort, Rosenbaum, et al., 2017; Vancampfort, Rosenbaum, Ward, et al., 2015). Additionally, it has been demonstrated that lifestyle interventions incorporating both physical activity and dietary components are effective in preventing the medication-induced weight gain associated with anti-psychotic medication (Alvarez-Jimenez et al., 2008; Curtis et al., 2016; Shiers et al., 2014). Severe mental illness-specific mental health benefits of physical activity are outlined below.

Schizophrenia

Physical activity, particularly performed at a moderate-to-vigorous intensity, can lead to improvements in both positive and negative symptoms for people with schizophrenia (Stubbs et al., 2018). Additionally, global cognition (which refers to a person's functioning and working memory) improves following physical activity engagement. These cognitive improvements can occur with as little as 90 minutes of physical activity weekly that is of moderate-to-vigorous intensity (Firth et al., 2017). Structured exercise that elicits increased fitness is correlated with increased brain volume, which may impact neurogenesis (the process by which new neurons are formed), through plasticity in the volume of the hippocampal brain region (Pajonk et al., 2010; Scheewe et al., 2013).

Major Depressive Disorder

Physical activity is effective in improving mood and well-being in people with depression following a single session of exercise, particularly those that are of moderate or higher intensity (Schuch, Deslandes, et al., 2016). Additionally, regular participation in physical activity in healthy people is beneficial for reducing future risk of developing depression (Firth et al., 2018). Studies indicate that physical activity is effective in treating mild-to-moderate depression with effects similar to traditional treatments including antidepressant medication and with fewer negative side-effects (and many adjunct positive effects; Schuch, Vancampfort et al., 2016). For people with major depressive disorder, physical activity and exercise is recommended as adjunct to standard care by the World Health Organisation (World Health Organization, 2018). While the mechanisms for how physical activity improves depressive symptoms are not fully clear, research indicates that physical activity can improve abnormal biomarkers associated with major depressive disorder; this can include cortisol reduction and decreases in chronic inflammation (Kandola et al., 2019). For more on the relationship between exercise and depression, see Chapter 15 (Brush & Burani, 2021).

Bipolar Disorder

Early evidence related to the role of physical activity for people with bipolar disorder suggests that physical activity is protective for cardiovascular disease; however, more evidence is needed regarding the impact on mood symptomology (Vancampfort et al., 2018). Research suggests that physical activity may be beneficial for mood fluctuations for people with bipolar disorder due to potential links to improvements to the brain's functional connectivity (Douw et al., 2014). Cardiorespiratory fitness is associated with health-related quality of life in people with bipolar disorder for both physical and mental health domains (Vancampfort, Hagemann, et al., 2017).

Fitness vs. Fatness

People with severe mental illness are more likely to be overweight and obese, which can also impact participation in physical activity, due to not only reduced fitness, but also perceived pain and poor self-esteem (Mishu et al., 2019; Vancampfort et al., 2011). Achieving significant weight loss is difficult for the general population with only one in 210 males and one in 124 females achieving a healthy BMI (under 25 kg/m2) without surgery (Fildes et al., 2015). Exercise professionals and mental health clinicians should encourage people living with mental illness to engage in physical activity regardless of their body weight and perceived body image. It is important to note that without specialized dietary input, exercise is likely to be ineffective in achieving weight loss for people with severe mental illness (Firth et al., 2015). While this may seem disheartening for people, particularly when trying to engage in physical activity, research tells us that improving fitness can reduce cardiometabolic risk and improve mental health, sleep quality, functional capacity, and cognition, regardless of change in weight. This can be a useful educational and motivational strategy for clinicians to assist clients in increasing physical activity levels.

Learning Exercise Three

Discuss (a) the benefits of physical activity in people with schizophrenia and (b) the mechanisms of how physical activity affects depressive symptoms.

Barriers to Engagement in Physical Activity

Low engagement in physical activity is prevalent in the general population and this may be influenced by many factors, including socioeconomic status, low confidence and knowledge about exercise, and lack of enjoyment (Stutts, 2002). Further, people living with severe mental illness experience additional barriers to being physically active that can be categorized into physical health, mental health, and social factors (Firth et al., 2016).

Physical Health

The high rates of co-morbid physical health conditions can negatively impact engagement in physical activity (Firth et al., 2019a). Obesity, associated chronic pain and musculoskeletal problems, can make physical activity difficult and less enjoyable, thus impacting exercise participation (Firth et al., 2016). Low cardiorespiratory fitness, seen in people living with severe mental illness, can also impact a person's ability to engage in long periods of physical activity, particularly if aerobic in nature. Other issues including low energy and lethargy as a result of antipsychotic medication can be impactful (Firth et al., 2016).

Mental Health

Common barriers from a mental health perspective include depressive symptoms, stress, low motivation, and acute psychotic symptoms (hallucinations, delusions and paranoia, avolition, anhedonia). Additional reported barriers include feeling unsafe when exercising or concerns about being injured, and low interest in exercise (Firth et al., 2016). Long-term engagement in physical activity is impacted by a person's autonomous motivation, that is, an internal desire to participation (Vancampfort et al., 2015e). Given the unique barriers that people with severe mental illness face regarding physical activity participation, developing individual strategies specific to members this population group that target improvements in intrinsic motivation (e.g., health coaching and motivational interviewing) is paramount when aiming to increase engagement (Farholm & Sørenson, 2016).

Social Factors

Strong social support networks assist in the uptake and regularity of physical activity, and individuals with severe mental illness are more likely to experience social isolation which can affect engagement (Daumit et al., 2005). Additionally, the financial costs, lack of resources, and time pressures associated with exercising are common reasons why people with severe mental illness may not engage in physical activity (Chapman et al., 2016; Firth et al., 2016; Stanton et al., 2015).

Learning Exercise Four

What are the key barriers for people with severe mental illness engaging in physical activity?

Photo by [Munbaik Cycling Clothing](#) from [Pexels](#)

Contraindications to Exercise

Unless a person with mental illness has been diagnosed with severe physical issues, physical activity and exercise is generally safe and effective to prescribe, particularly if of low-to-moderate intensity (Stubbs et al., 2018). The unique barriers to engaging in physical activity should be taken into consideration when promoting activities and an individualized approach (including referral to an exercise professional) should be encouraged.

Prior to beginning structured exercise programs, particularly if they are of high intensity, a person with mental illness should be screened for absolute and relative contraindications to engaging in physical activity, as per guidelines recommended by the American College of Sports Medicine (American College of Sports Medicine, 2017). The Physical Activity Readiness Questionnaire (PARQ) is a series of short questions that identifies any absolute contraindications to exercise (Thomas et al., 1992). Additionally, people experiencing higher levels of mental distress or poor mental health symptoms may need additional support to engage in appropriate and safe exercise. Like the general population, people with mental illness should be screened for typical contraindications to exercise (such as hypertension or a recent cardiac event). See Table 17.1 for a list of precautions that should be considered specific to this population (Firth et al., 2016).

Table 17.1

Precautions to Consider for People with Severe Mental Illness

Potential Issues	Precautions and Considerations
Fatigue	Prolonged tiredness and poor concentration are common for people and are influenced by factors including side effects of medication, sleep troubles, and symptomology. An individualized approach to an exercise plan tailored to times when a client may be more energetic is ideal.
Social anxieties	Public places and larger groups of people can act as a deterrent to engaging in physical activity. Setting small goals around exercise and establishing a routine is important initially, and gradually progressing may help with familiarity for clients
Side-effects of medications	In addition to extreme tiredness, other side effects of taking anti-psychotic medication can include visual problems, increased sweating and salivation, and issues with balance. Close monitoring of the client is important throughout the exercise session and adapting to the client’s changing needs will assist with increasing their confidence.
Psychotic symptoms	While symptoms such as auditory and visual hallucinations may present complications to engaging in physical activity, they do not preclude a person from participating. Instead, choosing activities that are lower intensity in nature should be considered. Exercises and activities such as body-weight resistance training, walking, and light stretching may be helpful. If people are presenting as manic or with extreme elevated moods, limiting distractions including music or television is encouraged. Exercising in a quiet space without people around can also be helpful.

Learning Exercise Five

What are the key safety concerns for people with mental illness engaging in structured physical activity?

Motivation and Physical Activity

Physical inactivity is not just an issue for people with mental illness as many people in the Australian general population also do not meet the recommended guidelines for physical activity (150 minutes of moderate or 75 minutes of vigorous physical activity weekly; Australian Bureau of Statistics, 2015). In Australia, a little more than half of adults meet the guidelines for physical activity (Australian Institute of Health and Welfare, 2018). Less than half the population in the United States meet the recommended levels of physical activity (Carlson et al., 2015) and rates of inactivity are higher in Europe, where almost 60% of adults do not engage in appropriate levels of activity (Oja et al., 2010). Given the robust evidence demonstrating the benefits of physical activity in improving the physical and mental health of people living with severe mental illness, it is important to examine the ways in which people can be supported to engage in exercise throughout the life course. Examining people's internal perceptions and motivation to exercise is a vital component of physical activity prescription (Chapman et al., 2016; Firth et al., 2016; Vancampfort, De Hert et al., 2015; Vancampfort et al., 2016).

Negative symptoms that are associated with schizophrenia can be associated with lower levels of motivation towards physical activity (Vancampfort, Stubbs, et al., 2015). These low levels of motivation may be related to a person's own priorities towards exercise and their physical health, past experiences with engagement, or beliefs about structured physical activity. Competing interests and priorities including work, study, and family can also be factors that affect motivation, in addition to socioeconomic factors such as lack of access to resources (Ussher et al., 2007). Education about how to engage effectively and safely in structured exercise and fostering self-determined motivation through building self-confidence and a sense of competency can improve participation. People may have had previous negative experiences with exercise, which may affect future performance (Ladwig et al., 2018). The influences that may dissuade people with mental illness from engaging in physical activity should be discussed by their health care providers to formulate an exercise plan that is based on the person's interests and preferences.

Self-Determination Theory

Examining the research into what motivates people to exercise is important for understanding how to support those with severe mental illness with long-term healthy behaviours (for more discussion on physical activity and exercise behavior, see Chapter 2 [Rebar et al., 2021], Chapter 4 [Brand & Ekkekakis, 2021], and Chapter 5 [Delli Paoli, 2021]). Utilising the self-determination theory (Deci et al., 2008) can be an effective way of facilitating long term enjoyment in physical activity (see Chapter 3; Quested et al., 2021). This theory is regularly used by many health professionals, including exercise specialists, to ascertain factors that guide someone's motivation to engage in a particular behaviour (e.g., exercise). It is applicable in the well-being and recovery of people with severe mental illness and can be used in the identification of external and internal forms of motivation. This theory examines specific basic psychological needs including autonomy, relatedness, and competence, and when applied to exercise can help people understand the reasons why they may or may not exercise. The theory states that *intrinsic* motivation is more conducive with exercise participation. Self-determination has been identified as important in people with schizophrenia for engaging in long-term exercise participation (Vancampfort, Stubbs, et al., 2015). So how does this work in practice? Motivational interviewing can be used with clients that have a mental illness to assist in promoting positive attitudes towards exercise and to help in discovering what motivates them to engage (Farholm & Sørensen, 2016).

Transtheoretical Model of Health Behaviour Change

The transtheoretical model (Table 17.2) suggests that making changes to health behaviours are typically achieved through five stages of change (Prochaska et al., 1997). These stages of change can assist in guiding conversation, education topics, and eventually exercise prescription (Prochaska et al., 1994).

Table 17.2

Stages of Change Based on the Transtheoretical Model

Stage	Stage Description
Pre-contemplation	During this period, people are not generally considering the practical steps to beginning exercise, so it is a good time to provide basic education. Identifying what is most important to them is of importance and gradually relating these goals back to the benefits of physical activity may be appropriate. As a clinician, you may then be able to get a level of understanding as to the client's thoughts towards physical activity.
Contemplation	As a clinician you can use this time to provide more detailed education and challenge beliefs that the person may have about what participating in physical activity might look like. Motivational interviewing should continue.
Preparation	During this stage, the client should engage in goal setting around future planned physical activity, planning next steps, and exploring barriers and strategies to overcome challenges.
Action	The client should begin regular physical activity and ideally in an activity that is enjoyable to them. Work with your client to identify ways in which they might adhere to their schedule. These may include the use of activity trackers or finding a friend or partner to exercise with. Reflecting on past experiences can be helpful to manage mood and psychological states. Providing positive reinforcement should be a focus of the clinician. Working towards maintaining current physical activity levels should be a goal of this period. This includes increasing goal setting to long-term periods in addition to reviewing goals to overcoming obstacles to participation.
Maintenance	At this stage, the client should be able to maintain their current physical activity levels independently and identify what are the internal motivating factors to their participation. New activities can be introduced and a plan to return if lapses occur can be developed.

Throughout these stages, it is important to openly discuss and listen to the client's needs and goals so that a recovery-focused approach to exercise prescription can occur (Slade, 2010). Understanding that symptoms of a person's mental illness may mean that the process may not be linear, and flexibility may be necessary. It can often take multiple attempts before someone succeeds in adopting lifestyle changes for the long term and as such, these stages can often be cyclical in nature. These components should be key in the education provided to clients to manage expectations and assist the client in adherence to the physical activity program.

A typical approach of health professionals when educating people in lifestyle behavior change is to initially educate and then persuade them to adopt new behavior through prescriptive directions. However, this approach is not typically effective as the simple act of providing information does not result in long-term behavior change. *Health coaching* is a method of utilizing the motivational theories previously discussed (such as the self-determination theory and the transtheoretical model) and practically applying them in a real-world context (Table 17.3).

Table 17.3
Consider the Ways in Which People with Mental Illness Might Benefit from a Motivational Health Coaching Approach to Physical Activity Education Compared to a Traditional Model

Traditional Interviewing Style	Health Coaching
Clinician is the expert in health topic	Client is the expert in their own life experience and is respected to make autonomous decisions
Clinician give advice and prescribes solutions to solve problems	Client identifies areas of health they would like to work on, and clinician works through options available providing information as requested
Clinician decides that client is at the stage to make health changes	Client leads change and clinician uses strategies to increase client confidence and self-determination
Clinician focuses on why things are not being achieved and solutions to this	Clinician provides positive encouragement at whatever stage client is in

Learning Exercise Six

Imagine a person with schizophrenia has been referred to you for lifestyle intervention. Utilising the concepts of the self-determination theory, outline the key concepts of your interview and physical activity prescription, given the person is in the preparation phase of the transtheoretical model of health behaviour change.

Exercise Professionals in Mental Health Services

There is overwhelming evidence supporting the benefits of physical activity for people living with severe mental illness, yet there are simultaneously significant barriers to participation. As such, embedding exercise professionals within mental health services to promote the integration of exercise interventions has been of growing interest to expand upon the treatment options available to people with severe mental illness.

Exercise professionals are experts in physical activity prescription, particularly for people living with chronic disease (including mental illness) and provide assessment, prescription, and delivery of exercise and physical activity interventions (Lederman et al., 2016; Stanton et al., 2018; Stubbs et al., 2018). Throughout Europe, physiotherapists have performed these roles and in the United States there are a growing number of clinician exercise physiologists working in mental health settings (Fibbins et al., 2019; Stubbs, Probst, et al., 2014; Stubbs & Rosenbaum, 2018).

Australia has an increasing number of exercise professionals working in private and public health systems, particularly in mental health services. Accredited Exercise Physiologists (AEPs) are university-qualified health professionals that lead physical activity interventions for people living with mental illness. There are robust referral schemes that people can access for evidence-based exercise counselling and prescription through universal-health care. AEPs have growing representation in many mental health care settings including community health centers and inpatient wards. They work to provide specialized services to mental health clients delivering individualized interventions in addition to upskilling the mental health workforce to be more knowledgeable regarding the benefits of lifestyle interventions.

In response to this rapidly growing industry, exercise professionals specializing in mental health are represented internationally by peak bodies and organizations. A joint consensus statement by peak professional organizations throughout Australia, the U.S, the U.K, and New Zealand determined that integrating physical activity interventions lead by exercise specialists was key to improving the physical health of people living with mental illness (Rosenbaum et al., 2018). The International Organization of Physical Therapists in Mental Health (IOPTMH) supports exercise professionals and upholds them as experts in lifestyle management and integral members of the multidisciplinary health team (Stubbs, Soundy, et al., 2014b). Exercise and Sports Science Australia (ESSA) is the peak organization that represents and provides accreditation to AEPs within Australia and promotes their services to mental health bodies and the wider community. Promotion through these organizations is critical to promoting the services of exercise professionals and as such there have been emerging recommendations for exercise to be included as part of standard mental health care treatment. This is represented in documents published by the American Medical Society for Sports Medicine, Canadian Network for and Anxiety Treatments (CANMAT), the National Institute for Health and Care Excellence (NICE), and the Mental Health Commission of NSW (Chang et al., 2020; Mental Health Commission of New South Wales, 2016; Stanton et al., 2014).

The Importance of Culture and Organizational Leadership

Despite the overwhelming evidence demonstrating the need for integrated physical activity interventions in mental health settings, there are significant challenges to their practical implementation. Traditionally, physical health in mental health settings has not been prioritized despite key principles, processes and standards to do so enshrined in international policies and guidelines (Shiers et al., 2014).

Clinician and workplace culture has been identified as a novel and targeted way of bridging the traditional siloed structure between physical and mental health. There is evidence suggesting that health workers that partake in healthy lifestyle behavior are more likely to promote such behaviors to their patients and refer them to exercise professionals (Rosenbaum et al., 2018; Stanton et al., 2015). As such, designing workplace lifestyle interventions, incorporating exercise and diet, and providing them to mental health staff may be a key strategy to improve outcomes for patients. Such interventions in mental health settings are feasible and acceptable (Fibbins et al., 2018) and do not negatively impact productivity. Additionally, improvements to workplace satisfaction, morale, and workforce capacity can be improved through such interventions (Forsberg et al., 2008; Hjorth et al., 2016; Tucker et al., 2016).

A Real-World Lifestyle Intervention for Youth with Mental Illness

The Keeping the Body in Mind (KBIM) program (Curtis et al., 2016) is a lifestyle intervention implemented as part of routine clinical care in a public mental health service in Sydney, Australia. The service includes weekly individualized consultations with a physical health team including a nurse, exercise physiologist, dietitian, and peer support worker. There is a free onsite gym that is serviced by student exercise physiologists, in addition to cooking and sports groups.

Initially evaluated as a pilot research project, youth with psychosis were offered this innovative program over a 12-week period and results were compared to another mental health service offering standard care (medication and psychotherapy).

The KBIM program successfully prevented antipsychotic related weight gain following the intervention while participants in the control group gained almost 8kg in weight and 7.0cm in waist circumference over the same time. Additional improvements were also evident, including improved cardiorespiratory fitness and significant improvements in discretionary food intake and increases in diet quality. As a result, the pilot program was implemented as part of standard care and now delivers interventions by multiple KBIM teams employed on a full-time basis across a large mental health district.

Conclusion

Physical activity interventions should be a key component of the standard treatment for people living with severe mental illness. These interventions can be safe, are highly acceptable, and result in improvements in both physical and mental health outcomes. Exercise professionals should be included within multidisciplinary mental health treatment teams and be referred to by primary care physicians and mental health team members. The uptake of such services is vital to improving health outcomes for people living with severe mental illness.

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Chapter 18
Exercise and Chronic Fatigue

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Chapter Overview

Fatigue is a symptom that can be experienced by anyone, whether through extended physical or mental activity, sleep deprivation or other environmental and social factors. Typically, fatigue is temporary and can be alleviated by rest or sleep. However, for some people, fatigue is an ever-present symptom that causes considerable distress and negatively impacts quality of life. Fatigue that is pathological, persistent and not resolved by rest can be called chronic fatigue. One of the most striking things about chronic fatigue is that it is common in people with many different diseases and disorders. Even though the underlying causes of fatigue may be different from one disease to the next, there are remarkable similarities in the experience of chronic fatigue. One consequence is that treatments and therapies which reduce fatigue in people with one disease may also be effective in reducing fatigue in people with a completely different disease. Exercise is one such treatment. Perhaps because of the historical (and incorrect) view that fatigue is caused by the depletion of an unspecified physiological source of energy (Hockey, 2013), exercise has long been examined as a possible treatment for chronic fatigue. Interestingly, there is growing evidence that exercise is an effective treatment to reduce chronic fatigue, at least in some cases. In this chapter, we will present the evidence for exercise as a treatment for chronic fatigue in four different patient groups; people living with and beyond cancer, people with multiple sclerosis, people who have had a stroke, and people with myalgic encephalomyelitis/chronic fatigue syndrome. First, it is important to understand what is meant by the word *fatigue*, both in general and in relation to these clinical populations.

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What is Fatigue?

Fatigue is a word familiar to many people; it can be used to describe how a person is feeling ("I'm really fatigued from my flight") or describe an apparent alteration in someone's behaviour, for example, a decline in an athlete's performance ("they are fatigued and making lots of mistakes"). Somewhat surprisingly, despite the ubiquitous use of the word in everyday language, scientists have had a hard time describing what fatigue actually is. Fatigue has been described as either a feeling of tiredness, weariness or exhaustion, a measurable decrement in performance of an activity caused by the prior extended performance of the same activity, or an insufficiency of the muscles or central nervous system to maintain physical or mental performance (Hockey, 2013). Fatigue is also often delineated by its proposed cause and consequence: Fatigue has been described as either mental/cognitive or physical/physiological, can be either central or peripheral, or can be acute or chronic. The term *mental fatigue* is typically used to describe feelings or behaviours which arise from the sustained performance of mentally demanding tasks, whilst *physical fatigue* is used to describe feelings and behaviours which arise from sustained performance in physically demanding tasks. Central fatigue can mean either mental fatigue or fatigue caused by, or which causes, a change in central nervous system function. Peripheral fatigue usually, but not always, refers to fatigue caused by or which causes changes in muscle function. Acute fatigue describes the *temporary* fatigue which arises from sustained task performance and which is alleviated by rest. Almost everyone experiences acute fatigue at one point in their lives, perhaps from studying hard for an exam or from a physically demanding hike.

With all these different definitions and delineations, you might have become fatigued! Thankfully for us, and for the purposes of this book chapter, several attempts have recently been made to provide a unified description of fatigue that, as scientists, we can use to describe, study, and treat fatigue (Kluger et al., 2013; I. Penner & Paul, 2017). Many diseases and disorders have their own definitions of chronic fatigue. We will present some of these for cancer, multiple sclerosis and stroke in sections of this chapter. However, as you will see, there are many common traits in each definition, supporting the proposal that a unified taxonomy can be used to describe fatigue (Kluger et al., 2013). Drawing together these disease-specific definitions, we propose the following definition of chronic fatigue, which is applicable across a range of diseases: *A persistent feeling or perception of weariness, tiredness or exhaustion that is not alleviated by rest, is not proportional to activity levels and is a disabling negative symptom that interferes with daily activities and impairs quality of life*. Importantly, the definition allows us to focus on fatigue as a symptom that is experienced across a range of diseases and disorders. This feeling or perception of fatigue may or may not be accompanied by a measurable decline in physical or mental function and performance, which has been referred to as *performance fatigability* (Kluger et al., 2013).

Prioritizing the Patient Experience

In exercise science, there is a tendency to focus on performance fatigability and use the term fatigue when referring to objective decrements in performance. There is also a tendency to place more value on *objective* measurements (such as a decrease in force during a motor task) rather than *subjective* self-report measures. Using the term fatigue in this way may originate from a focus on the sport or athletic performance. However, using fatigue to mean performance does not always reflect how the general public understands the term fatigue (a feeling of weariness, tiredness or exhaustion). In the case of clinically relevant chronic fatigue, the emphasis on *objective* (or even *actual*) fatigue makes little sense. There are many examples where a measure of fatiguability (such as a decline in muscle force during a sustained submaximal contraction) is deemed to be a more important measure than a patient's self-reported experience of fatigue. However, such objective measures are not inherently superior to a person's experience, and this is particularly important to emphasize in relation to clinical populations with chronic fatigue. A patient does not come to the clinic because they can no longer sustain a submaximal contraction of the forearm muscles. Patients come to the clinic because, for example, they are feeling overwhelming tiredness that is reducing their ability to go about their normal daily activities (e.g., interacting with family and friends, concentrating on completing work tasks, the ability to walk to the shops without causing a huge energy crash) and reducing their quality of life. In fact, most patients would only think something like sustained handgrip force was important if an exercise scientist told them it was. And what would happen if, for example, we improved the ability of the patient to sustain this handgrip force, perhaps by strengthening the forearm muscles used in the task? Would the patient's chronic fatigue then be treated? Of course not. The patient experience, reported to the clinician or scientists, is what matters. Patient-reported outcomes are questionnaires that are used to get a rating of fatigue from the patient and often ask questions about fatigue severity or intensity, and interference with usual activities, and dimensions/manifestations of fatigue (e.g., physical, mental, emotional). Some questionnaires are disease-specific and have been carefully validated (for example, based on clinical features of fatigue in a specific disease, qualitative interviews, and expert clinical consensus). That is, they are highly relevant to the patient. In the sections below, we will be concentrating on the effect of exercise on fatigue measured as a patient-reported outcome in several clinical populations.

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Exercise and Cancer-Related Fatigue

Definition and Description

More than one-third of people will be diagnosed with cancer in their lifetime. Due to improvements in cancer prevention and treatment, more people are now living longer with and beyond cancer. Fatigue can be one of the principal concerns for people with cancer. The most widely accepted definition of cancer-related fatigue (CRF) is "a distressing, persistent, subjective sense of physical, emotional, and/or cognitive tiredness or exhaustion related to cancer or cancer treatment that is not proportional to recent activity and interferes with usual functioning" (Berger et al., 2015, p. 1014). It can be hard to understand CRF if you have not personally experienced it, but compared with fatigue that can be experienced by healthy individuals, CRF is more severe (people with CRF describe it as "overwhelming" and "all-encompassing"), less likely to be relieved by rest, can limit daily activities, and can be debilitating (Scott et al., 2011). CRF is a significant clinical problem that has historically been under-recognized, especially in comparison to other common cancer symptoms such as pain or nausea. The experience of CRF can be highly individual, but there are several common clinical features that have been identified. Alongside significant fatigue and an increased need to rest, these features can include limb heaviness or weakness, problems with short-term memory, unrefreshing or non-restorative sleep, a perceived need to struggle to overcome inactivity, and emotional reactivity (Cella et al., 1998). CRF is assessed as a patient-reported outcome, and for routine screening in clinical practice, individuals are asked to self-report fatigue intensity over the past week on a scale of 0-10 (where 0 = no fatigue and 10 = worst fatigue). A score of ≥4 (where 0–3 = none to mild, 4–6 = moderate, and 7–10 = severe) helps identify fatigue as a problem and should be followed by a comprehensive fatigue assessment (Howell et al., 2013).

Cancer-related fatigue is common during active treatment (the period of weeks or months that a patient is receiving, for example, chemotherapy or radiation therapy), and this can be true for treatment delivered with both curative and palliative intent. Estimates of the prevalence of CRF vary due to differences in the methods used to measures CRF and differences in the specific population being assessed (considering there are many different cancer types and treatment protocols). However, fatigue does tend to worsen with the progression of the disease and can be more severe with multimodality or dose-intense treatment protocols. In the case of curative cancer treatment, fatigue resolves for most people in the weeks after the treatment has been delivered. However, for a sub-set of people, fatigue can become a chronic issue that can continue for years (Jones et al., 2016). This type of chronic CRF (also called post-cancer fatigue) can prevent people from returning to work and is associated with high levels of disability.

Although the mechanisms leading to CRF are not completely understood, it is well accepted that CRF is multidimensional and is influenced by a range of factors, including underlying biological mechanisms (Bower, 2014). Some of the factors that can contribute to CRF are psychosocial, including depression, anxiety, and lack of social support. People with CRF often report a lack of understanding from family, friends or doctors, and a lack of social and medical legitimacy for the symptom (Pertl et al., 2014; Rosman, 2009). CRF can lead to social isolation and disengagement, loss of identity, and feelings of guilt and frustration about fatigue (Corbett et al., 2017; C. Penner et al., 2020). CRF can be difficult to articulate, and there are barriers that prevent people with CRF from communicating with healthcare professionals about their fatigue, including not wanting to complain and a lack of awareness that there are effective treatments for fatigue (Passik et al., 2002). CRF is not trivial and more people now recognize the importance of the patient's experience. Clearly, CRF can have a significant impact on a person's overall quality of life.

The Role of Exercise in Treating Fatigue in People with Cancer-Related Fatigue

All people with cancer should avoid inactivity, be as physically active as current abilities and conditions allow, and return to daily activities as soon as possible following a cancer diagnosis (Cormie et al., 2018). However, for people with CRF, exercise can be considered first-line treatment. The mechanisms for the reductions of fatigue severity with exercise are not well understood but may include physiological factors such as increased cardiorespiratory fitness or reduced inflammation, and psychological factors, including reduced symptoms of depression, anxiety, and increased social support. Some of the evidence that supports exercise as a treatment for CRF is based on systematic reviews and meta-analyses. A systematic review is a methodical search of the literature that aims to summarize the current body of research. A meta-analysis is a statistical analysis that combines the results of multiple studies, often randomized controlled trials, and provides a high level of evidence on the effectiveness of an intervention. There are now several systematic reviews with meta-analyses on the topic of exercise for CRF. In 2020, van Vulpen et al. concluded that the beneficial effects of exercise on fatigue in patients with cancer are consistent across demographic and clinical characteristics. In 2018, Kessels et al. found that exercise has a large effect on CRF in cancer survivors and that aerobic interventions with high adherence have the best result. In 2017, Mustian et al. found that both exercise and psychological interventions are effective for reducing CRF during and after cancer treatment, and they are significantly better than the available pharmaceutical options. In perhaps the most comprehensive review to date, Oberoi et al. (2018) included 170 randomized controlled trials and found that physical activity significantly decreases the severity of fatigue in patients with cancer.

Although there are many studies on exercise for CRF, the body of research is not without limitations. In fact, in a systematic review of systematic reviews with meta-analyses, Kelley & Kelley (2017) concluded that more well-designed randomized controlled trials are needed because the results on exercise for CRF vary and are inconclusive. However, the researchers also noted that because exercise does not seem to make CRF worse and is associated with numerous health benefits, exercise programs that take into consideration the unique needs of cancer patients can be recommended. Another limitation is that some populations are underrepresented as most research is conducted on people diagnosed with breast cancer, whereas other cancer types have been overlooked. Similarly, most research includes interventions that are delivered during chemotherapy or radiation therapy, but there are far fewer studies on exercise for people with chronic CRF or for people with advanced cancer. Finally, the vast majority of studies do not specifically target participants with clinically relevant fatigue (Twomey et al., 2020), and this may contribute to the fact that although the beneficial effect of exercise of CRF is consistently demonstrated, the size of the effect (that is, the amount of improvement in fatigue) is usually only small to moderate.

In 2019, a consensus statement from an international multidisciplinary roundtable presented the most recent exercise guidelines for cancer survivors (Campbell et al., 2019). For some cancer-related health outcomes, there was consensus that the evidence was enough to recommend an exercise prescription based on the FITT principle (Frequency, Intensity, Time and Type). For CRF, the recommendation is to exercise three times per week at a moderate-to-vigorous intensity for 30 min, either as aerobic exercise or aerobic exercise plus resistance training. The FITT prescription provides a useful guideline, but exercise should be tailored to ensure the overall well-being of the individual. There is no "one size fits all" exercise prescription for CRF, and some people can exercise more frequently, for a longer duration or at higher intensities than the recommendations made by Campbell et al. (2019) without adverse effects. In contrast, a subset of people with CRF may experience a worsening of symptoms for multiple days after an exercise bout, and therefore, responses to exercise must be monitored carefully to avoid causing harm (Twomey et al., 2020). Finally, it can be counterintuitive or intimidating to become more physically active when you have CRF, and so support for behaviour change must also be considered alongside any exercise prescription.

Exercise and Fatigue in People with Multiple Sclerosis

Definition and Description

Multiple sclerosis (MS) is an auto-immune disease, primarily affecting the brain and spinal cord. It is estimated that over 2.5 million people worldwide have MS, and MS is a leading cause of adult disability (Compston & Coles, 2008). The exact cause of MS is unknown but likely involves genetic and environmental factors. MS is characterized by the demyelination of axons in the central nervous system.

It is believed that in people with MS, the immune system "attacks'' myelin, the insulating sheath around axons that enables efficient action potential transmission in the central nervous system. Failures in myelin-producing cells have also been indicated as a possible mechanism of MS. The loss of myelin causes dysfunction throughout the central nervous system and can cause problems with motor function (including weakness), sensory, autonomic and visual processes. The disease course of MS can be unpredictable, and the majority (~80%) of people with MS have *relapsing-remitting* MS, meaning they experience periods with few or no symptoms (remission), which can be followed by periods where symptoms flare again (relapse). Eventually, relapsing-remitting MS becomes what is known as *secondary progressive* MS, where symptoms get progressively worse (Compston & Coles, 2008).

Between 50–90% of all people with MS also report problems with fatigue, including adverse effects on activities of daily living, quality of life, and ability to work (Krupp et al., 1988). MS-related fatigue is defined as "a subjective lack of physical and/or mental energy that is perceived by the individual or caregiver to interfere with usual and desired activities"(Multiple Sclerosis Council for Clinical Practice Guidelines, 1998, p. 2). For many people with MS, fatigue is the single most debilitating symptom they experience. Despite its prevalence and impact, the exact causes of fatigue in people with MS are unknown. Fatigue in people with MS can be thought of as either a primary or secondary symptom. Primary fatigue is assumed to be caused directly by the pathophysiology of the disease, such as inflammation, demyelination, and neurodegeneration. Secondary fatigue is thought to arise from associated psychological effects of MS, including sleep loss, depression, and pain. There are at present two primary suspected biological mechanisms for primary fatigue in MS: immune and neuroendocrine dysfunction and lesion-induced changes to brain activation. People with MS can have increased expression of pro-inflammatory cytokines, including interferon-γ and TNF-α. Systemic overexpression of these cytokines has been linked to "sickness-like" behaviours and symptoms, including increased fatigue. Alternatively, or even simultaneously, cortical, subcortical, and white matter lesions caused by successive demyelination and relatively unsuccessful remyelination seen in MS may also cause fatigue. The presence of these lesions may alter the structure and function of neural networks involved in cognition and sensorimotor planning and performance, causing increased feelings of effort and fatigue during physical and mental tasks. Secondary fatigue might be the consequence of other primary symptoms of MS. People with MS often have problems sleeping and increased pain, and these symptoms are linked to the experience of fatigue (Kos et al., 2008).

The Role of Exercise in Treating Fatigue in People with Multiple Sclerosis

Despite being advised for many years not to exercise, exercise and physical therapy are now recommended treatments for people with MS. Some of the proposed benefits of exercise for people with MS include improvements in strength and cardiorespiratory fitness, improved balance, walking performance, and proprioception (Amatya et al., 2017). Exercise is also suggested to be an effective treatment for fatigue in MS. In a 2015 Cochrane systematic review and meta-analysis, Heine et al., (2015) reported a moderate effect of exercise on fatigue in people with MS. There were very few side effects of exercise reported, including very few relapses, suggesting that exercise can be safely used to treat fatigue in people with MS. Compared to usual treatment, endurance exercise, mixed exercise (a mixture of strength and conditioning and endurance exercise), and alternative forms of exercise such as yoga and tai chi were all shown to have a moderate beneficial effect on fatigue. However, as with cancer, the literature in support of exercise as a treatment for fatigue in people with MS has some limitations. In their systematic review, Heine et al., (2015) found significant heterogeneity in the literature. This means that there were many differences in methods, study populations, and outcomes between studies. This makes it harder for us to be able to say with certainty that exercise reduces fatigue. Much more research is required, with careful and large replication of previous effects needed for us to become more confident in these results.

It is perhaps unsurprising, given that the exact causes of fatigue are unknown, that we do not know exactly how exercise alleviates fatigue in people with MS. Nonetheless, several candidate mechanisms have been proposed, and these depend on whether it is primary or secondary fatigue. Exercise has been shown to have positive effects on pro-inflammatory cytokine expression and neuroendocrine regulation, possible causes of primary fatigue in MS. Exercise has also been suggested to be neuroprotective and induce neuroplasticity, meaning it has been shown to protect against brain damage and encourage beneficial changes to the brain, both of which may help alleviate primary fatigue. Proposed mechanisms for the effect of exercise on secondary fatigue include reductions in depression and increased socialization. Perhaps surprisingly, at present, it is not clear whether there is a direct link between physical deconditioning and secondary fatigue. Nonetheless, it is possible that the effects of exercise on cardiorespiratory and muscular function may reduce secondary fatigue in people with MS (Langeskov-Christensen et al., 2017).

There is some evidence that endurance and strength exercise may help alleviate both primary and secondary fatigue in people with MS, and exercise appears to be safe and does not cause a significant relapse. However, despite the growing body of evidence linking increased exercise participation and a range of symptom improvements in people with MS, including fatigue, participation levels remain low. It is estimated that perhaps as few as 20% of people with MS participate in physical activity and activity levels appear to decline as the disease progresses. Many factors may limit participation, from direct physical causes such as increased pain or reduced mobility, psychosocial factors including depression, self-efficacy and social support, and environmental factors such as limited access to suitable facilities (Motl et al., 2017). At present, it is not clear what type of exercise and what dose of exercise is best to treat fatigue in people with MS. More research is required on both the mechanisms of fatigue in people with MS and the pathways by which exercise may impact these mechanisms so that the promise of exercise as medicine for people with MS who report fatigue is realized.

Exercise and Post-Stroke Fatigue

Definition and Description

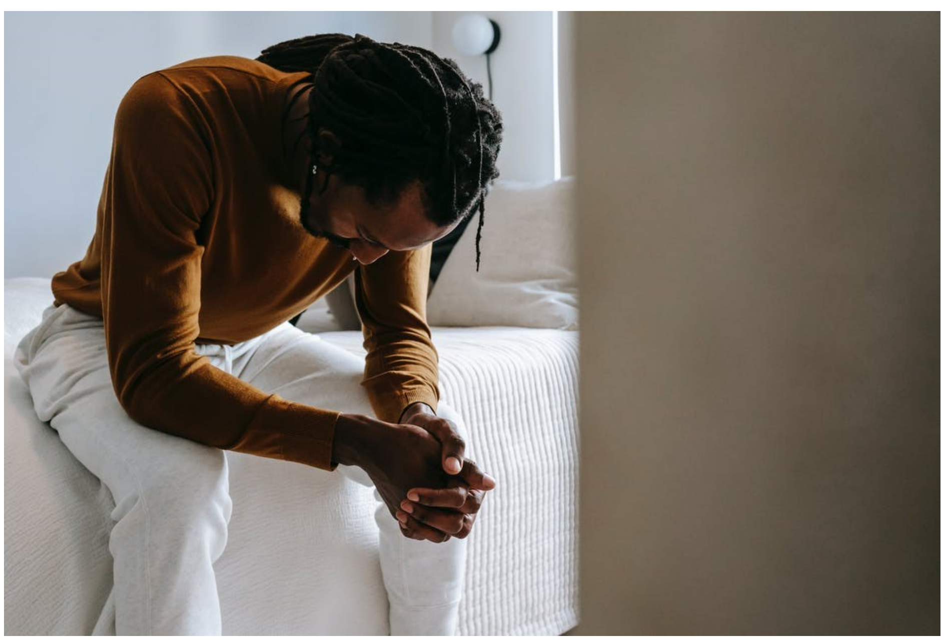
Stroke describes the brain damage caused by either a blockage or rupture of the blood vessels which carry oxygenated blood to the brain. It is estimated that over 30 million people worldwide have survived a stroke, and it is estimated that between 25% and 85% of these people experience post-stroke fatigue (PSF). PSF can reduce the quality of life and negatively impacts activities of daily living for many months and years after stroke, even after successful rehabilitation of motor and cognitive function. The development of strategies and therapies to help reduce and manage fatigue is a priority for people who have had a stroke and has thus become a priority for researchers and clinicians (Ingles et al., 1999).

Though multiple definitions for PSF exist, Lynch and colleagues have described PSF as a period of at least two weeks when an individual who has had a stroke experienced fatigue and a lack of energy, or an increased need to rest nearly every day or every day and this fatigue led to difficulty taking part in everyday activities (Lynch et al., 2007). The causes of PSF are unclear. The majority of people who have had a stroke report feeling fatigued in the weeks afterwards and this is often referred to as "early" PSF. However, not all of these people go on to experience chronic or "late" PSF. Indeed, a small number of people only experience fatigue some months after having a stroke. This suggests that chronic PSF is not a direct consequence of injury to the brain but of the long-term consequences of the stroke on brain structure and function. Whilst the location of the stroke might be related to early PSF, it does not appear to relate to chronic PSF. Several psychosocial and biological mechanisms of chronic PSF have been proposed. A number of studies have shown that chronic PSF is associated with post-stroke depression

(Schepers et al., 2006; Spalletta et al., 2005). There is some evidence that chronic PSF may also be related to pre-stroke depression, though one must be cautious when interpreting these studies because there is a risk of recall bias. PSF is also associated with a locus of control directed at more powerful others, such as clinicians, rather than a high internal locus of control. Possible biological mechanisms include increases pro-inflammatory markers, reduced corticomotor drive, and physical impairment (Doncker et al., 2017).

The Role of Exercise in Treating Post-Stroke Fatigue

Exercise has been proposed as a treatment for chronic PSF. In their 2014 Physical Activity and Exercise Recommendations for Stroke Survivors and 2016 Guidelines for Adult Stroke Rehabilitation and Recovery, the American Stroke Association suggests that exercise may help alleviate PSF (Billinger et al., 2014; Winstein et al., 2016). Stroke patients often do not meet the recommended guidelines for daily activity, and up to 75% of people who have a stroke are characterized as sedentary. However, perhaps surprisingly, there is limited evidence that exercise alleviates PSF. In a small pilot study, Clarke et al. (2012) suggested that a lifestyle education intervention, which included physical exercise education, was effective in reducing PSF. Perhaps surprisingly, at the time of writing, the only direct evidence for the effects of exercise on PSF has been provided from a single randomized controlled trial by Zedlitz and colleagues (Zedlitz et al., 2012). These authors reported that the addition of a graded exercise protocol to a cognitive-behavioural intervention doubled the number of people who reported a clinically relevant reduction in PSF compared to when just the cognitive intervention was applied. The exercise program was delivered so that it was tailored to the participants' individual heart rates, and intensity was increased every two weeks. Although this small study provides some evidence of the effect of exercise on PSF, it has yet to be replicated and does not provide any information about the mechanisms by which PSF might be alleviated. Why, then, is exercise a recommended treatment for PSF? One reason might be that exercise has many positive effects on people with stroke, and thus the prescription of exercise is recommended regardless of its effect on fatigue. However, much more research is needed about the effects of exercise after a stroke so that we can understand the types and volume of exercise required to provide meaningful help to patients in whom fatigue is a burden



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Exercise and Myalgic Encephalomyelitis/Chronic Fatigue Syndrome

Definition and Description

Exercise has been described as medicine for more than 26 chronic diseases (Pedersen & Saltin, 2015) but can exercise really be considered medicine for everyone with a chronic illness? This section will explore how people with a condition called myalgic encephalomyelitis or chronic fatigue syndrome (ME/CFS) can be affected by even mild levels of exertion. ME/CFS is a complex, debilitating, and long-term illness characterized by chronic fatigue, a substantial reduction in the ability to do usual activities, and other symptoms such as cognitive dysfunction and sleep abnormalities. ME/CFS has been a topic of much debate and controversy, and historically, patients have felt marginalized and have had to struggle to have the legitimacy of ME/CFS recognized (Blease et al., 2017). Many people with ME/CFS have not been diagnosed, partly due to the lack of laboratory or diagnostic tests and a lack of education for healthcare professionals about the condition. People with ME/CFS can struggle to keep a job, go to school or fully participate in their family and social life. One of the main characteristics of ME/CFS is post-exertional malaise, a worsening of symptoms after a physical or mental activity that would not have caused a problem before the illness (Centers for Disease Control and Prevention, 2018). There has been difficulty in defining and measuring post-exertional malaise (Chu et al., 2018; Holtzman et al., 2019), but it can involve exhaustion, cognitive difficulties, and muscle/joint pain that can peak between 24-72 hours after the exertion (Chu et al., 2018; Holtzman et al., 2019). Post-exertional malaise can be unpredictable, disruptive to everyday life (often requiring complete bed rest with little sensory input), and can have a significant impact on emotional well-being (Stussman et al., 2020). Considering this issue of post-exertional malaise, it becomes easier to see that for a minority of people, a blanket recommendation for exercise has the potential to be harmful.

Is Exercise Therapeutic for People with ME/CFS?

The 2011 PACE trial, published in The Lancet (a world-leading, prestigious medical journal), involved a comparison of graded exercise therapy and cognitive behavioural therapy for people with ME/CFS (see White et al., 2011, 2013). The investigators concluded both therapies were moderately effective for ME/CFS and led to "recovery" in over 20% of participants. However, there were several serious criticisms of the trial, including methodological concerns such as outcome switching. This means that during the trial, the researchers lowered their original threshold for recovery (i.e., switched a study outcome), resulting in more participants meeting the criteria for recovery. In general, improvements in self-report measures were not reflected in markers of functional recovery (e.g., the number of days lost from work). Another area of controversy was that the interventions were based on a cognitive behavioural model of ME/CFS, which proposed that rather than ongoing disease processes, ME/CFS is maintained and perpetuated by dysfunctional cognitions and avoidance of activity (see (Geraghty et al., 2019b)). Patients with ME/CFS can benefit from psychological support to help cope with the condition but reject the implication that the disease can be reversed by overcoming illness beliefs (Wilshire et al., 2018). This model is disputed because it suggests that there is no ongoing biological basis for the disease, despite growing evidence to the contrary.

Most patients do not think that graded exercise therapy is appropriate for their needs, and people with more severe ME/CFS report that exercise can have a negative impact (Geraghty et al., 2019a). Because the results of the PACE trial conflicted with a patient's experience of managing their condition, and due to the previously mentioned methodological issues, the researchers were challenged to release the study data for reanalysis by independent scientists. Eventually, the controversy culminated in a UK court tribunal, where the researchers were ordered to share their data. A reanalysis of the data found that if the researchers had used their original criteria for recovery, only 4% of patients who received graded exercise therapy would have met the threshold, compared to 3% of patients who received standard medical care (Wilshire et al., 2018). This is an interesting case to consider because this published research not only distorted the scientific record (i.e. indicated that graded exercise therapy was more beneficial than is likely the case) but was so influential that it directly affected standard treatment recommendations for people with ME/CFS. Some organizations have now removed these recommendations from their guidance for people with ME/CFS, and an updated Cochrane systematic review is underway due to the limited applicability of previous reviews (Larun et al., 2019). Currently, increases in activity are only advised if patients feel they are coping with current activity levels (Bested & Marshall, 2015). Any program involving exercise must be tailored to the individual, with awareness and understanding that worsening of symptoms is possible, and symptoms must be monitored over several days (not only immediately after exercise).

Future Directions: Coronavirus Disease 2019 (COVID-19)

At the time of writing, more than one year since the first outbreak, the coronavirus disease 2019 (COVID-19) pandemic continues worldwide. This contagious and multi-system illness is caused by a novel coronavirus named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). To date (February 2021), more than 100 million cases have been confirmed worldwide. Alongside fever, cough and shortness of breath, fatigue is one of the acute clinical features of SARS-CoV-2 infection. Clinicians and researchers have focused on the acute phase of COVID-19, but there is now a growing awareness that some patients experience an unexpectedly long and challenging recovery, with ongoing symptoms and complications that can last for months after infection. Researchers, patient groups and those affected by the condition are collectively calling this phenomenon *long COVID* (Brown et al., 2021). Long COVID does not seem to be an issue that is only affecting the minority of people who require hospitalization due to severe respiratory problems. Young and otherwise healthy people who had a mild presentation of symptoms can also experience prolonged symptoms. Patient-led initiatives, such as the Patient-Led Research Team, were the first to conduct surveys to explore health problems after confirmed or suspected SARS-CoV-2 infection (McCorkell et al., 2020). Fatigue, shortness of breath, brain and fog/concentration challenges are just some of the common symptoms, and many respondents who had been physically active before symptom onset had become largely sedentary. Furthermore, reports of fluctuating symptoms that can flair up unpredictably or in response to over-exertion reveal the potential similarities between long COVID and ME/CFS (Komaroff et al., 2021).

The development of chronic fatigue has been observed in survivors of other epidemics (Islam et al., 2020). In earlier coronavirus outbreaks, approximately one-third of survivors of hospitalization or intensive care unit admission had fatigue, reduced quality of life, reduced exercise capacity, and psychological issues including post-traumatic stress disorder, depression and anxiety, even beyond six months after the illness (Ahmed et al., 2020). Although the long-term impact of the SARS-CoV-2 infection is not yet well understood, similar findings are emerging (Halpin et al., 2021). Because COVID-19 is a new disease and research is evolving rapidly, little is known about the mechanisms leading to lingering symptoms or what rehabilitation support is needed. As we have seen in this chapter, exercise can be therapy for conditions where chronic fatigue, inactivity, deconditioning, and mental health concerns are major problems. Looking to the future, helping people manage fatigue, gradually increase activity, regain lost quality of life and return to normal function should be a priority. Improvements in energy levels and breathlessness may be aided by careful tailoring, pacing, prioritization, and modest goal setting (Greenhalgh et al., 2020). There is a potential role for exercise scientists with knowledge of chronic fatigue, working alongside clinicians in the development of such exercise and rehabilitation recommendations for COVID-19 long haulers (Barker-Davies et al., 2020). However, as we have seen in the case of ME/CFS, given the potential for post-exertional malaise, a great deal of caution is required. Future research on responses to exertion and the efficacy of exercise as an intervention must be transparently reported and co-created with the patients (and patient doctors [Alwan et al., 2020]) who have survived not only a global pandemic but one of the major public health crises of our lifetimes.

Conclusion

Fatigue is a symptom common across several diseases and disorders. The etiology of fatigue likely differs between each disease, although often the precise causes are unknown. However, the experience and overall impact of chronic fatigue can be similar across different diseases and conditions. For several clinical populations, exercise is a recommended therapy to improve health and quality of life. There is also some evidence that exercise alleviates chronic fatigue in some diseases. Indeed, even when the evidence base is poor, such as in stroke, exercise may still be recommended due to numerous other benefits to physical and mental health. However, as we have also shown in the case of ME/CFS, extreme caution is required when recommending exercise to people with chronic fatigue. Without knowing the causes of the symptom, it is possible that a therapy that alleviates fatigue in one set of patients may worsen it in another. It is often said that exercise is medicine (Pedersen & Saltin, 2015). For this to be true, then much like a drug, it is vital that we understand the mechanisms of action and the dose of exercise that is safe and beneficial. With these caveats in mind, in certain people, such as those who have been diagnosed with cancer or MS, exercise seems to be an effective and safe method to alleviate fatigue. In these people, a cautious prescription of exercise is likely warranted. Often, specific guidelines for the prescription of exercise in a clinical population have already been developed, and these can help the exercise scientist when designing and implementing an exercise program (Billinger et al., 2014; Campbell et al., 2019; Latimer-Cheung et al., 2013). However, much more research is required before we can fully understand if, how, and why exercise can be used to treat chronic fatigue.

Learning Exercises

1. Read Kluger et al. (2013). Fatigue and fatigability in neurologic illnesses: Proposal for a unified taxonomy (in Further Reading). Write down some examples of the type of statements you might hear from a client or patient when describing their fatigue. Think about whether they are describing their perceptions of fatigue or fatigability. Write down how you might explain to the patient why you need to measure both.

2. Read Campbell et al. (2019). Exercise guidelines for cancer survivors: Consensus statement from international multidisciplinary roundtable (in Further Reading, paying attention to the sections on fatigue). Design a 2-week intervention for a person who has completed their cancer treatment six months ago but still reports feeling fatigued. Write down how you would explain the purpose of the exercise you have prescribed and some considerations for the exerciser, including possible side effects.

3. We have provided four examples of clinical conditions where fatigue is a common symptom. Try searching for two more. Are there any existing recommendations for exercise for people with these conditions? If so, what are the proposed mechanisms by which exercise might help?

Further Reading

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Chapter 19
Taking the Field: An Introduction to the Field of Sport Psychology

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Chapter Overview

Sport psychology is a vibrant and growing field that examines the psychological factors that affect sport performance, as well as how sport affects the psychological outcomes of participants. This chapter is meant as a brief introduction into the field. To begin, we will define sport psychology and concisely discuss the different subfields within the larger academic discipline. Second, we will give a brief history of the field from first studies to the current state of research and practice. Next, we will talk about the roles that sport psychology professionals have in both the performance enhancement domain, as well as providers of mental health services. To complement this focus on the bifurcation of the field, we will discuss the jobs and careers in sport psychology along with the pathways necessary to obtain those jobs, with a specific focus on issues related to sport psychology professionals in the United States.

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Introduction to the Field

The psychological components of sport have been something of interest for people dating back to the late 19th century. Understanding how people perform in unique sport situations, exploring athletes' state- and trait-like psychological factors, and helping coaches be effective in their techniques are all areas of early focus for the field. Sport psychology is defined as the scientific study of people and their behaviors in sport settings and the application of that knowledge (Gill et al., 2017). This definition is noticeably broad and does not put the academic discipline of sport psychology into a narrow area. It is worth noting in the definition that sport psychology involves both people (and all that is nested within people) and the behaviors that people engage in during sport participation.

Previous scholars have noted that there are two main objectives for studying sport psychology. The first objective is to understand how psychological factors might impact sport performance (Weinberg & Gould, 2019). An example research project for the first objective might be concerned with how anxiety affects an athlete before a game or how motivation affects the practice habits of elite athletes. Both of these example projects frame a psychological mechanism as a potential antecedent to the sport experience. In both cases, a researcher might hypothesize that the antecedent affects sport performance. The second objective of sport psychology is understanding how being an active participant in sport might affect an individuals' psychological well-being or health (Weinberg & Gould, 2019). Researchers who study this objective could be concerned with issues like how sport participation might influence character development in athletes. Researchers could also be interested in examining if high levels of sport participation lead to burnout in athletes. In this case, sport participation is the antecedent and the various psychological consequences can be viewed as the outcomes.

Many subfields have developed in sport psychology over the decades the field has been in existence. Overall, the subfields still fit the guiding definition of sport psychology but are more refined in the research questions that might be studied. We present the subfields below not as exclusive categories, but as general guiding groupings.

Social Aspects of Sport Psychology

Sport rarely happens in a social vacuum. Even individual sports have coaches, officials, training partners, and competitors. This constant social impact is something that researchers have studied and continue to explore today. Some examples of research in the social aspects of sport psychology include working to understand under which social conditions athletes in relay teams work harder or have effort losses in elite competition (Hüffmeier et al., 2017). Researchers interested in social psychology of sport could also be focused on how the social ties between members of sports teams affect the social identity that individual athletes experience (Graupensperger et al., 2020). There are many exciting topics in this text that cover the social aspects of sport participation in Chapter 25 (Cotterill & Fransen, 2021), Chapter 26 (Kim et al., 2021), and Chapter 30 (Rumbold & Didymus, 2021).

Motivation in Sport Psychology

The attempt to understand sport motivation has been one of the driving factors behind the development of sport psychology as a field. Entire textbooks are dedicated to understanding the motivation of athletes under the unique condition of sport (see Roberts & Treasure, 2012). Motivation research is often rooted in theoretical perspectives such as social cognitive theory (Bandura, 1986), self-determination theory (Deci & Ryan, 2002), achievement goal theory (Nicholls, 1984), and many others. There is some cross-theoretical research that is conducted, but it is less common than studies that focus on extensions of existing research paradigms. Motivation could be viewed as an outcome of other individual and group level processes as Pacewicz and colleagues (2020) demonstrated with their recent work. Motivation can also be examined as an antecedent to other variables related to sport participation. Motivation also has negative components like perfectionism and burnout that are often studied from the sporting lens. See Chapters 27 (Hepler et al., 2021) and Chapter 28 (Madigan, 2021) for more information about motivation in sport psychology.

Individual Differences in Sport Psychology

There are a variety of individual differences that could affect sports performance. Some of the key variables to consider could be self-presentation anxiety, core self-perceptions (e.g., self-confidence, personality constructs, or self-esteem), or perfectionism. Some of the listed variables and concepts overlap with material in the applied sport psychology section, clinical sports psychology section, and the motivation in sport psychology section. However, some researchers might view these variables as stand-alone research concepts that are nested within individuals. For example, Hill and colleagues (2018) conducted a meta-analytic review evaluating the multidimensional perfectionism model in sport. In this text, individual differences are covered in Chapter 22 (Englert et al., 2021) and Chapter 29 (Didymus et al., 2021).

Psychological Skills in Sport Psychology (Applied Sport Psychology)

There are many journals and books that are dedicated to the understanding of psychological skills that athletes use to maximize their sport performance. Research in this area focuses on skills such as self-talk, imagery, goal setting, arousal management, and a host of others. The field typically conceptualizes these skills as foundational for performing well in a sporting context. The *Journal of Applied Sport Psychology, The Sport Psychologist, Case Studies in Sport and Exercise Psychology,* and the *Journal of Sport Psychology in Action* are all popular peer-reviewed journals where new research in applied sport psychology is published. There are many books that are focused on applied issues in sport psychology, however, the most impressive is likely *Applied Sport Psychology: Personal Growth to Peak Performance* by Jean Williams and Vikki Krane (2021). In this text, Chapter 20 (Rymal et al., 2021), Chapter 22 (Englert et al., 2021), Chapter 23 (Karageorghis et al., 2021), and Chapter 33 (Moyle, 2021) deal with applied issues in sport psychology.

Youth Development and Sport Psychology

Youth sport is a common area of interest for sport psychology researchers. In the United States alone, an estimated 45 million children participate in youth sports each year. Therefore, scholars should spend time researching the impacts that youth sport has on participants due to the broad reach of sport in society. In sport psychology, there has been research that focuses on early youth sport specialization, the development of leadership skills in youth, youth sport dropout, and positive youth development in sport. A great example of research in this area comes from DiSanti and Erickson (2020) who took a critical look at youth sport specialization. Positive youth development is another common research interest for researchers who study the role that sport has in the development of youth sport participants (Camiré et al., 2012; Gould & Carson, 2008). Some chapters in this text that cover issues related to youth physical activity and development include Chapter 8 (Peyer, 2021), Chapter 24 (Mills et al., 2021) and Chapter 25 (Cotterill & Fransen, 2021).

Clinical Sport Psychology

An increasing number of jobs in the area of sport psychology are requiring that you be a licensed mental health professional. Due to the increase in clinical issues in sport focused on athlete mental health, there is also an increasing amount of research published on clinical issues in sport psychology. The *Journal of Clinical Sport Psychology* and *Case Studies in Sport and Exercise Psychology* are two journals that are often read by clinical professionals. These journals focus heavily on the practical recommendations, psychological skills training, substance abuse, depression, and therapeutic strategies that can be used by mental health professionals working in a sports domain. See Chapters 29 and 30 for issues related to stress (Didymus et al., 2021; Rumbold & Didymus, 2021).

Table 19.1
Common Academic Journals Focused on Sport Psychology Topics

Case Studies in Sport and Exercise Psychology	Journal of Clinical Sport Psychology
Frontiers in Psychology: Movement Science and Sport Psychology	Journal of Sport and Exercise Psychology
International Journal of Sport Psychology	Journal of Sport Psychology in Action
International Journal of Sport and Exercise Psychology	Psychology of Sport and Exercise
International Review of Sport and Exercise Psychology	Sport, Exercise, and Performance Psychology
Journal of Applied Sport Psychology	The Sport Psychologist

Note. This is not an exhaustive list, but a good primer for those interested in seeing the newest developments in sport psychology.

On the Shoulders of Giants: A Brief History of the Field

Sport psychology as an academic discipline became formalized around the 1960s with the development of organizations supporting the dissemination of research, the creation of certifications, and the development of more educational training opportunities (Benjamin & Green, 2009). However, before development of the key organizations, there were many people who were creating the research foundation that helped form the field over time. Below we will discuss the history of the field starting in the late 19th century, moving through time to modern day sport psychology.

Early History

The earliest studies in sport psychology dated back to the 1890s where many psychologists were interested in the unique psychological components associated with sporting behaviors (Benjamin & Green, 2009). American psychologist Edward W. Scripture, French physician Philippe Tissie, and American psychologist Norman Triplett all published studies in the 1890s focused on sporting behaviors, broadly speaking. Scripture was interested in understanding reaction times in expert versus novel fencers. Tissie had an interest in the psychological connection between extreme endurance events and experimented with a field cyclist riding for 24 hours to understand the connection between psychology and the ability to endure extreme fatigue (Benjamin & Green, 2009). The most famous of the three is likely Triplett, who is often cited as the earliest researcher in sport psychology (which is not entirely true as Tissie and Scripture published before him). Triplett had cyclists ride alone and then in groups to determine if people worked harder in the presence of others. Triplett is often credited as uncovering the first evidence for social facilitation using his studies, however, recent research has shed light on some flaws behind the reasoning of Triplett's study being the first sport psychology study and evidence that it might not be the study that provided the first evidence for social facilitation (Martin, 2019). Early researchers around this time were starting to lay the groundwork for what would come in the following decades. However, early research had issues with dissemination of results. There were no conferences, easily accessible journals, or Twitter accounts to follow at the time. There were also issues with limited numbers of schools where you could get an education in anything resembling sport psychology. Kinesiology programs did not yet exist, as most early programs where solely for physical educators. Disseminating the knowledge about the work these early scholars were doing was quite difficult, and likely stunted some of the early growth the of field.

Coleman Griffith

Coleman Griffith is considered to be the father of North American sport psychology. He was one of the first North American academics to build a laboratory (at the University of Illinois) that was focused on understanding the role of psychology in the sport experience (Green, 2009). Griffith did consulting work for the Chicago Cubs and the University of Notre Dame's famous head coach Knute Rockne. Interestingly, Griffith spent a lot of his time writing the results of his experiments in periodicals that were specifically for practitioners. He did write for traditional scientific journals as well, but appeared to enjoy communicating to coaches. Griffith also wrote many books including *Psychology of Coaching* (1926) and *Psychology and Athletics* (1928). Unfortunately, Griffith's lab was shut down by the university in 1932 either due to the Great Depression or an issue with football at the university no longer trusting the work he was conducting (Green, 2009). Griffith moved to an administrative position and then to the Chicago Cubs as a consultant.

Coleman Griffith never trained any graduate students to continue lines of research similar to his. Traditionally, in academia, faculty members train graduate students to go on to careers as faculty members. This system of training allows for senior faculty to foster and develop young scholars to continue similar lines of research. However, Griffith did not do this due to a variety of constraints (Green, 2009).

Other Key Early Figures

Edward W. Scripture built an early research program at Yale University that was focused on the reaction time of athletes. His early research was published in an in-house journal that was often not distributed widely and was no longer circulated after 1902 (Goodwin, 2009). Another trailblazing figure in the development of sport psychology as an academic discipline was Dorothy Hazeltine Yates. Yates was a professor of psychology at San Jose State University in the 1940s. During this era, there was focus on developing psychological strategies that would help athletes perform at high levels. One of the most popular psychological strategies at the time was learning skills associated with relaxation, as it was believed to be a main factor of athletic success (Kornspan, 2009). Yates also taught relaxation and self-regulation skills to military aviators (Kornspan, 2009). This application of sport psychology to another area was perhaps one of the first forays into a field that is today known as performance psychology.

Up until the 1960s the field was very fragmented, and specific training was sparse if available at all. As we are about to see, the field changed rather quickly during the same time that training programs started to become more readily available and conferences and organizations started to serve as homes for scholars in the field of sport psychology. As you could expect, there was little before the 1960s in terms of unifying theory or overarching ideas the scholars were working on. The work that was being conducted was quite siloed and this likely hindered the development of the field.

The 1960s–1980s

The development of physical education programs in the United States and sport science programs around the world lead to further specialization of scholars who were interested in conducting research that broadly fit the definition of psychology in sport settings. The creation of sport psychology occurred when faculty broke away from motor learning and started focusing more on issues surrounding social aspects of sport, motivation, athletic performance, and personality factors. This new set of research interests provided scholars the opportunity to explore new horizons of psychology specific to the sport domain. Many scholars started to gain interest in the research questions more related to sport psychology, which led to the formation of many conferences and organizations which still stand today. In 1965, the First World Congress of Sport Psychology was organized in Rome. At this initial meeting, the International Society of Sport Psychology (ISSP) was founded. Both the Congress and ISSP are still in existence today with the World Congress occurring every four years.

Shortly after the development of the World Congress and ISSP, there was an uptick in the number of conferences and organizations that were started. In 1966, the North American Society for the Psychology of Sport and Physical Activity (NASPSPA) was formed, and they held their first conference in 1967. Also in 1967, the British Society of Sports Psychology and the French Society of Sports Psychology were formed (Eklund & Tenebaum, 2014). In 1969, the European Federation of Sport Psychology (FEPSAC) was formed, and the membership quickly elected a Bulgarian named Ema Geron as their first president. Dr. Geron worked as a full professor at universities in Bulgaria and Israel and was considered a stabilizing force for sport psychology in Europe (Tenenbaum et al., 2011). It was also during this time that more literature became available for people interested in the field of sport psychology. Bruce Ogilive and Thomas Tutko wrote the book *Problem Athletes and How to Handle Them* (Ogilive & Tutko, 1966). Ogilvie is considered a pioneer in North American applied sport psychology and was actively was actively working with athletes as a consultant during this time. John Lawther published his book *Sport Psychology* in 1972 making the field more visible and increasing interest in the academic discipline. Rainer Martens published *Social Psychology and Physical Activity* in 1975 creating specific texts targeted at those interested in studying and understand sport psychology. In 1979, the *Journal of Sport Psychology* (which is now *the Journal of Sport and Exercise Psychology*) was founded and published for the first time. There were also an increasing number of consultants working with professional and international level teams including Richard Suinn (United States), Brent Rushall (Canada), Antonli Alekseev (Russia), and Miroslav Vanek (Czechoslovakia; Eklund & Tenebaum, 2014). To sum up this time period, there were more opportunities to communicate sport psychology information via conferences and journals, and there were more people becoming interested in a new academic subdiscipline which led to much of the growth we see over the next few decades. There was also an increase in sport psychology consultants working with athletes during this time.

1980s–2000s

In 1980, Dorothy Harris was hired as the first ever resident sport psychologist for the United States Olympic Committee. Harris was a pioneer in the field of sport psychology as a full professor at Pennsylvania State University. She helped create graduate training in sport psychology at Pennsylvania State University, constructed an impressive line of research, was the first woman to win a Fulbright scholarship in sport psychology, and the first woman president of NASPSPA (Weinberg & Gould, 2019). During this time, journals continue to be created for the dissemination of knowledge in sport psychology. Those journals include *The Sport Psychologist* (1986), and *Journal of Applied Sport Psychology* (1989).

Organizations during this time continued to develop focusing on supporting research in sport psychology including, Division 47 (Sport, Exercise, and Performance Psychology) in the American Psychological Association (APA; 1986), British Association of Sport and Exercise Sciences (BASES; 1984), the Association for Applied Sport Psychology (AASP; 1986), the Spanish Federation of Sport Psychology (1987), the Australian Psychological Association creates a specialization in Sport Psychology (1988), and Asian South Pacific Association of Sport Psychology ([ASPASP] 1989; Eklund & Tenenbaum, 2014). The early leaders in these organizations helped promote the field and wrote many of the articles and texts that are often considered foundational readings today.

These organizations also started to discuss the role of a sport psychology professional. AASP created it certified consultant designation. In the United States, there were issues around professional practice ethics for people trained in both psychology and sport sciences. Later in this chapter, we will discuss some of the major training pathways that someone should consider when thinking of becoming a sport psychology professional in the US. The discussion about clinical psychology, sport science training, and the debate about the naming of sport psychology professionals rages during this time period (with many of the debates still largely unresolved).

2000–2020

At the turn of the century, even more journals were developed that focused on sport psychology included *Psychology of Sport and Exercise* (2000), *International Journal of Sport and Exercise Psychology* (2004), the *Journal of Sport Psychology in Action* (2010), and *Sport, Exercise, and Performance Psychology* (2012). During this time, more universities than ever are offering training in sport psychology.

Opportunities for employment in the field are likely as high as they ever have been. Professional sports teams are hiring sport psychology professionals who are trained in providing mental health services or performance enhancement techniques (sometimes jobs would like a professional trained in both). Universities and colleges are also hiring sport psychology professionals, but they tend to put more stock in professionals who are trained via a mental health route. This distinction is important to understand because there are two major training routes in North American sport psychology. These two routes will be elucidated further later in the chapter. Unfortunately, due to the early divides in the field, and unresolved issues around training there are two clear outcomes of how a sport psychology professional can work in today's field.

Sport psychology during this time is growing around the world. There are universities on most continents that support training in sport psychology. A recent ISSP conference in Seville, Spain drew participants from over 70 countries (Weinberg & Gould, 2019). This worldwide growth in the field is quite exciting, but does bring about many challenges that still need to be addressed in terms of education, training, and job creation.

Women in Sport Psychology

Like most academic disciplines, the story of women scholars has often been overshadowed by their male counterparts. We have already discussed the groundbreaking work of Ema Geron, Dorothy Harris, and Dorothy Yates. In addition to these early scholars, sport psychology has pulled many concepts, ideas, and theories from pre-eminent women scholars in psychology including Carolyn Sherif, Susan Harter, and Carol Dweck (Krane & Whaley, 2010). Many of these scholars' ideas and theories helped advance sport psychology. It is clear that modern sport psychology has been shaped by female scholars.

A thoughtful review of the role of women scholars in sport psychology was conducted by Vicki Krane and Diane Whaley (2010). Early in their paper, they introduced that women scholars have always been present in sport psychology, but they have often been overlooked for a variety of reasons including sexism. The focus of this review was to *re-place* women back into the history of sport psychology. Women scholars have been foundational in the development of many societies that focus on sport psychology and have been presenting at the conferences since their inception (Krane & Whaley, 2010). Dorothy Harris and Jean Williams each authored early texts in applied sport psychology, with the Williams text still being used today (with many updates over the years; Harris & Harris, 1984; Williams & Krane, 2021). Dorothy Harris, Diane Gill, Jean Williams, and Tara Scanlan all were early scholars in sport psychology that presented at early NASPSPA conferences.

Krane and Whaley (2010) also highlighted eight women scholars, nominated by their peers, who are considered trailblazers in sport psychology. These scholars were a part of a focus group that reflected on their careers, including the challenges of building the field through scholarship and contributions to their professional organizations and universities. This paper highlighted the careers of Joan Duda, Deborah Feltz, Diane Gill, Penny McCullagh, Carole Oglesby, Tara Scanlan, Maureen Weiss, & Jean Williams (Krane & Whaley, 2010). Their contributions to the field as of 2010 included "…advising 157 masters, 147 doctoral, and 11 postdoctoral students; at least 500 refereed journal articles, 20 textbooks, 200 book chapters, and well over 800 national and international conference presentations; President of 9 national or international organizations (21 total presidencies among them); and editors of *Journal of Sport and Exercise Psychology* (JSEP), *Journal of Applied Sport Psychology* (JASP), *Research Quarterly for Sport and Exercise* (RQES), and *Quest*." (Krane & Whaley, 2010, p. 361, italics added). This contribution to the field does not just manifest in terms of quantity, but these scholars' work is known for its high level of quality. It is important to also consider that these numbers were as of a decade ago and most of these scholars are still active researchers today.

Although the Krane and Whaley review of trailblazers in sport psychology ended before 2010, there are still women scholars currently pushing the frontiers of scientific advancement in sport psychology. Joan Duda has been cited by scholars in the sport sciences with over 45,000 citations in academic articles and book chapters! Professor Duda has also served as the President of the European College of Sport Science, which is an organization that promotes multi- and interdisciplinary research in the sport and exercise sciences. She is not alone in her contributions to the field. Gabriele Wulf is a highly cited scholar in the field of sport psychology and motor learning, and Maria Kavussanu is the editor-in-chief of *Sport, Exercise, and Performance Psychology,* a leading journal and official journal of Division 47 of the American Psychological Association. While it is near impossible to reduce an academic career to a single metric, it is evident that women have a central role in the current state of sport psychology.

Photo by Pixabay from Pexels

It is clear that women have had a strong hand in the development of the field of sport psychology. Without the contributions of these scholars (and many more not listed here), our field would not be what it is today. Moving forward, we should continue to look for other voices from underrepresented minority groups who have not been as visible in the field including people of color, individuals with disabilities, individuals from countries who do not have strong academic institutional support, and others who have not been heard from before. These unheard voices can only make our field stronger as we continue moving forward.

A Divide in the Field: Performance Enhancement vs. Mental Health Counseling

With the growth of sport psychology as a field, there have been new divides in professional practice roles. There are two main roles that sport psychology professionals can hold: performance enhancement or mental health counseling. In this section of the chapter, we will provide two short case studies that demonstrate some of the key differences between performance enhancement and mental health counseling.

Riley's high school volleyball team is tied 13 to 13 in the final set of their match. They cannot give up a point and must score twice in a row to win. The importance of this match is very clear to everyone, and it has been talked about all week. Riley's team will advance to playoffs for the first time in school history if they are able to come away with this win on their home court. The high stakes of this competition draws a large crowd. The noise in the gym is deafening and there is a constant buzz of excitement from the fans. By chance, Riley is in position to potentially win or lose the match with what could be the final serves. Riley rotates into position to serve and feels sudden increased shoulder tension, sweaty palms, and has some difficulty breathing. Riley's heart is beating faster and harder than normal, and the idea of unsuccessfully executing these serves becomes an overwhelming thought. Unfortunately, Riley's mechanics appear to be interrupted and the serve is rushed resulting in the ball going straight into the net. Riley does not walk away with the match winning points, and the team goes on to lose.

In this scenario, we see that the pressure of this big moment got the best of Riley who was not adequately prepared to handle it. Athletes like Riley benefit from applied sport psychology services equipping them with the skills needed to increase their chances of performing optimally. This is an example of when a performance enhancement model of delivery would be most appropriate. A sport psychology professional with a performance enhancement background could help Riley with managing arousal levels and concentration. The goal with performance enhancement is to help athletes like Riley to be able to perform close to the top of their ability levels more consistently, especially in important moments. The psychological factors that can influence performance vary from athlete to athlete and no two experiences are the same. The next scenario also presents a decline in performance but you will notice the source of the psychological stress is different.

Sam has always been a highly competitive soccer player who has been with the same club team for five very successful years. This season is an important one as Sam hopes to be recruited to play college soccer. As a consistently high performing player and a leader on the team, it is no surprise that Sam enters the season with confidence. Early in the season, coaches were suggesting that this confidence was "visible". This confidence and previous history as a quality player contributed in part to a promising start to the season. After a few successful weeks of training and competition, coaches begin to notice a significant change in Sam. That visible confidence has disappeared, and Sam appears lethargic, unfocused, and more reserved than normal. These behaviors continue and a decrease in Sam's performance is evident. One day after practice the coaches overhear Sam's teammates discussing that Sam is having trouble sleeping, struggling in school, and withdrawn during social events. This all seems completely out of character. There is a growing concern by Sam's coaches and teammates that Sam will miss out on the opportunity to play soccer in college if help is not provided soon.

In this scenario, it is unlikely that Sam's decline in performance can be credited to something happening within sport. Rather, it appears that something outside of soccer and unrelated to the team may be taking a toll and help is needed. Sport psychology services would benefit athletes like Sam as well, but the approach to providing support would be different. Sam's needs likely require more of a therapeutic approach or mental health counseling to address the unknown issue affecting performance and behavior across contexts. We provide further distinctions between performance enhancement and mental health counseling approaches to providing sport psychology services in the following section.

Understanding the Performance Enhancement vs. Mental Health Counseling Delivery Models

The development of sport psychology as an applied profession has involved establishing a balance between integrating core principles from diverse disciplines while also distinguishing itself from those same fields. This effort, however, has led to some confusion regarding the services provided by sport psychology practitioners. People tend to think of sport psychology services in one of two ways, namely (a) as a psychological aid to enhance athletic performance or (b) a therapeutic resource to address mental health concerns of athletes. These delivery models will be referred to as *performance enhancement* and *mental health counseling,* respectively. In this chapter, we offer simple distinctions between performance enhancement and mental health counseling, differentiate between their respective procedures of practice, and highlight how these models of delivery may realistically operate within sport.

Performance Enhancement

The primary goal of sport psychology from a performance enhancement perspective is to help athletes and performers build psychological and emotional skills that can optimize their experiences by consistently performing in the upper range of their capabilities and more thoroughly enjoying the overall performance process (Hays, 2006; Portenga et al., 2017). The performance enhancement model involves implementing systematic and consistent psychological skills training to address a series of psychological factors that account for fluctuations in performance and experience quality. Such psychological skills may include enhancing sport confidence, improving focus and concentration, regulating emotion and arousal, and maintaining motivation and commitment. The techniques used by applied professionals can target individual or even group needs by educating and implementing strategies such as self-talk, energy management, imagery, goal setting, and team building. Psychological skills training is valuable to many and can be provided to a number of diverse individuals and organizations within sport and other performance contexts (e.g., athletes, coaches, officials, soldiers, musicians). Ultimately, these practitioners hope to provide enough training so the performer is able to self-regulate and manage their own thoughts, feelings, and behaviors.

Now that the objectives, procedures of practice, and populations who benefit from a performance model of applied sport psychology have been briefly identified, we can apply this knowledge to our previous example where Riley struggles in a big moment. Following the conclusion of the season, Riley makes the decision to see an applied sport psychology consultant. Meetings with this practitioner help Riley recognize key signs of heightened arousal that lead to suboptimal performance (e.g., increased heart rate, intrusive thoughts, disrupted breathing pattern). With the knowledge that these things need to be managed, Riley and the consultant spend time working on key strategies. For example, the two may focus on self-talk techniques to address the negative thoughts Riley experiences or breathing exercises to manage Riley's heartrate and other physiological responses in high pressure moments. In working consistently with an applied sport psychology consultant, Riley is now more equipped to manage challenging moments in a match.

The description provided and application to Riley's scenario should demonstrate that the performance enhancement model is more of a consulting or educational model with a specific focus on performance issues (Aoyagi & Portenga, 2010). Performance enhancement is not concerned with assessing, diagnosing, and addressing mental health difficulties even if they disturb an athletes' performance. In fact, most sport psychology practitioners following a performance enhancement model of service are not qualified to attend to these concerns. These mental health concerns are the focus of clinical or counseling psychologists (i.e., licensed mental health providers). Just like athletes or performers need help managing psychological performance factors, they may also need mental health support to enhance their general well-being and quality of life.

Mental Health Counseling

Broadly speaking, the term *mental health counseling* in this chapter refers to helping people work through normal developmental life issues and/or serious mental health issues and disorders (Portenga et al., 2012). An individual does not have to meet the full criteria for a particular disorder to qualify for mental health support, but rather experience significant distress or impairment in their life. Such challenges can affect anyone, including athletes and performers, but mental health counseling is not specific to a particular population. Serious mental health concerns licensed professionals address can include grief, anxiety, depression, eating disorders, substance abuse, and personality disorders. Mental health counseling professionals differ from performance enhancement experts in regard to how they deliver their services, who they work with, and their ultimate goals. A performance enhancement professional will often work with individuals as well as groups of people in a variety of settings (e.g., locker rooms, training rooms, on the field), and the structure and timing of these sessions tends to vary (Andersen et al., 2001). These individuals may attend practice and training, sit on the sidelines during competitions, and even travel with the team. The more traditional clinical nature of mental health counseling contributes to a more rigid form of delivery that tends to be restricted to work with a single individual for an hour in a private office setting (Aoyagi & Portenga, 2010; McCann, 2005).

When working with athletes and performers, it can be challenging to determine when referral to licensed mental health professionals is necessary. Considering appropriate action steps for Sam's scenario may add further clarity. The different people who have observed Sam's change in behavior clearly have concerns that something serious is causing distress and ultimately impairing performance. Sam's coaches intervene and recommend Sam see the team's "mental coach". They likely make this recommendation assuming all sport psychology professionals provide mental health care, but the individual they consult with only provides performance enhancement services. Sam and the practitioner meet anyway, because neither is fully aware of Sam's needs. At the conclusion of initial meeting, Sam and the sport psychology practitioner decide it may be best to refer Sam to a licensed mental health practitioner who can provide appropriate care. This decision was made because Sam's prolonged negative psychological state is disruptive in a number of life domains and the source of the issue is not a sport-related psychological factor. The sport psychology practitioner suspects Sam may be experiencing depression and is not qualified to work with athletes on mental health issues such as this. Fortunately, Sam is able to meet with the licensed mental health professional for an assessment and obtains the appropriate treatment needed.

In many ways, performance enhancement needs and mental health difficulties can be challenging to separate as both have a place within sport and can be present simultaneously. Although the two may overlap in sport and performance settings, it is still necessary performance enhancement and mental health counseling professionals understand the limits of their expertise in order to remain ethical in their practice (see AASP Ethics Code below; Association for Applied Sport Psychology, 2011). The AASP ethics code provides general principles and ethical standards for AASP members, but this ethics code is not universally accepted worldwide. It is worthwhile to search the ethics codes specific to the country where consultants practice. There are, however, some practitioners who have formal education and training in sport psychology and clinical or counseling psychology and are qualified to deliver performance enhancement as well as mental health counseling services. In this chapter, those professional are referred to as *clinical sport psychology practitioners.* These individuals can offer much broader services as they are able to assess, diagnose, and address mental health difficulties while also implementing psychological skill training programs (Aoyagi et al., 2012). However, far fewer practitioners are qualified to provide services in performance enhancement and mental health counseling. Thus, current and future practitioners must understand some of the most basic distinctions between these two models so they may act within the boundaries of their professional competencies.

While some of the information presented in this section will apply to other territories, many of the issues surrounding practitioner roles and protected titles are specific to the United States. In summary, there exists two primary groups of practitioners in the United States with distinct training and professional competencies who provide different psychological services to athletes and performers, specifically in the United States. While some of the information presented in this section will apply to other territories, these issues around protected titles are specific to the United States. To confuse matters further, both groups of practitioners share the terms “sport psychology” to label what they do. However, it is important to note that there is legal protection around the title of “psychologist”. Only those with counseling and clinical training and licensure may use it, and practitioners trained exclusively in performance enhancement are unable to legally use the title of “sport psychologist”. This is why we see various alternative titles within the profession (e.g., mental performance coach). Aoyagi and Portenga (2010) distinguish performance enhancement from mental health counseling by stating, “Doing therapy with a person who happens to be an athlete is not sport psychology” (p. 254). Those who follow the performance enhancement model of practice utilize an educational approach to help athletes and performers reach optimal engagement and performance success. In many instances, these individuals are not trained from a counseling or clinical perspective which adds limits to their services. On the other hand, those who align with the mental health counseling model deliver more therapeutic focused work for people (some of whom may be athletes) and have received training in more traditional psychological disciplines. Without the aforementioned knowledge about these models of delivery, it is unclear who is qualified to provide particular services. While the field is continuing to develop and address this confusing issue, it is important to understand the current distinction.

Table 19.2
Association for Applied Sport Psychology Ethics Code

Principle A – Competence
AASP members maintain the highest standards of competence in their work. They recognize the boundaries of their professional competencies and the limitations of their expertise… They provide only those services and use only those techniques for which they are qualified by education, training, or experience.
Ethical Standard #2 – Competence
(a) AASP members represent diverse academic and professional backgrounds. These different training histories provide different competencies. Those trained in clinical and counseling psychology must be aware of potential limitations in their sport science competencies. AASP members trained in the sport sciences must be aware of their limitations in clinical and counseling psychology. Individuals from different training backgrounds must deliver services, teach, and conduct research only within the boundaries of their competence.

Note. This Ethics code is based in large part on the American Psychological Association's Ethical Principles of Psychologists and code of conduct *(American Psychologist, 1992, V47, #12, pp.1597-1611).*

Jobs and Careers in Sport Psychology

Opportunities for careers in sport psychology have seen significant growth in recent decades. However, the field of sport psychology is unlike many others in that there is not a prescribed career path everyone follows. Professionals with sport psychology backgrounds hold a variety of positions with different titles across a number of settings. This level of professional diversity in the field can be difficult to navigate for those who do not already find themselves within this unique professional network. The diversity of careers available is largely a function of education and training. Therefore, we will briefly introduce different jobs and careers in sport psychology and the steps it takes to acquire such positions.

Prior to exploring specific employment opportunities, it is important to briefly acknowledge that the field of sport psychology has research and applied components. These components are distinct from one another but also integrate and influence each other in a manner that continues to push the field forward. Research provides the field with scientifically backed theories and principles that shape the work done in performance settings by applied practitioners. The systematic application of techniques informed by research often highlight knowledge gaps that warrant further exploration. It is necessary for us to acknowledge these components and the reciprocal nature of their contributions because they are what shape typical job opportunities in the field. Thus, career types in the field of sport psychology are often characterized by applied or research responsibilities and occasionally both. One's chosen career path will depend on academic history and various experiences in disciplines associated with sport psychology.

Academic Training in Sport Psychology

As previously mentioned in this chapter, the field of sport psychology has links to the broader sport science and psychology academic disciplines. Understanding human behavior in sport and performance settings and the application of that knowledge requires that future professionals in the field acquire training in various areas of specialization within sport sciences and psychology. These include but are not limited to biomechanics, physiology, motor development and control, sociology, counseling, and educational psychology. The academic path to a professional career in sport psychology depends largely on individual aspirations but will typically involve undergraduate and graduate studies.

The academic training one receives will move from broad foundational knowledge to more narrow and tailored training. It may come as no surprise that earning a bachelor's degree in health or sport sciences, kinesiology, or psychology will provide high quality foundational knowledge necessary for a successful future career in the field. Those who choose to major in one of the aforementioned topics and minor in another may even experience a greater benefit. For example, one may choose to major in psychology and minor kinesiology or vice versa. This combination of educational programs is not absolutely necessary as many students with unique undergraduate experiences are admitted to and successfully perform in sport psychology master's programs. Rarely do students receive extensive sport psychology-specific education at the undergraduate level, and obtaining a master's degree in the area is needed for future professional success. Earning a master's degree in sport psychology enables people to begin providing applied sport psychology services and may also train them for more advanced research at the doctoral level. Earning a Doctor of Philosophy (PhD) in sport psychology is not a requirement in the field, but many people choose to pursue the degree for a variety of reason. If someone is interested in providing psychological and mental health services to athletes full-time, then they likely pursue a PhD, Doctor of Psychology (PsyD), or Doctor of Education (EdD) in counseling or clinical psychology. Alternatively, if an individual is interested in conducting research and teaching, then a PhD in sport psychology would be the proper path to travel. Occasionally the educational process does not stop there and some complete a postdoc or residency. This may be a requirement of a clinical or counseling program or a choice made by the individual because they believe it will advance their knowledge, skills, and abilities. This brief breakdown of academic stepping stones is by no means a comprehensive one, and those interested in future sport psychology studies should connect with professionals in the field and conduct thorough research of programs prior to making decisions.

Jobs and Careers in Sport Psychology

In this chapter, we discuss four general categories of jobs and careers for those with a background in sport psychology: (a) applied sport psychology practitioner, (b) clinical sport psychology practitioner, (c) physical activity and health practitioner (non-sport psychology professional), and (d) academic sport psychology professional. Aside from providing details about the responsibilities of these respective positions, we will also discuss specific examples of current employers when appropriate. Finally, the more difficult realities of pursuing these various careers will be mentioned as will insight into how to successfully find, apply for, and earn desired positions (also see Chapter 33; Moyle, 2021).

Previous research has documented that upcoming professionals in the field of sport psychology tend to be initially interested in a career goal that focuses specifically on working directly with athletes providing applied services (Andersen et al., 1997; Fitzpatrick et al., 2016). Applied positions like these are referred to by a number of names (e.g., sport psychology consultant, mental coach, mental conditioning coach, mental performance coach, mental skills trainer), but the title *applied sport psychology practitioner* will be used to encompass the variety of existing titles. The Association for Applied Sport Psychology (AASP), defines applied practitioners as those who are trained in sport and exercise and provide individual or group counseling focused on performance-related issues. Ultimately, the goal of applied sport psychology practitioners is to help athletes optimize their sport experiences by consistently performing in the upper range of their capabilities and more thoroughly enjoying the overall sport performance process (Portenga et al., 2017). This is achieved by extending theory into the field and applying sport psychology principles to educate sport personnel (e.g., athletes, coaches, parents, fitness professionals; AASP, n.d.). Applied sport psychology practitioners use systematic psychological skills training to help improve performance. A focus on the use of these skills to address *performance enhancement* and not *mental health* distinguishes these positions from clinical sport psychology practitioners.

Many emphasize the term *performance* over *sport* when discussing the role of applied sport psychology practitioners because the core principles of sport psychology are applicable within other performance contexts (Portenga et al., 2017). Those with the appropriate academic education, supervised training, and additional experience working with a variety of performers are capable of working in a number of performance domains (e.g., athletics, performing arts, medicine, military). Believing applied job opportunities only pertains to working within athletics limits where and with whom practitioners can work. This is an important consideration to bear in mind as one seeks out potential job opportunities as listings may not reflect one's training directly. For example, one of largest employers of applied sport psychology practitioners is the United States Military and rarely do graduate students gain applied experience with military personnel as a part of their sport psychology programs. However, applied practitioners working with military personnel utilize many of the same theories and frameworks from sport psychology to apply to high pressure situations that military professionals might face.

While there are more opportunities for applied work than ever before (e.g., Olympic organizations, Major League Baseball, youth sport academies) there are limited chances to obtain highly coveted full-time positions. Therefore, young applied sport psychology practitioners should not expect to obtain a full-time position working with elite athletes and teams merely because they have earned a sport psychology degree. This is a difficult truth for many young practitioners to accept, but one that is necessary to mention (Martin, 2020). Whether it is due to the lack of formal professional positions or personal aspirations, many applied sport psychology professionals take an alternative route into private practice. This requires quality entrepreneurial skills, high drive, and a deep client base in order to build a successful business working with diverse clients at the organizational, team, or individual level.

Typically, individuals who identify as an applied sport psychology practitioner have completed a sport psychology master's program, occasionally a doctoral program, and their AASP Certified Mental Performance Consultant ®(CMPC) certification. There are, however, legal limits to one's practice with this education and training. These professionals must be mindful not to assist athletes or performers with mental health-related issues as it exceeds their professional competencies. In fact, when said issues are beyond the scope of the applied sport psychology practitioner's ability referrals are necessary. Such referrals can be made to those who we will refer to as *clinical sport psychology practitioners*. Applied and clinical practitioners may provide similar services by delivering in-depth mental skills training to clients, but clinical practitioners are qualified to address mental health issues within and outside of the client's respective performance domain. With this added professional responsibility comes added educational and licensure requirements. Clinical sport psychology practitioners must develop competence in both sport psychology and counseling or clinical psychology. Therefore, earning master's and doctoral degrees in these areas is necessary. Legally, clinical sport psychology practitioners must also become licensed nationally and within the state they work. The extensive education and training are often deterrents to those interested in pursuing a career in sport psychology, however pursuing clinical or counseling route may offer more diverse employment opportunities within and external to performance contexts.

As previously mentioned, clinical sport psychology practitioners are able to deliver the same sport psychology services to clients as applied practitioners without clinical training. Therefore, similar employment opportunities apply to both types of practitioners. It is common to find clinical practitioners working with athletes in their own private practice, hospital settings, and academic institutions. More advanced education and training in mental health tend to make clinical practitioners more attractive to some employers. Athlete mental health has received greater attention in recent years and continues to be a large concern for many programs and organizations (Chang et al., 2020). As a result, an increasing number of colleges and universities with strong athletic identities have begun to employ licensed clinical sport psychologists. These positions are often housed in college or university athletic departments or counseling centers, but some may be hired as a consultant and work out of their private practice (Connole et al., 2014). Clinical sport psychology practitioners provide services targeting performance enhancement in sport and academics, personal development, and holistic student-athlete wellbeing, including mental health difficulties (Weinberg & Williams, 2010). Positions such as these are a promising advancement in the field, especially for those who express a desire to work in collegiate athletics.

A third type of practitioner is one who would likely not identify "sport psychology professional" as their primary career goal. It is common in the field of sport psychology for individuals with other physical activity- and health-related career intentions to pursue supplementary education in sport psychology. These professionals often include sport coaches, athletic trainers, and strength and conditioning coaches to name a few. The core principles of sport psychology certainly have value in outside disciplines such as these, and it is not uncommon for these professionals to continue their education in graduate sport psychology programs. Typically, the goal of these individuals is to enhance their professional value by building upon the services they provide to their athletes as well as finding answers to questions about the "mental game" they have observed through their various sport-related experiences. For example, a strength and conditioning coach may believe there is something more to learn about the unique relationships between coaches and athletes that will enable her to be more effective when working with a number of athletes with different skill levels.

There are varying perspectives on whether or not it is the ethically responsible for other physical activity and health professionals to provide applied sport psychology services. Again, it depends on the history of one's education and applied training. For example, if a youth soccer coach chooses to pursue a sport psychology master's degree after years of coaching, then there is very little preventing this coach from doing applied work with athletes. Alternatively, if a coach simply has an interest in sport psychology and does not have a corresponding degree or certification, then they are not properly equipped to replace applied sport psychology practitioners. In short, with adequate education and supervised training these individuals are able to combine core sport psychology concepts with their primary profession.

While there are a number of individuals with diverse applied careers in the field of sport psychology, they only represent a portion of the professional network. Others have career goals of teaching or conducting sport psychology-related research. For these individuals, academic positions as sport psychology faculty members at colleges and universities have been a consistent professional placement (Fitzpatrick et al., 2016; Williams & Scherzer, 2003). *Academic sport psychology professional*s have typically earned a Ph.D. and have some teaching and research experience from their doctoral studies prior to pursuing an academic career. This professional career path varies by institution type and departmental needs but often involves teaching, research, and service responsibilities. Teaching expectations can include teaching undergraduate and graduate sport psychology and other sport science courses. Research often involves working independently, with a student research team, or with others in the field to conduct sport psychology experiments and studies. Regularly publishing this work in peer reviewed journals is also a common expectation. Service often refers to work within and external to one's institution as well as within their respective research community assisting with projects, committee work, and the review of research. Additionally, advising and mentoring students is commonplace, and often academic sport psychology professionals are training future applied practitioners. Some positions might also include some applied delivery of sport psychology content as well, but these positions have historically been less common. Many academic professionals find great satisfaction in these positions because they are regularly working with students, designing new courses, conducting research projects, and identify as a lifelong learner.

Professional careers in sport psychology are diverse and rewarding, but require specific education and training and can be highly competitive. The academic requirements and training can be extensive but will prepare individuals for a successful future career. There are a few additional suggestions you can consider as you prepare to pursue a career in the field. First, many young professionals may assume they are or are not qualified for a position by simply investigating the title of a job posting. For example, it may mention terms like "mental training", "counseling", "sport psychologist" and these may be somewhat ambiguous at surface level. You should be sure to read the entire posting and use the descriptions of positions above to determine their personal qualification. Second, you should consider becoming members of sport psychology organizations (e.g., AASP, NASPSPA, APA Division 47, BASES, BPS-DSEP). These organizations regularly share employment opportunities and valuable professional development resources. Third, you are also encouraged to begin to develop your professional network by attending academic conferences where a number of diverse individuals with research and applied backgrounds will be present. Building connections with professionals in the field and seeking out personalized mentorship will have value prior to and throughout one's career. Finally, you should aim to gain diverse research and applied experiences working with a variety of individuals. Experience such as this will reflect a greater degree of competence than what is gained through coursework alone. By engaging in experiences related to professional choices, you will likely gain a better view of who you want to be as a professional and this will guide your future educational and training choices.

Table 19.3
Typical Academic and Licensure Pathways for Careers in Sport Psychology

Career Type	BS/BSc Psychology/ Kinesiology/ Sport Science	MS/MSc Sport & Exercise Psychology	PhD Sport & Exercise Psychology	PhD/PsyD/EdD Counseling or Clinical Psychology	Postdoctoral research or Residency	CMPC ®
Applied sport psychology practitioner	✓	✓	+ or	+		+
Clinical sport psychology practitioner	✓	✓		✓	+	+
Physical activity or health practitioner		✓				+
Academic sport psychology professional	✓	✓	✓ or	✓	+	+

Note. ✓ *= typically required for career; + = not necessary but provides an advantage for future employment opportunities*

Conclusion

This chapter is meant as a broad introduction to the field of sport psychology. The early stages of this chapter discussed what sport psychology is and the historical development of the field. Additionally, the chapter focused on career paths and training need for specific jobs that are often available with training in sport psychology. Sport psychology is an exciting career that has career pathways in research and consulting. Consulting careers can have a focus in either performance enhancement or mental health concerns. As we noted above, there are many interesting avenues in the research domain that examine the role that psychological factors play in sport performance. The future of sport psychology is exciting and bright, but as we highlighted, early scholars should have a clear focus on the type of work they expect to do and engage with their academic studies with a future career in mind. As you read further chapters in the book, you will receive more detail about specific sub-fields and research areas that have answered many interesting questions. You will also see many future research projects that can be conducted. There are still many unanswered questions that could use the attention of upcoming scholars.

Learning Exercises

1. Define "sport psychology".
2. Identify three different subdisciplines in sport psychology and create a research question that someone in that subdiscipline might be interested in studying.
3. Discuss the role of women in the development of sport psychology.
4. Who had an influence in the development of early sport psychology? Outline what they contributed.
5. Compare and contrast performance enhancement and mental health counseling in sport psychology.
6. Identify typical careers types in sport psychology.
7. Explain why someone in the field of sport psychology may pursue a PhD, PsyD, or EdD.
8. Identify the career path you are most interested in and explain the typical academic and licensure pathway.
9. Explain why there is confusion around professional practice roles in sport psychology.

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Chapter 20
Get Your Head in the Game: Examining the Use of Psychological Skills in Sport

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Chapter Overview

Psychological skills training (also known as mental skills training) is used at all levels of sport, worldwide. There are many psychological skills that are theorized to impact sport performance. In this chapter, we will introduce four psychological skills that are crucial for high level sport performance. These skills are focus, self-talk, imagery, and observation. All of these skills have been used to improve sports performance, and research evidence would suggest that if used appropriately, they can be harnessed to help athletes at all levels. Each section will provide a theoretical background of the skill, the research evidence that supports the assertions made, and ways in which the skill can be applied in the sporting context.

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Focus

It is common to hear coaches before a big moment exclaim, "Focus!" However, coaches rarely provide guidance about how to focus, or what to focus on. One of the key factors in peak performance in sport is the ability to focus and refocus during a game (Krane & Williams, 2015). This section of the chapter will briefly cover the applied sport psychology literature that has examined the ability to focus and concentrate.

What is the Ability to Focus?

Effective concentration involves two main components; the ability to attend to the correct things at the correct moment and the ability to attend to the information in the correct way (e.g., are you focused on the right thing at the right time). At face value this might seem quite simple, but it can actually be a challenge. For example, JR, an American football quarterback, is trying to hear the play call from his coach so that he can relay the play to his teammates. The home crowd is loud, making it difficult to know if he is relaying the correct information to his teammates. He tells his teammates the play, and then heads to the line of scrimmage. The coach gave him the option to audible (i.e., change the play if he deems it appropriate) if the safety (i.e., one of the defensive players) is close to the line of scrimmage. His focus jumps to the movement of the safety, but of course, the safety is moving all over the field before the play begins. He is having difficulty reading what the safety will do, but he must make a decision. He decides to keep the original play call, which is a four-man passing play (he must look at four different routes to know where to throw the ball). He calls for the ball to be snapped. Immediately one of his offensive linemen misses a block and he has to scramble to avoid being tackled. He avoids the first defender but knows more are coming. While avoiding rushing defenders, he must scan the field for who is open and what coverage the defense is playing. He notices that they are playing zone and notices that there is a hole in the coverage. He steps up and throws to what he thinks is an open receiver. However, there was a safety just out of his line of sight. His receiver makes a great catch over the safety's outstretched arms. He throws a touchdown!

Before we move on, consider all of the things that JR had to concentrate on in the example provided above. You will see for a play that might have lasted six seconds, there were many different components to focus on for the play to be successful. The ability to focus on the correct information, at the correct time is vital for sporting success. It is also necessary that athletes are able to shift their focus throughout the game (Williams et al., 2015). In the example above, we excluded any information about past or future events. Both past and future events can be a distractor to athletes during play. Scholars believe the best form of concentration is the ability to stay in the here and now (Hermansson & Hodge, 2012), meaning an athlete maximizes their concentration whenever they have complete focus on the task at hand. In the next section, we will lay the groundwork that focuses on conceptualizing the different types of attention that athletes have during sports participation.

Conceptualizing Attention Control

In the 1970s, Robert Nideffer proposed a model of attention control training that suggests that people have four unique dimensions of attention in a 2x2 model. The first component is the direction of the athlete's attention, which is conceptualized as either being internal (within oneself) or external (outside of oneself). When attention is internal, an athlete could be focused on feeling their muscular tension or rehearsing strategy within their own thoughts. When attention is external, an athlete could focus on the movement of the other players on the field or finding the open teammate to pass to: that is, focusing on anything outside of one's body.

The other key component from Nideffer's model is width of attention focus. Width of attentional focus is thought of as being either broad or narrow. Broad attentional focus is being able to attend to a lot of different pieces of information at the same time. For example, a basketball player surveying the court to see where her teammates and opponents are in order to decide to pass (and who to pass to) or shoot. The basketball athlete needs to see as many of her teammates and opponents as possible to make the decision. Otherwise, she might pass to a teammate who is being covered by someone who she did not see and lose possession of the ball. However, if her attention is too broad, she might become indecisive, leading to her turn the ball over. An example of a narrow attentional focus would be a golfer right before trying to make a short putt (we will assume the golfer has already picked the line of the putt using broad information). The golfer knows that they have to make clean contact with the ball with their putter. In this situation, you will likely see the golfer with their head down, staring at the ball. This is very narrow because the golfer is no longer looking at their surroundings, they have already chosen the shot and now they have to execute it.

Taken together, Nideffer's model proposes that at any time an athlete will be focused at some width and in some direction. This creates four unique dimensions that include broad-external, broad-internal, narrow-external, and narrow-internal (See Figure 20.1). The importance of an athletes' ability to shift their attention to where they need it in critical moments of a game is well documented but like most psychological skills, there is a high amount of individual variance in an athlete's ability to shift focus (Ziegler, 1994). Also, athletes seem to have a high amount of variability in their ability to attend to many or a few cues at a time (Williams et al., 2015). Some athletes can inherently attend to more cues in the environment than others. That is not to say that focus (or shifting focus) cannot be trained, but there seems to be some level of focus that is innate for each athlete.

Figure 20.1

The Dimensions of Attention as Proposed by Nideffer (1976) with Examples

Broad-External: Scanning the field to see where teammates and opponents are located.	**Narrow-External:** Seeing a pass coming from a teammate to your foot in a soccer game.
Broad-Internal: Forming a game plan for an upcoming match.	**Narrow-Internal:** Using imagery to practice a skill.

Stevinson and Biddle (1998) proposed a slightly different model of attentional focus. Within the Stevinson and Biddle model there are still two focal dimensions, but they are divided by task-relevance and direction. For task relevance, the researchers hypothesized there are two dimensions of either task association or task dissociation. Similar to Nideffer's (1976) model, it also incorporates the direction component.

There have also been other classifications of focus in sport that are newer and have less empirical support to date. Brick and colleagues (2014) created two categories that focus solely on internal association named internal sensory monitoring and active self-regulation. Some hypothesize that this model works well when focused on endurance sports due to the high internal focus that often happens during events that last for many hours (Neuman, 2019). There is also recent theorizing that proposes that an external focus is optimal for skill learning and development of most motor skills (Wulf & Lewthwaite, 2016).

Each of these alternative views of focus in skill learning and performance is worth considering because the demands of focus are incredibly varied across the sport domain. What information a gymnast needs to focus on is likely quite different from what a soccer player must focus on for optimal sport performance. Although the Nideffer model has been most cited, these other models are well conceptualized and have empirical support (Williams et al., 2015, Wulf & Lewthwaite, 2016). Therefore, when considering a model that might be most useful for your specific sport needs, examine each of the proposed models in detail to see if they fit the sport-specific needs of the domain.

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Application

Like all mental skills, in order to be able to optimally focused, athletes must train to focus on the correct cues at the correct times (Ziegler, 1994). Interestingly though, athletes rarely get explicit training on what to focus on during a sporting event. Athletes that have sport demands that are somewhat static (i.e., sports where the object is stationary before the play begins, like archery) probably have thought more about their ability to focus compared to athletes who play invasive sports (like basketball or soccer). However, for all sports, there are ways to train focus that should be considered when working with athletes.

Athletes often struggle with shifting their focus from one object to another (Ziegler, 1994). Shifting focus can be trained during normal practice situations. It would be useful for a coach to explicitly tell and athlete what they should focus on in a situation and when their focus should shift (Williams et al., 2015). After a simple explanation, the coach could repeatedly run an athlete through a situation where they have to shift their focus from one cue to another. The coach could give the athlete the space to fail and let them work through the process in a way that allows them to self-correct and self-regulate their behavior. If the athlete continues to struggle, the coach could work to simplify the decision, and then add complexity later on in the practice session. When an athlete successfully completes the task and clearly shifts focus, the coach could verbally encourage that behavior and the shifting of focus. After the athlete has developed the skill set to focus on the task in a practice scenario, the coach could make the scenario more difficult by making the situation more complex in a simulated competition.

Another important, but often overlooked detail, is talking with an athlete about what they are seeing or focusing on after a play. What a coach or mental performance consultant thinks an athlete is seeing compared to what they are actually seeing might be quite different (Williams et al., 2015). Talking with an athlete might help them filter the cues they are seeing. The athlete might be having too broad of a focus during a time when they need to be much narrower in their focus. These conversations should be commonplace for athletes who are struggling with focus during games. Knowing what someone is focusing on is the first step in either enhancing that focus, or altering that focus. Consultants or coaches could also focus on incorporating a pre-performance routine with their athletes. This routine should be developed with focus in mind. At the end of the routine, a coach would want the athlete to be completely focused on the task at hand.

Moving back to the motor learning literature, there has been some interesting theoretical work by Wulf and Lewthwaite (2016) who created the OPTIMAL model of motor learning. Part of their model focuses on the type of focus that most athletes or skill learners should have to optimize for skill learning and development. In basic motor learning tasks, they find that an external focus of attention is far superior to an internal focus of attention (Wulf & Lewthwaite, 2016). They posit that an external focus of attention likely decreases self-focus which allows for increased focus on the task goal. This increase focus on the task goal will lead to increases in motor performance and motor learning. The increase in external focus has beneficial effects on efficiency and accuracy in lab and field-based tests (Lewthwaite & Wulf, 2017).

Being able to focus on the right object at the right time is crucial for most sport performances. Understanding the key components of focus are crucial for understanding how and why performers make mistakes on well-learned tasks. The ability to train focus is increasing with different biofeedback and neurofeedback tools that are available on the market today. Moving forward, sport psychology researchers should continue to develop strong theoretical arguments about how focus is structured in specific sport settings and how it can be best measured.

Self-Talk

Self-talk is thought to have strong ties to our cognitions and affect in the sporting domain (Williams et al., 2015; for more discussion on affect, see Chapter 4 [Brand & Ekkekakis, 2021], Chapter 11 [Jones & Zenko, 2021], and Chapter 12 [Zenko & Ladwig, 2021]). In fact, self-talk has been highlighted in previous studies of Olympic level athletes as a tool that they use to achieve sporting success (Gould et al., 1993). Self-talk is often defined as our internal dialogue that is almost constant throughout the day for many people (Hardy, 2006). Self-talk has been proposed as a tool that athletes can harness to perform at their best. However, simply having an internal dialogue does not necessary lead to success; as such we will cover the foundations of research in the self-talk literature and then provide some suggestions for how to maximize self-talk as a useful tool in an athlete's psychological tool chest.

What is Self-Talk?

Self-talk has many synonyms including inner dialogue, intrapersonal speech, inner voice, or internal monologue. By definition, self-talk is dynamic, multidimensional, and serves both instructional and motivational functions (Hardy, 2006). Self-talk has many purposes and uses for athletes (Hardy, 2006). One athlete might use more motivational components of self-talk, compared to another athlete who might use self-talk to induce the appropriate amount of arousal before a competition.

Conceptualizing Self-talk

Only a few self-talk models have been proposed in the sport psychology literature over the years. However, one of the few models that has been circulated comes from Hardy and colleagues (2009). The self-talk model that was proposed highlights there are both antecedents and consequences of self-talk for most athletes. Specifically, there are personal factors and situational factors that are antecedents to athletes' self-talk. The personal factors can include how athletes prefer to process cognitive information, how much an athlete believes self-talk will impact their performance, and personality traits that might make athletes more amenable to self-talk (Hardy et al., 2009). Situational factors that influence self-talk include (a) how difficult the task is, (b) the competitive setting the athlete is in (along with other social pressures), and (c) the coaching behaviors interpreted from the athlete. The model proposes that self-talk can directly influence performance in sport and that self-talk can also have other cognitive and behavioral consequences. Some of the other consequences that are highlighted by Hardy and colleague's (2009) are cognitive mechanisms (such as concentration), motivational mechanisms (self-motivation and confidence), behavioral mechanisms (skill technique), and affect mechanisms (general affect and sport-related anxiety). Like most psychological skills models, the Hardy and colleagues (2009) model places self-talk at the center of the model.

A more recent model of self-talk outlined by Latinjak et al. (2019) breaks self-talk into two categories; organic self-talk and strategic self-talk. Organic self-talk is defined as self-spoken statements that reflect what is currently happening cognitively with the athlete (Latinjak et al., 2019). Within the organic self-talk category, Latinjak and colleagues propose separate subcategories of spontaneous self-talk, goal-directed self-talk, and self-talk that occurs in reflexive interventions (i.e. reflecting on past events and analyzing the self-talk that occurred). Strategic self-talk is defined as cue works used specifically for strategic purposes (Latinjak et al., 2019). Strategic self-talk is planned and practiced before competition to help athletes manage their arousal, anxiety, motivation, to keep them focused on the task at hand. Understanding how self-talk occurs both through organic (more natural processes) and strategic (more trained processes) provides insight into what the purposes of self-talk are for athletes and might elucidate a better understanding from consultants when trying to work with athletes.

Despite some differences in the models of self-talk, each model suggests that self-talk can be used to benefit sport performance. The next section of this chapter will be devoted to understand the benefits of self-talk and how to use self-talk for sporting success.

Why is Self-Talk Important?

Tod and colleagues (2011) noted in a review of 47 self-talk studies that self-talk can be beneficial for sports performance whenever it is *positive, instructional, and motivational in nature*. This study also concluded that negative self-talk did not have detrimental effects on performance, but is also unlikely to provide beneficial effects. Overall, it appears that self-talk can be used as a tool to enhance sport performance, perhaps though cognitive and behavioral mediators or mechanisms (Hardy et al., 2009).

Self-talk might be a more useful tool in sports that are self-paced (e.g., golf, tennis) compared to sports that are externally paced (e.g., soccer or basketball; Williams et al., 2015). Sports that are self-paced allow for more time and control over the process of starting the action. This means that there is more time available for athletes to have a pre-programmed plan that can be quickly put into action.

There is evidence that self-talk can be beneficial for athletes. Looking at the Hardy and colleagues' model (2009), the next few paragraphs will outline the ways in which self-talk can benefit the cognitive, motivational, behavioral, and affective mechanisms in sports.

The cognitive mechanism of self-talk is directed at any process in sport that involves the processing of information, concentration, or attention (Hardy et al., 2009). In fact, one of the most common reasons that athletes use self-talk is to help them focus or concentrate on the task at hand (Hardy et al., 2001). Self-talk can help direct the processing of information to the most relevant parts of the skill. When working with athletes, it is important to correctly identify the parts of the skill performance where the cognitive processing needs to be present. Once the athletes and coaches have identified they key parts of the performance where the attention should be focused, the next step would be to identify key words or phrases that the athlete could say to themselves to keep their focus on the relevant details. Using a key word or phrase can direct an athlete's attention to the most relevant part of the performance, hopefully leading to improvements in skill performance. If a basketball player is about to take a free throw they might need to think "smooth and follow through" right before taking their shot to ensure that they are focused on the parts of the shot that will lead to optimal outcomes.

Some athletes use self-talk to motivate themselves to perform their best during challenging circumstances. Hardy and colleagues (2009) further break down the motivational component of their model into self-efficacy and persistence. According to self-efficacy theory (Bandura, 1997) verbal persuasion, which can come from oneself, is a way to build perceptions of self-efficacy. Therefore, if an athlete uses self-talk that reflects on their high ability level, they will likely see increases in confidence. Motivational self-talk might also keep people going during difficult tasks and keep them driven to achieve success. Although proposed in the Hardy and colleagues' model, this has little support in the sport psychology literature with very few studies examining the topic (Hardy et al., 2009)

The behavioral mechanisms of self-talk are highly intertwined with other aspects of kinesiology like biomechanics, motor learning, and motor behavior. Hardy and colleagues note that movement patterns are hypothesized be tied to the self-talk of an individual. However, to-date there is little evidence that supports this mechanism.

Hardy and colleagues (2009) use the affective mechanisms label as an umbrella term to capture all things affect, mood, and emotion (for further discussion on the distinctions between affect, mood, and emotion, see Chapter 12; Zenko & Ladwig, 2021). Using self-talk that manages feelings of anxiety and arousal can be beneficial for athletes who have performance decrements due to arousal issues. Using language that is calming or relaxing could create an affective state that would benefit the athlete. On the contrary, if an athlete is having a difficult time getting appropriately aroused and ready to go for a game or match, the athlete could benefit from self-talk that is energizing and stimulating. However, more research is necessary to understand the ties between self-talk and affect in sport.

Application

At first, athletes might struggle to even know what they say to themselves during a performance. Athletes might also struggle with the awareness of self-talk. One of the first things to have them do would be to create a self-talk journal that documents the things that they said during practice or game situations. This will make the athlete more aware and help them see that their self-talk patterns might not be helping them perform at high levels (and for many athletes they will recognize that their self-talk patterns could be improved).

Another useful tool is having athletes reflect to their previous best performances and attempt to remember the types of self-talk that they were engaged in during that performance. For this exercise, the athlete can try to remember as many details as possible of their best performance (this will also impact some self-efficacy perceptions). To make this relevant to self-talk, have them reflect on the things that they said to themselves and jot down the things that are relevant to future performances. If the self-talk worked then, regardless of the purpose, it might be beneficial for future performances. Furthermore, the understanding the type of self-talk that is beneficial for performance can guide a self-talk intervention for future performances.

Lastly, a common technique used by practitioners to change self-talk is thought-reframing, also known as cognitive reappraisal. In this technique, someone would work with an athlete to take the negative self-talk and have the athlete reframe the thought with the purpose of using the reframed phrases whenever the athlete is in a similar situation in the future. For example, if a tennis player hits a shot out, they could say, "I am terrible, I can't believe I missed that." An athlete could instead say, "I missed that shot, but I know that shot does not define me. Next point matters the most." Thought-reframing is a very common technique use by sport psychology professionals for athletes who struggle with negative self-talk during performances.

Imagery

Most people do not realize how often they use imagery. When you are driving to a restaurant you've been to a few times but don't quite remember exactly when that last turn is, you might picture that parking structure that comes up immediately before that turn. This not only helps you remember when to turn, but also, in what direction. This brief "mental movie" you've created is imagery. In sport, a volleyball player might *imagine* what the hitter's hand and wrist look likes when they are going to dump (versus hit) the ball so they can then mentally practice how to move in response. Imagery is a cheap, adaptable, and learnable psychological skill widely used by athletes at all competitive levels.

What is Imagery?

Imagery is any sort of detailed mental experience you *purposefully* create in your mind using some combination of your memories, senses, thoughts, and emotions. By "purposefully", we mean you are generating the image with the expectation that it is going to help you in some way, much like the examples in the previous paragraph (e.g., Morris et al., 2005). Because imagery doesn't require any external equipment or specific training space, imagery can be done almost any time and anywhere.

Conceptualizing Imagery

It is widely-known that objective performance improvements are achievable through regular and structured imagery use (for a review, see Munroe-Chandler & Guerrero, 2017). Meta-analyses conducted on the efficacy of imagery use on motor learning and performance by Driskell and colleagues (1994) and Feltz and Landers (1983) revealed small-to-moderate effect sizes of 0.53 and 0.48, respectively. Many years later, Simonsmeier et al. (2020) conducted a meta-analysis on the effects of imagery interventions in sport, and reported similar findings (i.e., overall effect size of 0.43). Furthermore, Simonsmeier and colleagues found that imagery intervention could positively and significantly influence not only physical outcomes of performance, but also motivational and affective outcomes (e.g., feelings, emotions).

We are less clear, however, as to exactly *why* imagery use is beneficial. Nevertheless, there are a few theories that do help us understand imagery's influence on our learning and performance. Two such theories are the bio-informational theory (Lang, 1979) and the triple code theory (Ahsen, 1984).

Lang's (1979) bio-informational theory suggests that mental images contain two main parts: *stimulus propositions* and *response propositions*. Stimulus propositions are the characteristics of the skill or scenario to be imaged (i.e., what you're doing and what your surroundings are), while response propositions are the physiological (i.e., physical sensations) and affective responses that the individual experiences when imaging that particular skill or scenario. For example, a baseball player may imagine the fans, the opposing team's pitcher and defense, the score and the count, and themselves in the batter's box waiting for the pitch (stimulus propositions). However, they may also incorporate into this image the physical sensation of their heart beating faster, hands feeling sweaty, and general feelings of excitement and optimism (response propositions). The bio-informational theory posits that imaging a skill or scenario with the particular associated response propositions – even if they are considered debilitative or negative responses – can help an individual improve their performance as they are mentally simulating the actual task, including the affective responses. In doing so, the individual is more closely simulating the task as it would occur in real life.

One of the more comprehensive theories of imagery to-date is Ahsen's (1984) triple code theory (ISM). This theory is similar to Lang's (1979) bio-informational theory, however, Ahsen's theory offers a third element to its operational definition. The image (I) is similar to Lang's stimulus propositions in which effective images are vivid and realistic, closely replicating the physical/environmental elements present in the real-world experience. The second source of information involves the individual's somatic responses (S; similar to Lang's response propositions) in which imaging a task results in psychophysiological changes to an individual such as an increase in heart rate, sweaty palms, or other somatic responses to anxiety or arousal. The third source of information is the meaning of the image (M) to the imager; this is highly related to the intended purpose of generating the image (e.g., the image being created means that the individual is ready to perform and optimally focused). Triple code theory states that the most effective images are vivid and realistic, evoke psychophysiological response, and impart meaning to the individual.

Why is Imagery Important?

One direction of imagery research has been to advance explanations of the relevance of imagery use in sport and physical activity (e.g., Hall et al., 1998). In a landmark sport imagery publication, Paivio (1985) proposed an analytic framework which explained that imagery could serve both cognitive and motivational functions (*function* refers to the intended purpose of the image). He added that each function operates on either a "specific" or a "general" level. A number of years later, Hall and his colleagues (1998) added further delineation to the functions of imagery, resulting in five functions. Specifically, the purpose of one's images could be: cognitive general (CG: assist in learning, development or mastery of strategies, game planes, or routines); cognitive specific (CS; assist in the learning, development or mastery of specific sport skills); motivational specific (MS; regulate effort and affect relating to achieving one's goal); motivational general arousal (MG-A; regulate arousal and stress); and, motivational general mastery (MG-M; increase mental toughness, perceptions of control, or self-confidence). It is important to note that individuals can choose to employ multiple functions of imagery at the same time, for a single image (e.g., Cumming & Williams, 2013). For example, a high jumper using an image of themselves executing a jump in competition may be choosing to employ imagery to help practice the skill (i.e., CS imagery), but, at the same time, may also intend to use that image to increase their confidence in their ability to execute the jump successfully (i.e., MG-M imagery).

Application

One of the most important variables impacting imagery effectiveness relates to the learner's ability to create vivid and controllable images (Munroe-Chandler & Guerrero, 2017). This is known as imagery ability. Simply put, if you can create a mental movie in your mind that plays from start to finish and that "looks" and "feels" real to you, wherein you can precisely control exactly what is happening in the movie, then your imagery will be highly effective. Imagery is a psychological *skill*, and thus, is learnable (i.e., you can get better at it with training and practice; e.g., Wright et al., 2015). Those who are not proficient at imagery should not be discouraged from using the skill if they are willing to devote time and energy to develop it. For example, Rodgers and colleagues (1991) reported that the ability to image basic movements improved in figure skaters following a 16-week figure skating imagery training program. More recently, an eight-week intervention conducted by Wright and colleagues (2015) demonstrated that imagery training improved imagery ability in a sample of female golfers. Researchers have suggested at least a moderate level of imagery ability prior to beginning an imagery practice routine or program for sport is important (e.g., Cumming & Ste-Marie, 2001). Below are two possible avenues in which coaches or sport psychology consultants can train imagery and thus enhance its effectives with sport participants.

Layered Stimulus Response Training (LSRT)

Layered Stimulus Response Training (LSRT) is an imagery training method based on the bio-informational theory (Lang, 1979). Cumming and her colleagues have developed and employed this training method in previous studies (e.g., Cumming et al., 2007; Williams et al., 2013) and have found it effective in improving imagery ability as well as actual motor performance. This training method consists of helping an individual learn how to construct vivid and controllable images by starting with generation of the most salient stimulus proposition(s) (relative to the imager's perceptions) such as the immediate environment of the scenario being imaged, any equipment they may use, and/or others around. Following practice of this base "layer", the imager would then be instructed to add another layer—essentially, more nuance to their images—by incorporating other stimulus propositions to their current image layer. These nuances typically involve senses other than vision (e.g., the smell of fresh cut grass, the sound of a ball hitting the sweet spot of the tennis racket, feeling dirt moving under one's shoes, etc.). Following practice of the first and second layers, the last layer involves incorporating response propositions by having the imager try to feel the emotions they want associated with their image and/or any particular moods, thoughts, or beliefs they believe will be facilitative of the scenario being imaged. Initial research examining the effectiveness of LSRT has been promising (e.g., Marshall & Wright, 2016) and thus LSRT should be considered for any novice imager.

PETTLEP Approach to Imagery

Holmes and Collins (2001) proposed the PETTLEP approach (also known as the PETTLEP model) to motor imagery to guide precisely how one structures their images and their imagery practice. PETTLEP is an acronym that stands for physical, environmental, task, timing, learning, emotional, and perspective. This approach is based on the notion that mentally imaged actions and actual physical execution of actions are "functionally equivalent". Neuroimaging techniques, such as functional magnetic resonance imaging (fMRI) and positron emission tomography (PET) allow neuroscientists to examine the areas of the brain that are activated when mentally imaging versus when physically performing actions (for a review, see Ruffino et al., 2017). Holmes and Collins (2001) have suggested that, "if physical and mental practice are [functionally] equivalent, then many of the procedures shown to be efficacious in physical practice should also be applied in mental [imagery] practice as well" (p. 62). The PETTLEP model was intended to highlight several of these key efficacious procedures, or elements, which should be considered when preparing to use imagery. These include physical, environmental, task, timing, learning, emotional, and perspective (PETTLEP) elements:

1. Physical: Athletes should try to best approximate the physical state required when they are performing the situation to be imaged in real life, successfully. Holmes and Collins suggest that athletes become *actively* involved during their imagery session, perhaps employing sporting implements, wearing competition clothing, and even making physical movements, when appropriate.
2. Environment: Accurate and vivid mental recreation of the training or competition environment using all relevant senses can enhance imagery. Holmes and Collins suggest using aids, such as photo, video, or verbal accounts of the actual training or performance environment to ensure a realistic recreation of the surroundings.
3. Task: Careful consideration of how the individual personally experiences the task to determine the appropriate content and focus of their image. Holmes and Collins suggest that athletes may differ with regards to the specific elements of the task they focus on when physically performing (e.g., a novice might focus internally on feeling balanced while a more skilled individual might focus externally on the basket during a free throw shot). In addition, different athletes may prefer different visual perspectives when imaging (i.e., first- versus third-person perspectives, or, a combination).
4. Timing: Generally, it is recommended that images should unfold in real-time speed (the speed at which actual physical execution occurs). However, more recent research suggests that, indeed,

real-time image speed is critical when athletes are working on learning/mastering sport skill/strategy timing or tempo, but interestingly, that slow- and fast-motion speed images are also being used deliberately by athletes, and that their use can produce positive effects on learning and performance (e.g., O & Hall, 2009, 2013; O et al., 2020).

5. Learning: Images should be adapted as an athlete's focus and/or execution quality changes. As an athlete becomes more skilled, Holmes and Collins suggest that image content should be reviewed and updated (if necessary), to ensure functional equivalence.
6. Emotion: Encourage athletes, when imaging, to experience any emotions they have when physically performing successfully. These emotions should ideally be experienced at the same level of intensity as they are experienced in real life.
7. Perspective: This element refers to the primary sense used to experience the image (e.g., sight, kinaesthetic and/or tactile feel, sound, smell, and/or taste). Holmes and Collins suggest that a kinaesthetic focus (e.g., feeling the movements) will result in the greatest physiological response to the imagery session, thus leading to more effective learning and performance outcomes.

The PETTLEP approach to motor imagery (Holmes & Collins, 2001) is a theoretically driven and evidence-based checklist intended to maximize the effectiveness of athletes' imagery use. The model has received significant support via testing of various PETTLEP elements (e.g., for a review, see Wakefield et al., 2012). Incorporating every single element of the PETTLEP model is not currently noted as a "requirement" to achieve positive effects of applying the model. Thus, although incorporating all seven PETTLEP elements may, perhaps, elicit the *greatest* effects on imagery practice outcomes, athletes can also feel confident in the benefits of incorporating only a few of these elements if time, motivation, and/or resources prohibit full PETTLEP alignment of one's imagery practice.

Observation

Technology is constantly at our fingertips. Therefore, it is not shocking to witness an athlete pulling out their phone in the middle of training to watch a video of themselves, or someone else, performing a skill. If asked why they did this, a typical response relates to using the video to help them get better. For example, a baseball player may be seen reviewing their recent up to bat during practice in order to gain information on how to perfect the technique of the swing. Or an aspiring dancer may watch a YouTube video of a professional dancer performing a pirouette in hopes that they will be just like the professional dancer when they grow up. This is known as observational learning or modeling.

What is Observation Learning/Modeling?

Observational learning is the process by which individuals view a demonstration of either them self or someone else performing an action and, from this, is able to gain the ability to produce that same action (Cumming et al., 2005). There are many forms in which one can observe (for more detailed definitions see Ste-Marie et al., 2012); one can view the self or someone else and either of these techniques can be live or on video. Viewing the self is known as a self-as-a-model technique. Here, one can view themselves at their current skill level which could potentially include errors (i.e., self-observation) or at their best with little to no errors (i.e., self-modeling). The self-modeling technique can be broken down into two categories. The positive self-review technique is an edited video of the learner performing a skill to show the individuals best ever performance, such as those featured in highlight videos of athletes. The feedforward self-modeling technique uses footage of prior attempts which are then edited and spliced together to create a video of a behavior not quite achieved (Dowrick, 1999). For example, a gymnast may be struggling with certain skills in their floor routine. Their coach may decide to create a feedforward self-modeling video in which clips of each of their skills performed independently, but correctly, are spliced together to create an optimal full routine. In this situation, the gymnasts would see themselves performing their entire routine at the best they have every performed each skill independently: A snapshot into their future perhaps!

When viewing someone else, one can choose from either a skilled, unskilled, learning, mastery, or coping model. The most common forms used in sport are either the skilled or unskilled models. Thus, we will elaborate on these two types but direct readers to Ste-Marie et al. (2012) for further information on other modeling types if interested. A skilled model would demonstrate the skill with proper technique whereas an unskilled model would demonstrate that same skill but there would be obvious errors viewed as the individual has not yet acquired the proper technique. For example, a beginner volleyball player could watch a skilled player serving the volleyball in order to gain the accurate information on how the timing and proper technique of the overhand serve are carried out in hopes to be able to transfer that information into their own attempts. No matter what modeling technique one chooses, the consensus is that observing a demonstration works (Ste-Marie et al., 2020).

Conceptualizing Observation/Modeling

The two most prominent perspectives regarding the effectiveness of observing a demonstration stems from Bandura's social-cognitive theory and Gibson's direct perception perspective (for more on social-cognitive theory, see Chapter 5; Delli Paoli, 2021). Albert Bandura's (1986) view relates to observation and social learning. This view suggests that we learn through observation by symbolically coding the observed behavior and translating that information into a cognitive representation. The cognitive representation is stored in our memory which then serves as a guide to later perform that skill. There are four subprocesses necessary for the individual to learn through observation: attention, retention, behavior reproduction, and motivation. Therefore, an individual must attend to the observed behavior in order to pick up the relevant information presented to them by the demonstration. From here, the information picked up would be retained in the form of a cognitive representation that can later be used to guide their own behavior when attempting to reproduce that same action. Motivation plays a key role as well. As such, if an individual is motivated to reproduce the behavior, they will selectively attend to the information presented to them via the demonstration and as a result are more likely to produce an accurate cognitive representation that would guide subsequent attempts to a desired reproduction of that movement. Past research has aligned with this perspective and has supported the notion of a cognitive representation in fact influencing subsequent actions (e.g., Frank et al., 2018).

Scully and Newell's (1985) view aligns with Gibson's (1950) direct perception perspective and suggests that we are able to simply "pick up" the information from a demonstration in which our visual system automatically processes the information without the need to create a symbolic representation. That is, we are able to directly perceive in a way that constrains our motor control system to act in accordance to what we see and produce a movement. Specifically, the individual viewing the demonstration directly perceives the relative timing of the joints and uses these motions and coordination patterns to develop their own movement patterns. An example of early related research was conducted by Johanson (1973), where light reflector markers were placed on the joints of a model while walking and running and individuals viewing the lighted dots in motion were able to distinguish the difference between movement patterns (i.e., walking vs. running). Within this perspective, point light displays (PLD) are typically used when models have light reflectors on their joints and it is the movement of the light reflectors that the learner observes on video. From these movements, the observer is able to gain information regarding the timing of the skill to be learned. Research conducted from this perspective suggests that PLD provide the relative motion information needed to learn a motor skill and that these displays are beneficial for highly complex skills (i.e., skills with multiple limbs involved) as well as less complex skills (i.e., skills with single limb movements; e.g., Kordi & Ghamary, 2014).

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Why is Modeling Important?

No matter which perspective one is taking, there is ample evidence that support the notion that observation provides the necessary information to the learner and as a result the learner is better able to acquire or perfect the motor skill, create strategies, and assist in mental states (see Ste-Marie et al., 2020). As examples, observation techniques could highlight how to properly execute a free throw in basketball, help develop game strategies and routines when understanding power play formations in hockey, and help an athlete learn how to reach an optimal state of arousal before competing in their figure skating long program. The next section examines experimental results regarding the effectiveness of observation within these three functions.

In regard to evidence relating skill acquisition, the majority of research on the effects of using a skilled model has been promising. For example, the use of skilled models has been shown to increase the motor execution in areas as a power lifting (Sakadijanet et al., 2014), golf putting (Kim et al., 2017), badminton serving (Kamanga et al., 2013), throwing (e.g., Ghaehroudhani et al., 2016), and basketball shooting (e.g., Kordi & Ghamary, 2014). Another common model type is viewing the self. Research has shown positive effects in both the skill acquisition (e.g., Ste-Marie et al., 2011) and competitive enhancement (e.g., Rymal & Ste-Marie 2017). In Ste-Marie et al.'s (2011) work with competitive gymnasts, beam performance was significantly higher at competitions in which the gymnasts viewed a feedforward self-modeling video compared to competitions where no video was viewed. Recently, research has ventured into the exploration of combining models. This research has shown positive effects when learning how to perform sport skills such as hurdles (Amara et al., 2015), volleyball passing (Barzouka et al., 2007), gymnastic sequences (e.g., Robertson et al., 2018), as well as balancing tasks (Karlinsky & Hodges, 2018). In Robertson and colleagues' (2018) research, participants either viewed the self or a combination of the self and a skilled model when attempting to learn a gymnastics sequence. The results indicated that both groups increased in performance however the group that received the combo model intervention outperformed the self-model group only for both skill learning and error recognition.

Cumming et al. (2005) reported developing strategies as the second most frequent use of observation, following the skill function. That is, the reason for which individuals use observation can also be tied to developing strategies/game plans to help achieve the motor skill. The use of observation as an actual intervention to influence strategies is sparse, but the few studies that have investigated this have shown promising results. For example, gymnasts in Rymal & Ste-Marie's (2018) research used their self-modeling video as a means to strategically plan motor execution, create adaptive inferences, and analyze tasks specific to their bar routine. Frank and colleagues (2018) were interested in the effects of observation on physical performance and mental representations of the mechanics of the golf swing. Participants were assigned to one of two groups; an observational group and a combined observational and physical practice group. Despite both groups increasing physical performance and acquiring the mental representation of the golf swing (i.e., identifying correct mechanics of the swing when presented with a video), only the observation plus physical practice group was able to transfer that strategy into motor output. Thus, physically practicing alongside of an observation intervention helped identify skill mechanics which then lead to the use of those mechanics in future attempts.

Research investigating the performance function typically coincides with research investigating skill learning as the main outcome. Self-efficacy seems to be the most commonly measured psychological construct in such research. Increases in self-efficacy have been found in areas such as swimming (Clark & Ste-Marie, 2007), gymnastics (Robertson et al., 2018), as well as hockey (Feltz et al., 2008). Extending beyond self-efficacy measures, much of Rymal and colleagues' work with divers and gymnasts (2010, 2017, 2019; Ste-Marie et al, 2011) investigated the relationship of self-modeling and self-regulatory processes during a competition. The results of both divers and gymnasts suggest that the observation technique promoted performance characteristics such as self-efficacy, motivation, satisfaction, and arousal control during a competitive event.

Application

As noted by Ste-Marie and colleagues (2012; 2020) there are many things to consider prior to determining an observation intervention; however, it is not our goal to review the entire Applied Model for the Use of Observation (i.e., AMUO). We will instead give some avenues and suggestions as to potential applications. Specifically, we will discuss some options with respect to the type of model to use (i.e., "who" should be observed), as well as when and how to implement observation with athletes (for a full review of the AMUO see Ste-Marie et al., 2012; 2020).

Who Should be Observed?

Should the learner observe someone else? Would it be more beneficial if it were a skilled model or an unskilled model? Or perhaps the self should be viewed, but should it be at their current skill level, at their best, or at a level that is slightly better than their current state? These are all worthwhile questions that have some evidence from the research literature to answer them! Overall, existing research demonstrates that no matter who one chooses, all models seem to be effective to some degree (Ste-Marie et al., 2012; 2020). If looking to increase skill, a skilled model would be appropriate as a skilled model provides the correct information regarding the timing of joint movements. A skilled model can also assist in the cognitive representation, providing information to guide the learner when attempting to perform skill (e.g., Frank et al., 2018). An unskilled model would also be appropriate, as an unskilled model is thought to increase the problem-solving process and thought to help with error detection and correction of mechanisms. A key feature to consider is model similarity. If an athlete perceives they are similar to a model then it is more likely they will pay attention, associate to similar timing of the joints, and thus have a greater effect on skill learning (McCullagh, et al., 2012).

However, no one is more similar to you than yourself. Previous research suggests that there is a greater advantage to viewing the self, as compared to viewing other models. Noteworthy is that Ste-Marie et al.'s (2020) re-examination of the AMUO suggest that it is the combination of different model types that are giving the most promising results for motor outcomes and psychological aspects (e.g., Robertson et al., 2018). Furthermore, Karlinsky & Hodges (2018) examined dyads practicing a balancing task and despite no differences between those who were paired to those whom were not, paired practice might help coaches that have limited time due to the fact that dyads practicing together can both concurrently learn a new skill by examining their teammate as a model. As such, we will not suggest one model type over the other when working with individuals acquiring a new skill, but we do suggest to use more than one model type (e.g., skilled and self-model) as a means to enhance skill acquisition and performance.

When and How to Implement Observation Techniques?

According to Ste-Marie et al., (2012; 2020) the majority of research is still unclear as to whether one should show a demonstration before, during, after, or combinations thereof. However, most research that implements the observation intervention before and during has shown positive results. To date, very few research studies have compared the scheduling in order to determine which is actually more beneficial. Outside of the sport environment, research has suggested that viewing either before or during physical practice seems to be advantageous to the motor task outcome (e.g., Herbert, 2018). Furthermore, researchers are exploring the use of a self-control protocol when using observation to enhance motor skills. Here, the learner chooses how much and when they would like to view the demonstration. For the most part, evidence is still unclear as to which is best for skill acquisition: self-controlled viewings or other-controlled viewings. There is, however, a trend moving towards self-controlled viewings over experimenter-controlled viewings (e.g., Marques & Corrêa, 2016). What is interesting however, is that much of the research in this area has shown consistent findings regarding how much a learner actually needs to view a demonstration in order produce a change in behavior. Specifically, if self-controlling the frequency of viewings, the learner still benefits from the observation technique but these benefits arise from fewer viewings than compared to experimenter-controlled viewings (e.g., St. Germain et al., 2019). From a practical standpoint, coaches and practitioners are not able to be with one learner at all times to ensure they do their viewings. However, by allowing athletes to be in control of their own viewings, they may get just as much of a performance improvement in a much shorter time.

Conclusion

This chapter has covered four main psychological skills that are commonly used by athletes at all levels. If used appropriately, these skills can lead to greater sports performance. This chapter is meant as an introduction to four of the most common skills used by athletes today that are supported by research evidence. Many mental skills programs will work on many of these skills together. We believe that this is an optimal way to approach mental skills training, as long as the athlete is not overwhelmed by the amount of information being presented. Overall, mental skills training can improve performance and these straightforward skills presented in this chapter are a great place to start.

Learning Exercises

1. Explain the 2x2 model for attention control. What are the four unique components of the model?

2. How would you help an athlete whose attention is too narrow?

3. How would you help an athlete who is attending to the wrong cues in practice and game situations?

4. What are some of the functions of self-talk?

5. What is thought reframing? How might you use this technique to change someone's self-talk?

6. How does self-talk influence performance in sport?

7. Briefly define the five functions of imagery. Provide an example of each function framed within your favorite sport or physical activity.

8. Using a sport or physical activity you are familiar with, give examples of stimulus and response propositions (bio-informational theory; Lang, 1979).

9. Pick a specific skill or strategy in a sport or physical activity that you have done in real life many times. Come up with an LSRT outline, specifically noting what you would include in the first, second, and third "layers" of the LSRT.

10. Explain the three functions of observation and provide an example of how you, as a movement instructor, would implement an observation technique as a means to influence each of these functions.

11. Using either Bandura's (1986) social cognitive theory or Gibson's (1950) direct perception perspective, explain how observation is thought to benefit skill learning and performance for a specific sport of physical activity.

12. Pretend you are a movement instructor of your favorite sport or activity. Think of a scenario in which you are required to teach an individual a skill or strategy. Using the guidelines put forth by the AMUO (Ste-Marie et al., 2012), determine who should be observed as well as when and how the observation technique should be implemented.

Further Readings

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Chapter 21
Motivation in Coaching: Promoting Adaptive Psychological Outcomes

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Chapter Overview

The purpose of this chapter is to identify theoretically driven, practical strategies that can be used to support promotion of an adaptive psychological environment for athletes. Given the influence that coaches in sport can have upon the motivational outcomes and well-being of an individual (Cronin & Allen, 2015; 2018; Keegan et al., 2014), the strategies are focused on the actions and interactions of the coaching practitioner. We begin the chapter by providing a brief overview of some of the dominant theoretical frameworks that that have underpinned research into psychological environments. Having described the theoretical foundations to the research, we will review that work, and then, based on the implications, discuss strategies that could support the promotion of adaptive psychological environments.

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Introduction

Competition lies at the very heart of many sporting endeavours, with its specific nature often dictating that there will be winners and losers as an outcome. While it is clear that these absolutes are less relevant to some (as many engage at least partly to compete against themselves to extend their skills, conditioning, and knowledge, for example), it is the role of the leader, often the coach, to calibrate a positive and healthy definition of success for their athletes, one that will see them enjoy and thrive within the performance arena.

An athlete's motivation sits at the core of their sporting experience, driving them towards their goals while being simultaneously moderated by the environments they act within (Ames, 1992). The specifics of the environment can be a powerful influencer of the athlete's goal-directed behaviour, and when effectively structured, organised, and with appropriate personal support, can promote positive experiences that have meaningful psychological, cognitive, and affective benefits for the individual (Dweck & Leggett, 1988).

Psychological Environments in Sport

According to social-cognitive theories of motivation, in any sport setting, the personal tendencies of an athlete will interact with the situational cues they experience (e.g., the coach, peers, activities, opposition) to prompt a range of both (potentially) positive and negative psychological outcomes (Maehr, 1983). Indeed, it is *how* these cues are subjectively perceived by the athlete that will, in turn, prompt their cognitive and affective responses (Ames, 1992; Maehr, 1983; Roberts, 2012). Coaches positively influence an athletes' perceptions of the achievement environment through using language and behaviours that instil a pattern of adaptive cognitive responses (Ames, 1992, Roberts, 2012). More broadly, and to increase the likelihood of desirable cognitive and affective outcomes, the coach can aim to create an adaptive *psychological climate* for their athletes.

Psychological climate is a term used to describe the motivational features of an achievement setting and the subjective meaning given to those features from the individual participants who experience it (Maehr & Braeskamp, 1986). This general term will be used throughout this chapter to describe the psychological environment within an achievement setting; it is a phrase that will also serve to highlight many of the overlapping principles between theories and provide a coherent summary of knowledge to date. We now turn to address the two dominant theories associated with research into psychological climates within sport: *achievement goal theory* (AGT; Nicholls, 1984) and *self-determination theory* (SDT; Deci & Ryan, 1985; 2002). Each theory has established efficacy in describing and explaining achievement environments, and thus represent appropriate theoretical anchors (Layder, 1998) to help support coaches in the development of adaptive psychological environments.

Achievement Goal Theory

AGT (Nicholls, 1984) is one of the most established theories of motivation within the sport and exercise psychology literature (Roberts, 2012). As a competence-based social-cognitive theory, AGT is grounded through the basic assumption that we, as human beings, are intentional, rational goal-directed organisms, and that achievement goals reflect and guide beliefs and decision-making in achievement contexts (Roberts, 2012). According to Nicholls' theory, it is an individual's perception of what competence means that drives behaviours. For example, those individuals who are primarily concerned with mastering tasks and who construe competence through self-referenced criteria can be regarded as *task-involved*, whereas those whose competence judgements are based on how they perform relative to others are described as *ego-involved* (Jaakkola et al., 2016; Roberts, 2012). At any given moment in an achievement context (e.g., after conceding a try in a rugby game, taking a free-throw shot in basketball) an individual's state of involvement (or *why*) drives their thoughts, feelings, and behaviours. This is a dynamic state, and these motives sit on a continuum that extends from a strong ego- to a strong task-involvement (Gernigon et al., 2004). A person's goal involvement is based on their moment-to-moment perception of the environment interacting with their predisposed goal involvement; the latter being referred to as a *goal orientation* (Nicholls, 1984; 1989).

As trait-like dispositions, goal orientations are more stable than their state-like goal-involvement (Duda & Whitehead, 1998). Within AGT, there are two orthogonal goal orientations: task- and ego-orientation (Kingston et al., 2020; Roberts & Kristiansen, 2012). The orthogonality of goal-orientations means that, as independent structures, a person can be simultaneously high or low in one or both orientations (Roberts, 2012). Research into these goal orientation *profiles* has indicated that the combination of a high task-, low ego-orientations are associated with a range of positive outcomes, whilst the reverse (low task-, high ego-) is linked to more maladaptive outcomes (Harwood & Thrower, 2020). In contrast, a high task-, high ego-orientation profile has been proposed to be the most beneficial combination, with the greatest motivational outcomes when associated with high levels of perceived competence (see Roberts, 2012). Though dispositional goal orientation(s) are relatively stable, they are moderated by situational cues; if these are particularly salient, then the environment may override the dispositional goal orientations of that individual (Roberts, 2012; Roberts et al., 1997). Consequently, it is possible for coaches to effectively influence and even manipulate goal perspectives through the psychological environment they facilitate. Situational cues are influenced by key social agents, and these impact how competence perceptions are derived within an achievement setting to subsequently create what is known as the motivational climate (Ames, 1992; Keegan et al., 2009).

Recognised as one of the most powerful elements of AGT, the motivational climate refers to the features of an achievement environment that influence how an individual's competence is defined (Ames, 1992, Roberts, 2012). As such, there are two types of motivational climate that can be fostered, a *mastery (task) climate*, or an *ego (performance) climate,* distinguishable by how competence is perceived to be demonstrated (Dweck & Leggett, 1988). A mastery climate will promote learning, effort, persistence, and focus upon self-improvement with participants demonstrating competence through individual skill-development and progress (Roberts, 2012). Studies within sport have reported favourable outcomes from the fostering of mastery climates, for example: increased dedication; increased enjoyment (Balaguer et al., 1999; Jaakkola et al., 2016); improved cohesion (Eys et al., 2013); greater sportspersonship (Gano-Overway et al., 2005); enhanced mental toughness (Nicholls et al., 2016); reduced anxiety (Smith et al., 2007); and improved learning strategies (Treasure & Roberts, 2001). In contrast, an *ego climate* (or performance climate) promotes competence as being norm-referenced, and thus reflects a judgement based on comparison of standing to other participants (Ames, 1992; Dweck & Leggett, 1988). Ego climates are characterised by the public comparison of ability, minimal participant authority, a focus upon a select few (often the more "talented") athletes, and the use of disciplinary mechanisms following mistakes (Hassan & Morgan, 2015). Such environments have been found to have negative implications for participants, for example, in terms of reduced cohesion (Eys et al., 2013) or cheating (Ntoumanis et al., 2012). Although it has been recognised that ego climates can be of value to sport environment (d'Arripe-Longueville et al., 1998; Roberts & Kristiansen, 2012), researchers have espoused that the creation of mastery climates should be the priority for sport organisations and the coaching practitioner (Gill et al., 2017; Keegan et al., 2010).

Self-Determination Theory

Self-determination theory (SDT; Deci & Ryan, 1985) is the second of the two dominant theoretical frameworks that have helped to guide research and subsequently the development of adaptive psychological climates within sport settings (see Occhino et al., 2014). For more on SDT, see Chapter 3 (Quested et al., 2021).

SDT (Deci & Ryan, 1985) is a macro-theory of motivation concerned with the development and functioning of personality within social contexts, and specifically the mechanisms through which self-determined behaviour is nurtured or impeded (Kingston et al., 2006). According to SDT (Deci & Ryan, 1985), the social context, in which the coach is a key agent, is paramount to supporting an individual's basic psychological needs (BPNs). Extending their premise, Deci and Ryan (2000) suggested that the satisfaction of a person's innate psychological needs will provide the necessary conditions for effective motivational functioning and enhanced well-being of that individual; the needs are: *autonomy*, *competence*, and *relatedness.* These fundamental psychological needs are the psychological mediators of the relationship between social/contextual factors and behavioural and affective responses; they are described within basic psychological needs theory (BPNT, Deci & Ryan, 2000), a sub-theory of the broader SDT. Specifically, an individual's need for autonomy is met when they feel authentically responsible for their actions, while competence is promoted through a feeling of effectiveness when interacting with the environment, and relatedness refers to the extent that a person feels a sense of closeness, connectedness, and being cared for within a given social environment (Bartholomew et al., 2011; Ryan & Deci, 2020). As a consequence of the ease of application across contexts, attention has turned to the promotion of these three BPNs within sport settings (e.g., Sarrazin et al., 2002), with a burgeoning amount of research seeking to address the coaching behaviours that can influence them (e.g., Matosic et al., 2016; Reinboth et al., 2004; Stebbings et al., 2015).

Researchers have robustly supported the central tenet of SDT that environmental factors that can promote or thwart the development of the BPN (e.g., Bartholomew et al., 2011; Matosic et al., 2016). An environment that has been found to support the BPN of an individual is termed an *autonomy-supportive* environment, while an environment antagonistic toward developing positive developmental tendencies is commonly known as a *controlling-coach environment* (Adie et al., 2008; Deci & Ryan, 1985; Ntoumanis, 2012). Mageau and Vallerand (2003) outlined seven key features of an autonomy-supportive coaching environment, these included: provision of choice, providing a rationale for decisions, acknowledgment of feelings and perspectives, opportunities for problem solving, giving non-controlling feedback, avoiding controlling behaviours, and focusing on self-referenced rather than norm-referenced criteria. These pedagogical behaviours are also supported by providing structure and an empathetic and caring attitude towards athletes as people (Mageau & Vallerand, 2003).

Reflecting on the consequences of such environments, Occhino et al. (2014) argued that a coach who can foster an autonomy-supportive environment can: (a) satisfy participant's psychological needs; (b) maintain intrinsic motivation; (c) promote engagement in sport; and (d) enhance individual performance. More recently, Cronin and Allen (2018) suggested that the creation of autonomy-supportive climates is also positively associated with the promotion of life skill development in sport. The transfer of life skills is recognised as a crucial element of positive youth development, whereby young athletes will learn life skills and psychological competencies that will facilitate success in both sport and life (Bowley et al., 2018). In contrast, a controlling-coach environment is fostered when coaches use tangible rewards, controlling feedback, employ excessive control, engage in intimidating behaviours, encourage ego-involvement, and have conditional regard for individuals (Bartholomew et al., 2011). Similar to the widespread endorsement of mastery motivational climate through AGT (Nicholls, 1984), the promotion of autonomy-supportive climates (along with the de-emphasis of controlling behaviours) has been widely endorsed and thus appears an important objective (Stebbings et al., 2015). From a SDT perspective, methods to guide the creation of such adaptive psychological climates are of critical value to coaches and their athletes.

Frameworks Used to Support Adaptive Psychological Climates

For the last few decades, researchers have provided guiding principles and frameworks to support the coaching practitioner in promoting adaptive psychological climates. With a variation of theoretical approaches taken (e.g., AGT, Nicholls, 1984; SDT, Deci & Ryan, 1985; or a composition of both) different frameworks have been espoused. Indeed, a growing recognition of the overlapping and complimentary features of AGT and SDT has led to an understanding that the theories are not mutually exclusive (Duda, 2013; Duda et al., 2018; Keegan et al., 2009; Ntoumanis, 2001). For example, using regression analysis, Ntoumanis (2001) indicated that the task orientation of university athletes positively predicted their self-determined motivation, which in turn was positively associated to their competence (SDT's conceptualisation of competence). This section of the chapter will consider strategies that are informed by overlapping and sometime analogous principles of both theoretical frameworks to influence the psychological climate of sport environments, drawing attention to the most salient themes. Three frameworks will be reviewed: TARGET (Ames, 1992; Epstein, 1989), MAC (Smoll & Smith, 2009), and Empowering Coaching™ (Duda, 2013); theoretical and practical implications discussed for each framework.

TARGET

Initially conceived by Epstein (1989), and then later developed by Ames (1992), TARGET is an acronym used to identify salient features of teaching environments: *task*, *authority*, *recognition*, *grouping*, *evaluation*, and *time*. Underpinned by AGT (Nicholls, 1984), TARGET has been used successfully within classroom, physical education, and more recently in sport settings as a framework to understand the development of mastery motivational climates (e.g., Kingston et al., 2020). Each of the TARGET structures can be influenced by the leader of that given achievement environment to promote an adaptive psychological climate for the participants within it. Briefly, *task* refers to the design of activities (e.g., organisation of tasks) with the coach ensuring that they are varied, challenging, promote self-referenced goals, and differentiated for all participants (Ames, 1992; Morgan, 2017). *Authority* pertains to participants being active agents in their own development, with the coach creating the opportunity for them to make meaningful decisions within the environment (Roberts, 2001). *Recognition* relates to the focus of feedback; in a mastery climate, a coach would provide equitable feedback for individual progress, effort, and persistence (Morgan, 2017). The *grouping* structure refers to the sorting of participants into heterogenous groups, where overt perceptions of competence may diminish (Ames, 1992). Linked closely to recognition is *evaluation*, which refers to the manner in which feedback is provided. In a mastery-involving evaluation structure, a coach would provide meaningful, individualised, positive, and one to one feedback to players (Morgan, 2017). Finally, affording players flexibility to master the task at hand, catering for all levels of abilities in managing time are encapsulated within the *time* structure (Ames, 1992). It is important to note, converse behaviours (to those identified) may promote an ego climate (see Morgan & Kingston, 2010; Morgan et al., 2005).

Within sport settings, Cecchini et al. (2014) conducted a 12-week intervention study with student-athletes, examining the impact that the manipulation of the motivational climate could have upon their motivation, behaviours, and the social and psychological moderators of this relationship. The intervention programme, which was based upon the TARGET framework, was executed by trained coaches. Participants engaged in 20 hours of theoretical training, and 10 hours of practical training. As part of the training, one coaching session was video recorded each week with feedback being given to the coaches during the next training seminar. Their findings showed TARGET to be a useful mechanism to manipulate the motivational climate and to promote adaptive outcomes amongst their high-school sport participants, for example: performance improvement, decision making, competence, autonomy, self-determined motivation, social relations, persistence, effort, cooperative learning, and reduced boredom. Where Cecchini and colleagues explored the psychosocial impact upon participants, Hassan and Morgan (2015) shifted focus to the coaches in evaluating if a mastery climate coach education programme (based upon the TARGET structures) would modify coach behaviours and this be perceived by their athletes. Through guided video self-analysis, Hassan and Morgan (2015) found that over time, not only did coaches increase their mastery-involving behaviours across each of the TARGET structures, but that their athletes also perceived an increase in mastery and decrease in ego-involving features of the motivational climate.

Applying the TARGET framework into elite youth sport contexts, Kingston et al. (2020) conducted a longitudinal observational study with a Premier League soccer academy. Observing elite youth soccer coaches over a seven-month period they found that mastery climates dominated within the youth development phase of the academy (under 12–16 years), but ego climates were still prevalent. Kingston et al. suggested that features of the motivational climate demonstrated additive characteristics and surmised that some mastery-involving TARGET features (i.e., task, authority, recognition, and evaluation) could compensate for features aligned with promotion of social comparison (e.g., grouping and time elements). Although this assertion was also made by Ames (1992), more research is required to confirm compensatory effects as this could have significant practical implications. For example, in competitive situations (e.g., small-sided games) the coach could emphasise mastery criteria (e.g., cooperation, problem-solving, and providing opportunities for meaningful input by players). Given the challenge that some coaches have in promoting mastery or autonomy supportive climates during competition, knowledge of features that can compensate for ego-involving components may help them to effectively manage the climate even during the most “heated” of competitions (Delrue et al., 2017; Smith et al., 2017).

Mastery Approach to Coaching (MAC)

Originating from coaching effectiveness training (CET; Smith et al., 1979), MAC (Smoll & Smith, 2009) is a program that incorporates the mastery principles of AGT (Nicholls, 1984). MAC places an emphasis on two key themes: *coaching behaviours*; and *maximal effort* as the key criteria for defining success (Smith et al., 2007; Smoll & Smith, 2020). Firstly, MAC distinguishes between positive and aversive coaching behaviours, and provides a user-friendly list of coaching “dos and don’ts” to guide practitioners. Positive behaviours (the dos) include: positive reinforcement, mistake-contingent encouragement, corrective instruction delivered in an encouraging fashion, and technical instruction. Conversely, aversive coach behaviours (the don’ts) include: a lack of reinforcement of positive behaviours, punishing mistakes, and punitive technical instructions (Smith & Smoll, 2012; Smith et al., 2007; Smoll & Smith, 2020). The second key theme is the emphasis placed upon defining success around employing maximal effort. This theme is consistent with Epstein (1989) and Ames’ (1992) guidance within the TARGET framework (i.e., recognition), whereby the coach will recognise and reward athletes for high effort rather than their ability (Morgan, 2017). Therefore, both models promote competence as reflective of individual effort (Ames, 1992), highlighting the shared philosophies of each framework.

The MAC (Smoll & Smith, 2009) and CET (Smith et al., 1979) programmes have been successfully employed within different sport settings (e.g., basketball, soccer, swimming), reportedly enhancing the psychological climate and promoting adaptive motivational outcomes of participating athletes (e.g., Mclaren et al., 2015; Smoll et al., 2007). McLaren et al. (2015) used the MAC programme as a coaching intervention with the aim of exploring how a mastery climate would impact perceptions of task and social cohesion within their youth soccer teams. Twenty youth coaches were educated on the principles of MAC, while a further six coaches were spoken to about optimizing the athletic experience (but not about MAC). Players who participated under the MAC-trained coaches reported elevated perceptions of team cohesion by the end of the season in comparison to those who had participated under the non-MAC trained coaches, whose perceptions of cohesion declined significantly. In a similar study with basketball coaches, Smith et al. (2007) explored the effects of MAC on players' somatic and cognitive anxiety. Twenty participating coaches received the MAC training whilst the remaining seventeen did not (no-treatment control condition). Basketball players of the MAC-trained coaches reported a reduction in both dimensions of anxiety and perceived higher levels of coach-initiated mastery climates than the control group.

Although MAC and TARGET are both grounded within AGT (Nicholls, 1984), and indeed MAC was designed in-part with Ames' (1992) TARGET principles in mind (Smith et al., 2007), MAC differs in its aim to distinguish between positive and aversive coach behaviours (see Smoll & Smith, 2012), and thus arguably helps coaches to better calibrate their mastery actions. Moreover, the emphasis placed upon *knowing* aversive behaviours draws parallels to researchers of SDT who have examined the controlling-coach behaviours that thwart individual's satisfaction of their basic psychological needs (e.g., Bartholomew et al., 2011).

Despite the user-friendly qualities of the MAC programme it is not readily available to coaches outside of research projects (e.g., Smith et al., 2007; Smoll et al., 2007). Participants were given a manual entitled *Coaches Who Never Lose* (Smoll & Smith, 2005) to support their employment of mastery approaches to coaching. This situation is by no means unique, and the availability of sport psychology resources for coaches has been raised previously (e.g., Bissett et al., 2020; Pope et al., 2015). Indeed, Empowering Coaching™, to which the section will shortly turn to, shares similar issues to the MAC programme in this sense. Limited access to resources carries practical implications with coaches unable to acquire or apply knowledge; a situation that broadens the theory to practice gap and risks the topic of psychological climates becoming more esoteric.

Empowering Coaching™

Empowering Coaching™ is a programme designed to enrich the experiences of participants and maintain their long-term participation in sport through the creation of adaptive motivational climates (Duda, 2013; Larsen et al., 2015). Utilising analogous concepts across AGT and SDT (see Ntoumanis, 2001), Duda (2013) designed the programme to help coach practitioners create empowering climates and discourage behaviours that disempower. An empowering climate is characterised as high in autonomy support, relatedness support, and task-involving, whereas a disempowering climate is recognised as controlling, relatedness compromising, and containing ego-involving coach behaviours (Duda, 2013; Tessier et al., 2013). In their sample of Finnish athletes, Into et al. (2020) found that disempowering coaching environments were positively associated with burnout, supporting previous research by Appleton and Duda (2016). They also examined the implications of coaching climates on school burnout amongst their participants; their findings indicated that student-athletes who experienced disempowering climates also suffered burnout in school. Given the drive towards early specialisation in some sports (e.g., association football in the UK; see Wixey et al., 2021), and the low odds that specialising early will lead to a professional career (Callender, 2010), the risk of a young adolescent suffering from burnout in both their sport and studies is a major concern as both have potentially serious ramifications for their well-being and future endeavours.

A key premise of the Empowering Coaching™ programme is that the psychological climate can be more-or-less empowering and disempowering. This has been demonstrated in recent research (e.g., Into et al., 2020; Smith et al., 2016), highlighting that features of the motivational climate may be neutral in their empowering or disempowering effect. Indeed, Into et al.'s (2020) study found that climates possessing both empowering and disempowering features were experienced by 42% of participants. Given that adaptive motivational and psychosocial outcomes are assumed to evolve as a result of empowering environments, the *intermediate* climates identified in Into et al.'s (2020) and Smith et al.'s (2016) studies highlight the importance of coaches possessing the knowledge and capabilities to effectively promote strong features of an empowering climate in order to positively influence the overall psychological climate.

Duda (2013) distinguishes the Empowering Coaching™ programme from other frameworks in its intention to educate coaches and increase their awareness of the *what*, *why*, and *how* of motivation, motivational processes, and their consequences with respect to the psychological climate they foster. This is important when considering the dynamic nature of the psychological climate (e.g., training versus competition; Delrue et al., 2017; Smith et al., 2017), and the premise that the extent to which an environment is autonomy-supportive or disempowering depends on the salient (yet changeable) features of that environment (Duda, 2013).

The Empowering Coaching™ program was used by Larsen et al. (2015) to explore how grassroots coaches from France and Norway reflected upon their coaching practices. Eighteen participant coaches were led through a six-hour workshop that focused on *being* an empowering coach. The workshop provided strategies for creating an empowering environment structured around the acronym CLIMATE (cooperative contribution, learning emphasised, intrinsic focus, mastery orientated, authority with autonomy, taking others' perspective, evaluation of effort and improvement). Participant interviews revealed positive perceptions of the Empowering Coaching™ programme and its role in supporting them foster empowering environments for their players. The merits of the creating such empowering environments does not just stop with the players. For example, Solstad et al. (2018) found that coaches who promoted higher levels of empowering climates had higher levels of well-being at the end of the season than the disempowering coaches. This suggests that creating empowering environments is mutually beneficial for both the players and the coaches.

The frameworks discussed in this section have several overlapping features. Firstly, they all place an emphasis on recognising "effort" as a key mechanism for improving; TARGET and MAC are underpinned by AGT where effort is inextricably linked to learning in conceiving of ability in achievement setting (Nicholls, 1984; Ames, 1992). Although competence is described as a basic human need in SDT (Ntoumanis, 2001), the importance of effort still features as a characteristic of autonomy supportive coaching (Conroy & Coatsworth, 2007), and is utilised within the CLIMATE framework, which is a component of the Empowering Coaching™ programme (see Larsen et al., 2015). Second, and aligned closely to the promotion of effort, is the intention to shift participants' view of *how* competence is defined from norm-referenced (social comparison-based) to self-referenced. To help do this, TARGET, MAC, and Empowering Coaching™ all advocate the employment of task-involving coach behaviours. Third, all frameworks prioritise athlete autonomy, with each providing similar means to enable athletes to have a sense of ownership and capital within their development. Fourth, Empowering Coaching™ and MAC present both adaptive and aversive coach behaviours; illustrating the acknowledgement that an environment can be more-or-less empowering based upon the coach's actions (Duda, 2013, Into et al., 2020). Although not presented originally by Ames (1992), more recent TARGET literature has provided descriptors for ego involving features (e.g., Morgan & Kingston, 2010; Morgan et al., 2005), information that can help coaches to better predict the implications of their behaviours. Fifth, the interpersonal style of the coach was recognised as a key moderator of fostering autonomy supportive and mastery climates, a feature that was more recently suggested by Morgan (2017) as an important component that was missing from the TARGET framework. Finally, each approach gives a perspective on the content and manner of feedback with the frameworks recommending the use of positive and instructional feedback, and where possible, in a one-on-one situation.

Further Considerations When Creating Adaptive Psychological Climates

These frameworks each provide parameters for creating adaptive psychological climates. There are, however, several moderating factors that may need to be considered when trying to foster desirable climates and thus their athlete's motivational outcomes. Emerging from the literature to date, a number have evolved, each of which should be considered and these include: coach's capabilities, athlete level of participation, incongruence between coach and player perceptions, intervention approaches, and the role of reflective practice.

Coach's Capabilities to Foster Adaptive Psychological Climates

Coaches are well-positioned to significantly impact changes to an athlete's motivation through their influence on the psychological environment. Pritchard and Deutsch (2015) suggested that "the motivational climate is remarkably controllable" (p. 210), and research indicates that across sports, through their organisation and behaviours, many coaches are already acting to foster positive psychological climates for their players (Smith et al.,2006; Tessier et al., 2013). Within soccer, Tessier et al. (2013) analysed the psychological climates created during training by coaches (*n* = 57) from England, Greece, and France; they noted that coaches fostered more autonomy supportive climates than controlling ones. However, despite the positive evidence, and Pritchard and Deutsch's (2015) optimistic assertions, many coaches have described difficulties in managing the psychological climate during competition, where there is a tendency to promote (sometimes inadvertently) more controlling environments (e.g., Delrue et al., 2017; Smith et al., 2017). For example, Smith and colleagues analysed the coaching climates of 17 grassroot soccer coaches across both training and competition environments. Their analysis suggested that the coaches engaged in greater need-thwarting than autonomy-supportive behaviours during competition. Delrue et al. (2017), focusing on game-to-game variations in autonomy support and need-thwarting coaching behaviours, identified substantial differences across games indicating that coaches may promote both autonomy-supportive and need-thwarting behaviours; the latter leading to antisocial behaviours amongst the participants. In addition to supporting previous research (e.g., Hodge & Gucciardi, 2015) that portrayed the psychological climate as dynamic, Delrue et al. reasoned that this variation could be due to personal (e.g., coach's need satisfaction) or situational factors (e.g., opponents). This emphasises some of the challenges to maintaining an autonomy-supportive climate within competition settings when there are often more significant consequences to the outcome.

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Level of Participation

Although winning is often no less important in non-elite sport, additional pressures (e.g., financial gain, media, rewards, career longevity) within the elite echelons creates a natural necessity to be the best. However, given the maladaptive motivational outcomes of norm-referenced criterion (Harwood & Thrower, 2020), which may occur readily (given the competitive nature of elite sport), it is important that the psychological climate of these environments are carefully considered.

Within some elite youth sport settings (e.g., academies and other professional development organizations), the sole aim might be to produce professional athletes (e.g., elite youth soccer, Adams & Carr, 2019). However, it is important to note that early-specialisation settings where individuals engage in focused training in a single sport from a young age (Baker et al., 2009) has been associated with reduced levels of intrinsic motivation and enjoyment, and a reduced likelihood of ongoing participation in sport (Russell & Symonds, 2015). Therefore, the psychological climates of early specialisation settings need be carefully considered and designed.

Within some organisations there is a belief that experience of ego-involving climates are necessary to increase the likelihood of progressing to elite adult sport (d'Arippe-Longueville et al., 1998; Ommundsen & Roberts, 1999). Despite this perceived need to expose young players to ego-involving, controlling, or disempowering structures (e.g., soccer, see Cushion & Jones, 2006; Manley et al., 2012), research within professional sport has maintained that mastery climates and autonomy supportive coaching are favoured (by athletes), and result in positive motivational and behavioural outcomes (e.g., Hoigaard et al., 2008; Keegan et al., 2014; Pensgaard & Roberts, 2002). Keegan et al. (2014) interviewed 28 elite athletes to discuss the behaviours from significant social agents that were regarded as being motivationally relevant. They found that all social agents (coaches, peers, and parents) provided feedback and pre-performance motivating behaviours, whilst coaches and peers provided relationships and social interactions. Keegan et al.'s participants also reported that their respective coaches further influenced motivation through one-to-one coaching, task design, equal treatment, selection (processes), and the criteria through which they were evaluated. Despite these findings, the authors highlighted that motivational outcomes are likely to be moderated by both contextual and interpersonal factors. It is, therefore, of considerable importance for the coach to know their athletes when determining the value and efficacy of exposure to arguably less constructive motivational climates (Becker, 2013; Keegan et al., 2014) .

The value of positive coach-athlete relationships, and transparency in decision-making appears a similarly influential factor within elite sport settings. In one of the most successful international sport teams in recent history (the New Zealand All Blacks), an autonomy supportive environment was credited as being a central to their success in the lead up to their 2011 rugby union World Cup victory (Hodge et al., 2014). Hodge et al. (2014) examined the motivational climate of the All Blacks following a critical turning point (i.e., an incident at a social event) which led to players and coaches agreeing upon a dual-management leadership model; players were given more accountability, ownership, and became greater stakeholders in management responsibilities. Drawing parallels between their dual-management model and the principles of SDT (Ryan & Deci, 2020), Hodge et al. (2014) suggested that the offering of choice, encouraging of initiative, and empowering performance feedback supported the transformation of the team and its culture, while simultaneously supporting of the player's BPN. Despite the necessity to win, the research endorses the integration of autonomy supportive features within competitive elite sport settings (Hodges et al., 2014; Keegan et al., 2014).

Incongruence Between Coach and Athlete Perceptions of the Psychological Environment

One key tenet of AGT is that the subjective perceptions of the participants will determine their motivational outcomes (Ames, 1992); a premise that has been supported recently in literature (e.g., Gjesdal et al., 2018; Møllerløkken et al., 2017). Incongruence between coach and athlete perceptions can have a deleterious impact on motivational outcomes (Gjesdal et al., 2018), highlighting the value of congruence between the intended climate of the coach and how the climate is perceived by athletes. Møllerløkken et al. (2017), for example, found that grass-root soccer players (from 17 different teams in Norway) regarded the motivational climates they experienced to be more ego orientated and less mastery orientated than their respective coaches. Similarly, Gjesdal et al. (2018) examined the disparity in coach and soccer players' perceptions of the climate, enjoyment, goal orientations, and anxiety and found that when perceptual agreement existed for mastery climates there was positive correlation to enjoyment and team-rated task goal orientation, whilst perceptual agreement on ego climates demonstrated a positive relationship with ego goal orientation and anxiety and negatively correlated with enjoyment. Crucially, Gjesdal et al. (2018) reported that when the coach perceived the climate to be more mastery involved than their players, it also led to deleterious psychological effects for the participants. Given that incongruence appears common (i.e., Møllerløkken et al., 2017), and that there are potentially maladaptive consequences for such incongruency (Gjesdal et al., 2018), it is imperative that the coach not only employs mastery involving behaviours, but also reflects upon the strength of these features (Ames, 1992) ensuring that task involving features of the environment are not undermined by ego involving discourse (see Kingston et al., 2020).

Intervention Approaches

It has been argued that approaches to ongoing support following education on creating adaptive motivational climates is crucial to promote change within coaching practices (Stodter & Cushion, 2019), and should, therefore, be integral to education around the psychological climate within sport settings. Traditional coaching orthodoxies (e.g., soccer, see Champ et al., 2020), may, however, create some inertia to change, with coaches potentially opting for the safer and more tested methods of coaching (Cushion et al., 2012). As alluded to previously, coaches have a primary influence upon the psychological climate, and the consequential cognitive, affective, and behavioural outcomes for athletes. Consequently, for acquired knowledge to be applied effectively, coaches should be fully supported through this process.

Most commonly, interventions in motivational climate are based around educational workshops; these communicate to coaches the principles and strategies for creating adaptive psychological climates. For example, the studies using the MAC (Smith & Smoll, 2009) frameworks utilised a one-off workshop that lasted for 75 minutes with a supporting piece of literature designed specifically to reinforce the workshop and encourage coaches to apply their knowledge to practice (*Coaches Who Never Lose*, Smoll & Smith, 2005). Research evaluating this approach reported successful outcomes from the intervention, indicating the efficacy of including educational workshops (e.g., McLaren et al., 2015; Smith et al., 2007). In contrast, Langdon et al. (2015) reported that the participating coaches in their study were not able to significantly modify their autonomy supportive behaviours. In this case, their approach was to conduct a one-hour workshop to youth soccer coaches on the principles of creating a mastery climate, supplemented by weekly online modules for the coaches to complete. Reflecting on their lack of impact, the authors suggested a number of potential reasons for this (e.g., coaches demonstrated moderate autonomy supportive behaviours anyway, data collection during competitive time of the season), but primarily they felt that the intervention was too short-lived. Langdon et al. (2015) suggested that an intervention over an extended period may have further supported the volunteer coaches to modify their autonomy-supportive behaviours, echoing sentiments from Thompson and Pascal (2012) who suggested prolonged interaction helps to embed changes within practice.

Video analysis of coaching sessions has also been widely, and successfully, employed in conjunction with educational workshops to support coaches and help embed principles in fostering adaptive psychological climates (e.g., Conde et al., 2009). Partington et al. (2015) advocated the use of video feedback after their longitudinal study with five coaches in an English Premier League soccer academy. Their systematic analysis of video footage using the coach analysis and intervention system (CAIS, Cushion et al., 2012) was not only well-received by the coaches, but also lead to positive changes in coaching practices (e.g., use of questioning, decrease in concurrent instructing). In their intervention study, Cecchini et al. (2014) also used video analysis as part of a combination of intervention strategies (e.g., workshops, pre-designed sessions, and video analysis) to successfully train the coaches on the principles and application of TARGET structures. The utilisation of video analysis aligns well with the day-to-day experiences of many coaches, and hence is likely to be an appealing approach. Regardless of the specific training model adopted, it appears that prolonged engagement, reviewing coaching in action, and ongoing support are important to embed the integration of autonomy-supportive behaviours into a coaching environment.

Reflective Practice

Reflective practice is an examination of self which transforms experiences into learning (Knowles et al., 2014). It can be defined temporally as *reflection-in-action* (reflecting during live coaching episodes), *reflection-for-action* (the critical consideration of prior learning and future targets to effectively plan for action), *reflection-on-action* (reflections that occur after a time the situation can be affected), and *retrospective reflection-on-action* (reflections on a specific period of multiple incidents such as a sporting season; see Cropley et al., 2018). As highlighted in the previous section on incongruence, when reflecting on the impact they have, coaches need to be aware that the climate they intend to foster may not transfer to the reality of the climate once they are in it (i.e., “the map is not the territory”; Andersen, 2006). Therefore, given the dynamic nature of psychological climates, coaches should be active (and reactive, see Smith & Smoll, 2012) to the evolving environment, and willing to shape the climate that they have agency to change (see Cropley et al., 2018). To support a coach’s readiness to adapt the psychological climate during training or competition, coaches can consider developing their reflective practice capabilities. For example, although challenging (Cropley et al., 2016), reflection-in-action is a valuable mechanism for a coach to be able to utilise and is integral to the contextualisation and application of knowledge *in action*, which may help to bridge the theory to practice gap. A mechanism to support reflection-in-action that has received recent attention is the Think Aloud protocol (for a more extensive overview, see Whitehead et al., 2016). Think Aloud is a method that promotes reflection whilst coaches are within live coaching sessions and will be discussed, briefly, later in the chapter. Reflection-on or -for-action can be supported through a range of approaches that occur outside of the performance environment, and methods may include journals, mind-maps, visual cues, recordings, critical friends, or use of online blogs (Knowles et al., 2014). According to Andersen et al. (2004), if a coach has a positive attitude towards engaging in reflective practice (e.g., open-mindedness; whole-heartedness; commitment to engage in a formal process of experiential learning), they will in turn develop as a reflective practitioner. Further, this ability to utilise reflection as a mode of practice will undoubtedly assist the coach in fostering the desired psychological climates for their athletes (Bowley et al., 2018).

Strategies to Develop Adaptive Psychological Climates

The coach has significant influence over an athlete’s motivational outcomes (Cronin & Allen, 2018) and thus it is imperative that they can create adaptive psychological climates for individuals to thrive. This chapter has considered two theories that have underpinned much of our knowledge on psychological climates to date (i.e., AGT and SDT), and in doing so examined the application of three espoused frameworks designed to support the promotion of adaptive psychological environments (i.e., TARGET, MAC, and Empowering Coaching™). Although they adopt different approaches, several common themes became evident, and it is these that we will scrutinise. They include: (a) task-involving features of the environment; (b) promoting autonomy for participants; (c) a focus upon effort; (d) coach behaviours; and (e) interpersonal coaching style. Moreover, based upon research to date, it was deemed important for coaches to be aware of the factors that can moderate their ability to foster a desired psychological climate (i.e., coach capabilities, elite level of participation, incongruence of perceptions, intervention approaches, and reflective practice). These considerations, along with the overlapping concepts, will help to inform the strategies presented in Table 21.1, with each being described in further detail to support their application to practice.

Strategies have been organised around three general themes: *design*; *coach-athlete interactions*; and *monitoring*. The strategies and guiding principles are informed by the most salient, and overlapping implications resulting from an interrogation of the literature. Our objective is to provide informed guidance on how to promote psychological climates that are associated with positive motivational outcomes for participants at any level of sport. One key feature of Table 21.1 is the inclusion of associated aversive behaviours (i.e., controlling coach behaviours, need-thwarting behaviours, ego-involving criteria). These characteristics are highlighted to increase awareness and facilitate understanding of the behaviours that may create a disempowering climate, such that coaches can more effectively gauge and recalibrate their psychological climate if required. Within the MAC (Smith & Smoll, 2006) and Empowering Coaching™ (Duda, 2013) programmes, emphasis is placed upon the coaches being self-aware, but also as Bartholomew et al. (2011, p.1469) highlighted, such aversive coach behaviours are not necessarily the "opposite side of the same coin" but rather they can co-occur alongside autonomy-supportive criteria. Further, knowledge of the potentially aversive behaviours alongside the associated strategies to promote autonomy supportive environments may help coaches in more competitive environments (e.g., elite youth sport) manage the psychological climate effectively.

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Design

When designing the psychological climate, coaches need to have a clear destination in mind (i.e., "what I am seeking to achieve for these athletes?"). The coach can start by considering what some of the key features that they believe, over time, will be most effective for development of their athletes and achievement of this goal (e.g., "how is success represented?", "what key skills are we working on?"). This "curriculum" can consider level of participation, stage of development (see, Wylleman et al., 2004), and type of talent pathway (e.g., early specialisation). In planning individual sessions, coaches can then reflect on *where* their athletes are, *what* they currently require, and *how* the individual session fits into their overall curriculum. These steps may combat an *ad-hoc* approach to designing psychological climates, with the coach able to provide a structure that consistently promotes patterns of adaptive behaviours (Ames, 1992).

Embedded within the design of individual sessions should be a consideration for the personal goals of participants, and how to provide each athlete with the opportunity to develop towards or achieving their personal goals. While their goals may not be explicit within the session, as part of their development plans, players should be made aware of how they may facilitate goal achievement through session content and aims. Personal goals accompanied by a rationale from the coach (demonstrating greater involvement from the coach), may serve to enhance the relatedness for an athlete and give them a sense of belonging (Gilchrist & Mallett, 2017; Reinboth et al., 2004). It is, therefore, important to consider athlete goals at the design stage, rather than "shoehorning" them in after by only including the players as an afterthought. One final consideration for design relates to the structure of tasks or activities. Given their nuanced motivational impact, it is important that coaches reflect on the tasks they intend to prescribe to their athletes, ensuring activities are as far as practicable, challenging, varied, differentiated, and promote problem solving.

Table 21.1
Strategies to Support the Development of Adaptive Psychological Climates Within Sport

	Autonomy-Supportive Strategies	Guiding Principles	Associated Aversive Coach Behaviours	Literature Informing Espoused strategy
Design	Planning	Consider: the stage of the athletes' development, personalities, personal goals, and the experiences they require Map the intended psychological environments that athletes will experience over time Decide which features are going to be emphasised to support the intended climate Provision of stable and consistent autonomy supportive climates Plan how athlete's BPN will be satisfied	Ego-involving structures emphasised A (default) disempowering environment	Delrue et al. (2017); Into et al. (2019); Kingston et al. (2020); Ommundsen & Roberts (1999); Smith & Smoll (2012)
	Goals	Task objectives and rationale (for learning) communicated, notably when tasks promote social comparison. Emphasis on individual skills & roles, with ongoing guidance relative to personal goals. Reflective thinking re: goals and skill development is encouraged and supported through monitoring of goals.	Goals are norm-referenced Focus solely on the outcome No individualised goals	Ames (1992); Kingston et al. (2020); Mageau & Vallerand (2003)
	Structure	Task-focused and cooperative Sessions/tasks should be varied and challenging, promoting problem-solving Instructions – clear, with expectations of learning included. Defined progressions with creativity encouraged where possible.	Monotonous activities with little challenge Coach has dominant presence during activity Learning or progress is not communicated or clear	Ames (1992); Kingston et al. (2020); Mageau & Vallerand (2003)

Table 21.1 (continued)

Coach-athlete Interactions	Relationships	Get to know your athletes Afford time to communicate equitably with all athletes Use of humour Be empathetic	Use of sarcasm without prior knowledge that it will be positively received by athlete Conditional regard Intimidation Making athletes feel isolated	Bartholomew et al. (2010); Becker (2013); Deci & Ryan (2002); Keegan et al. (2014); Morgan (2017); Mageau & Vallerand (2003)
	Feedback	General encouragement and support throughout group situations/practices Recognition given for effort, persistence and effective problem-solving. Focused on task requirements, with links made to individual roles and personal goals. Feedback should be unconditionally positive, and meaningful.	Public and negative, verbal and non-verbal, feedback Players recognised for outperforming others Select few athletes receive praise Draw attention to mistakes with public and punitive consequences	Ames (1992); Bartholomew et al. (2010); Deci & Ryan (2002); Duda (2013); Mageau & Vallerand (2003); Smith & Smoll (1996); Smith & Smoll (2012); Smoll & Smith (2020)
	Empowerment	Rationale provided for tasks, with opportunity for player input. Authentic opportunities for player decision-making, e.g., timing or nature of progressions. Acknowledgment and value attached to player perspectives.	No opportunity for players to self-regulate their learning Inauthentic/contrived opportunities for athlete input Exerting excessive control	Ames (1992); Bartholomew et al. (2010); Deci and Ryan (2002); Duda (2013); Into et al., (2020); Kingston et al. (2020); Mageau & Vallerand (2003)

Table 21.1 (continued)

Monitoring	Reflection-On-action	Reflect upon the climate created against the desired outcomes, and note any changes to make for the next session Use of video footage to analyse climate created Utilise other coaches or sport psychologists to provide feedback Reflect on individual psychological development of athletes	Duda (2013); Knowles et al. (2014); Stodter & Cushion (2019); Partington et al. (2015); Smith & Smoll (2012); Whitehead et al. (2016)
	Reflection-For-action	Consider the design of the curriculum and how knew knowledge can be integrated into that plan Apply what has been learnt from reflecting-on-action	
	Reflection-In-action	Interpret the status of the climate and salient features Continually review ways to emphasise autonomy-supportive features of the climate Remain active and aware of evolving ego climate	

Coach-Athlete Interactions

Given that motivational outcomes are idiosyncratic (Keegan et al., 2014), knowing your athlete becomes an important part of creating an adaptive psychological climate (Becker, 2013; Morgan, 2017). Coaches are advised to work on building and maintaining high quality relationships, communicating equitably with each individual participant. Specifically, Jowett (2017) has highlighted that high quality relationships are founded on closeness (e.g., depth of emotional attachment); commitment (e.g., dedication to maintaining the relationship over time); complementarity (e.g., cooperative and effective interaction); and co-orientation (e.g., shared principles for goal striving). Where possible, coaches should strive to afford time and space to get to know their athletes and to build relationships. For example, age-appropriate humour could facilitate the building of relationships potentially playing a crucial role in making the more "serious" of sport environments more palatable for performers to commit to (Morgan, 2017; Ronglan & Aggerholm, 2013; Ronglan & Aggerholm, 2014). However, despite good intentions, coaches should be aware that humour *at someone* (Ronglan & Aggerholm, 2014) may be counterproductive. Indeed, Owusu-Sekyere and Gervis (2016) found that elite youth soccer coaches used banter as the primary method of developing a players' mental toughness; a behaviour that the authors suggested to be more aligned to a form of emotional abuse. It is important to recognise that such banter or other forms of ridicule may have deleterious effects, undermining the sense of relatedness an athlete may have towards a group or their coach (Ronglan & Aggerholm, 2013).

A more general principle is that coaches should seek to provide opportunities for individual and positive feedback, while understanding that positive feedback also includes instructional guidance (Becker, 2013). Public feedback relating to mastery behaviours (e.g., high effort levels, ability to overcome mistakes, and problem-solving) can help develop an athlete's perceptions of competence (Reinboth et al., 2004). In contrast, coaches are discouraged from drawing public attention to mistakes or employing punitive measures (e.g., verbal abuse or physical punishments) as a form of feedback; controlling-behaviours such as these have been reported to undermine (thwart) individual's basic psychological needs with resultant negative psychological outcomes (Bartholomew et al., 2011).

When interacting with their athletes, coaches are encouraged to facilitate a sense of empowerment within every athlete; this translates to the athlete having a feeling ownership over their own development and choice within the specific achievement environment (Morgan, 2017). Empowerment is a characteristic described in both AGT (Nicholls, 1984) and SDT (i.e., BPNT, Deci & Ryan, 1985; 2000; Ryan & Deci, 2020) literature and represented under the authority structure within the TARGET framework. To help empower, coaches can provide space for athletes to share their thoughts while they actively listen, value, and act (authentically) upon the athlete's opinions (Duda, 2013; Morgan, 2017). Such opportunities may arise during one-to-one interactions with athletes, for example during feedback or general conversations, or during team discussions such as water breaks, performance analysis sessions, or team talks (see Middlemas & Harwood, 2017). Coaches can also adapt their session design to provide opportunities for athlete ownership. This may come in the form of giving time for athletes to work on a skill of their choice, providing options regarding how to progress the practice, giving opportunity for athletes to feedback to the coach during sessions, or overtly employing suggestions made by athletes.

As much as focusing on empowerment, coaches should be aware of the disempowering climates that competition environments can elicit (Gjesdal et al., 2018; Smith et al., 2017). They should readily employ mastery coaching behaviours that can go some way to buffering against the motivational impact of a situation that naturally focuses upon norm-referenced competence (i.e., winning). In these instances, coaches may wish to orchestrate opportunities to interact individually with athletes (e.g., before competition, during breaks, or post competition) to provide positive and instructional information or feedback. If available, assistant coaches can be deployed to maximise interactions with individual athletes. When opportunities for one-to-one communication are minimal, given the public nature of competition, coaches are encouraged to only provide positive and general public feedback during events. Considering the challenges of interacting with athletes during competition, peer-interactions become an important feature of the team sport environment. Coaches may want to work with athletes (in training at first) on how to effectively communicate with one another during competition, asking athletes to recognise adaptive behaviours in one another (e.g., effort and overcoming of mistakes), and to give each other task-focused and positive feedback.

Monitoring

The motivational climate is a dynamic component of an achievement environment and therefore requires constant monitoring, appraising, and actioning (Smith et al., 2015). Coaches should try to be active agents within the achievement environment, acting as a bridge between the physical environment they set up (i.e., the drills) and the perceived motivational climate of athletes (i.e., how success is perceived to be determined).

To further support their management of the climate it is recommended that coaches develop their ability to reflect *in-action* (Schön, 1984). The employment of the Think Aloud protocol (Whitehead et al., 2016) may be a useful process to undertake to enhance reflective practice and support the management of the psychological climate. In short, Think Aloud requires coaches to concurrently talk through what they are thinking during a practice (for a full overview of the programme we refer readers to Whitehead et al., 2016). Coaches wishing to monitor their psychological climate might narrate to a microphone, or if unavailable, to an assistant coach or to themselves. Narrations might include the key influencers of the psychological climate, for example: “What are athletes being recognised for?”, “How are the players being evaluated?”, “What autonomy do the athletes currently have?”. Coaches can then review their own action plan, and how they may combat any potential disempowering or need-thwarting features that are present. Indeed, the programme itself may help prevent autonomy or need thwarting coach behaviours. Indeed, participants in Whitehead et al.’s (2016) study reported that the explicit commentary made them pause before they delivered harsh feedback to athletes.

Following reflection-in-action it is suggested coaches engage in *reflection-on-action*, a retrospective type of reflective practice which occurs outside of a situation that can no longer be influenced (Knowles et al., 2014; Whitehead et al., 2016). In relation to the topic of the current chapter, a coach can reflect upon their design, interactions, and monitoring of the psychological climate, considering the extent to which the climate they fostered supported the intended aims (see Gilbourne et al., 2013). The principles outlined in Table 21.1 might serve as a useful starting point, (e.g., “Was my feedback positive throughout that session?”, “Were there any individuals who I gave negative and public feedback to?”). The medium that coaches reflect through is their prerogative, examples include pen and paper notes, journals, social networks, mind-maps, photographs, or recordings (Cropley et al., 2018). Having gone through this reflection-on-action process, coaches can then systematically consider how to action what they have learnt in practice, a process of *reflection-for-action*. This may require coaches to reflect upon their curriculum (perhaps with peers) and appraise how they may integrate what knowledge they have acquired from reflecting-on-action into future psychological climates. Ultimately, just like planning and implementing strategies to support the psychological climate, the development of the climate itself will therefore become an iterative process, it evolving as the coach develops as a reflective practitioner.

Conclusion

The coach has a considerable influence over the psychological environment experienced by athletes, and therefore has significant responsibility to promote adaptive environments that promote positive cognitive, behavioural, and affective outcomes for those involved. This chapter has sought to provide an overview of the central theories that have underpinned much of the research regarding psychological climates to date, along with a description of the frameworks, and as discussion of their efficacy in promoting adaptive environments. Further considerations were also discussed to provide the coach practitioner with a more rounded view to better support their application of acquired knowledge. The chapter culminated in advocating several strategies, each with guiding principles, to support the creation of autonomy-supportive environments. These strategies were also aligned to disempowering coach behaviours to prompt greater self-awareness amongst coaches, which, it is anticipated, will assist coaches to calibrate and manage their impact on psychological climates.

Coaches are the gatekeepers to the positive psychological outcomes that sport participation can bring to individuals. We would encourage coaches at all level to consider how they might apply the principles outlined in this chapter, not just for the benefit of their players' motivation, performance and psychological well-being, but also for their own.

Learning Exercises

1. How has research, underpinned by AGT and SDT, informed our knowledge of psychological environments to date?
2. What are the commonalities in terms of strategies advocated according to the AGT and SDT approaches to promoting effective coaching environments?
3. What strategies can coaches employ to support their development of an adaptive psychological environment?
4. Within your own coaching practice, which strategies are you going to prioritise to support the promotion of an adaptive psychological environment in training?
5. Which strategies will you aim to emphasise within competition to help foster an adaptive psychological climate for athletes?

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Chapter 22
Self-Control in Sports

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Chapter Overview

Imagine yourself walking to the gym in the rain after a long hard day at work. Picture yourself lifting heavy weights, even though you would prefer sitting on the sofa watching your favorite baseball team win a playoff match. This is just one sports-related example during which self-control processes enable us to keep striving for a desirable goal and suppress potentially tempting action alternatives. In general, "self-control refers to the capacity for altering one's own responses, especially to bring them into line with standards such as ideals, values, morals, and social expectations, and to support the pursuit of long-term goals" (Baumeister et al., 2007, p. 351). However, self-control is not always applied effectively as, for instance, evidenced by the large number of gym dropouts every year (e.g., Englert & Rummel, 2016).

In this chapter, we will discuss empirical findings that highlight the importance of self-control for sports-related performance and we will introduce the theoretical accounts that try to explain why self-control sometimes appears to fail. Finally, we will discuss open research questions in order to improve our understanding of how self-control operates and why it cannot be applied at all times and at all costs.

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Self-Control and the Sensation of Effort

Research on self-control[1] has a long tradition: Narcissus Ach conducted the first studies on self-control already in the beginning of the 20th century (Ach, 1905, 1935). In general, there is a common agreement amongst researchers that exerting control over the self can be a tiring and unpleasant experience. In the mid-20th century, Hull already stated that impulses or response tendencies have a motivational strength, suggesting that in order to resist these tendencies one must invest some kind of effort or willpower (Hull, 1943). Thus, the application of self-control is intrinsically linked to the sensation of effort (e.g., Kurzban, 2016; Shenhav et al. 2017). This sensation commonly refers to "the particular feeling of that energy being exerted" and is associated with "a sensation of strain and labor, a feeling that intensifies the harder a person tries" (Preston & Wegner, 2009, p. 570). This feeling of work is associated with voluntary actions and provides crucial information for the judgement of personal actions (Preston & Wegner, 2009).

Self-Control and Sports Performance

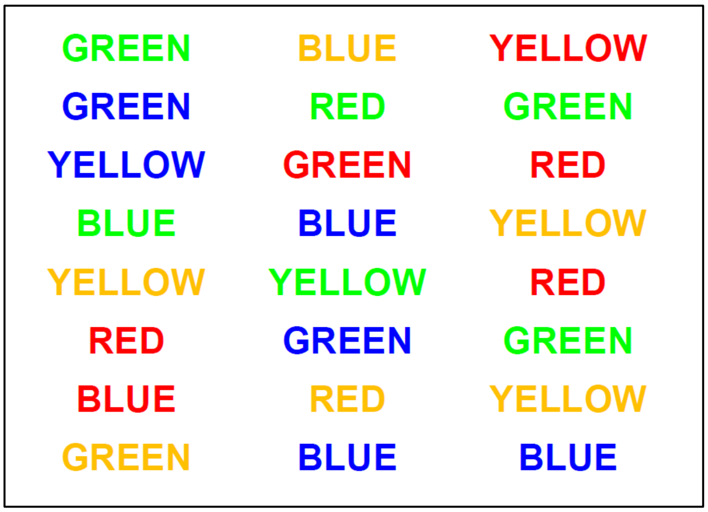
Imagine you had a long day at work, where you had to face multiple self-control demands: For example, you had to perform a very tedious task, where you had to enter an endless string of numbers into a spreadsheet. Additionally, your colleague was constantly talking loudly on the phone and you had a hard time concentrating. It is very likely that after this day you feel mentally drained and can't (see heading *Can't: Does the application of self-control deplete a limited resource?)* or won't (see heading *Won't: Does self-control reflect a reward-based choice?*) invest the mental effort that would be required to beat your personal best in a 10.000 meter run. The bulk of self-control research in sports has focused on precisely this phenomenon: the effect of prior self-control application on subsequent sports performance (for two recent meta-analyses and one book chapter, see Brown et al., 2019; Giboin & Wolff, 2019; Pageaux & Lepers, 2018).

In this line of research, scientists primarily adopt a *two-task-paradigm*: A primary task which either does or does not require the exertion of self-control or intense mental effort and a subsequent secondary task which requires self-control from all participants (e.g., Muraven et al., 1998). One of the most frequently administered self-control tasks is the *Stroop* task during which participants work on a series of color words which are either written in the same font color as the color word (e.g., "red" written in red font color; congruent trial) or in a different font color (e.g., "red" written in yellow font color; incongruent trial; Stroop, 1935; see Figure 22.1). To correctly identify the incongruent trials, one must override the dominant tendency to read the color word and instead name the font color. It has frequently been shown, that participants who have worked on a series of incongruent Stroop trials tend to perform worse in secondary self-control tasks than participants who have previously answered the congruent version of the Stroop task (e.g., Bray et al., 2011; Englert & Wolff, 2015). To assess the effects of prior mental exertion on sports performance, performance in specific sporting tasks is used as a secondary self-control task in sport psychology research. For example, Boat and Taylor (2017) asked their participants to perform a wall-sit-task for as long as possible after having worked on a primary task, which either did or did not require self-control. The results revealed that the wall-sit durations were significantly shorter in participants who had to control their impulses in the previous task. Thus, the primary self-control task had reduced the capability or willingness to apply the self-control that would be required to do well in the wall-sit task (also see Zering et al., 2017). Englert and Wolff (2015) tested the effects of prior mental exertion on endurance performance in an indoor cycling task. In their study, participants performed the indoor cycling task at two times of measurement. The experimental setup was almost identical with the only difference being that at one time of measurement participants

[1] According to Duckworth and Kern (2011), the terms self-regulation, willpower, or inhibitory control are synonyms for self-control and supposedly capture the same psychological phenomenon.

worked on a self-control demanding primary task (i.e., incongruent Stroop task), while at the other time of measurement they completed a less self-control demanding primary task (i.e., congruent Stroop task). Again, participants performed worse after they had worked on the self-control demanding primary task, compared to when they worked on the less demanding primary task. Apparently, the same participants were less capable or less willing to push themselves to their limits during the cycling task if they had to control their impulses in the previous task (see also, Martin Ginis & Bray; 2010; Wagstaff, 2014). In line with these studies, meta-analytic evidence supports the notion that prior mental exertion is a detriment to subsequent sports performance (Brown et al., 2019; Giboin & Wolff; 2019).

Figure 22.1
Illustration of the Stroop task



Note. Categorizing the words' font color is easier and faster when font color and meaning match ("congruent") compared to when they differ ("incongruent").

Research has also shown that prior mental exertion impairs sports-related performance under pressure (for an overview, see Englert, 2015; Englert & Bertrams, 2015). In general, anxiety negatively affects efficient attention regulation as anxious individuals are more likely to be distracted by irrelevant stimuli (e.g., the crowd or worrying thoughts; e.g., Wilson et al., 2009). In order to shift the focus away from the irrelevant stimuli onto the actual task at hand, self-control is highly important (Schmeichel & Baumeister, 2010). However, if prior mental exertion affects the capability or willingness to effectively apply self-control, it should be more difficult to flexibly shift attention away from these stimuli, potentially affecting performance. Empirical evidence has reliably supported this assumption. For instance, Englert and Bertrams (2012) instructed basketball players to perform a series of free-throws under high and low anxiety conditions after having worked on a self-control demanding or a non-demanding primary task. In the high anxiety condition, participants scored a significantly lower number of successful free-throws when they had worked on the self-control demanding primary task, compared to those who had worked on the non-demanding task (see also, Englert & Bertrams, 2015; Englert, Zwemmer, Bertrams, & Oudejans, 2015; Shin et al., 2019; Yang et al., 2019).

Prior Mental Exertion Does Not Impact All Types of Physical Performances

Since the study of Marcora et al. (2009), the effects of prior mental exertion on subsequent physical performance has also been a growing topic of interest for exercise (neuro)physiologists. While these researchers mainly refer to mental fatigue induced by prolonged engagement in cognitively demanding tasks, they are using similar experimental setups involving the sequential task paradigm (for reviews, see Brown et al. 2019; Pageaux & Lepers 2018). In these studies, the classical Stroop paradigm is used, as well as other tasks such as the AX Continuous Performance test known to involve sustained attention, working memory, and response inhibition processes. The principal difference between the two approaches is that exercise neurophysiologists traditionally use longer primary tasks compared to the psychological self-control researchers (50±27 vs 5±3 minutes; Giboin & Wolff, 2019).

During sporting events, athletes' performance is linked to their ability to accurately and efficiently produce different types of physical performance. As an example, during a game, basketball players are confronted with physical efforts that drastically differ in nature. They have to sprint as fast as possible in a fast break situation to take advantage of the defense, throw the ball as accurately as possible to score points, decide when to pass the ball to their teammate in the most accurate timing, or have to repeat a vast number of efforts over the course of the game. These examples in the context of basketball illustrate that athletes' performance can be subdivided into their ability to a) produce a given speed, power or force as fast as possible (i.e., maximal force production, sprinting), b) efficiently perform goal-directed movements (i.e., motor skills performance, shooting), c) make accurate decisions based on the information provided by the environment (i.e., decision-making performance, passing), and d) repeat their effort for a prolonged duration (i.e., endurance performance). Therefore, athletes and coaches would greatly benefit from research that specifically assesses the effects of prior mental exertion on each subgroup of physical performance that is required in sports.

Interestingly, a recent meta-analysis questioned the magnitude of the detrimental effect of prior mental exertion, also referred to as mental fatigue, on subsequent physical performance (Holgado et al., 2020). However, it is important to note that this effect size is likely to hinge on the specific nature of the subsequent physical performance. It is plausible that due to differences in physiological and psychological demands of different sports-related performances, prior mental exertion could differentially impact these various performances. This possibility has not been accounted for in this recent meta-analysis. Building on this rationale proposed by Pageaux and Lepers (2018), Brown et al. (2019) confirmed in their meta-analysis a performance dependant effect of prior mental exertion. It appears that contrary to endurance performance, motor skills performance and decision-making performance, maximal force production is not impaired by prior mental exertion. In other words, when an athlete is mentally fatigued, their sprinting or jumping performance is unlikely to be affected, whereas their endurance performance, movement precision or decision making are all likely to suffer.

While further research is needed to better understand why prior mental exertion specifically impacts some types of physical performances, it is worth noting that the only subgroup of physical performance not impacted by mental fatigue, maximal force production, is the only kind of performance where self-control might not be critically present. Indeed, in this kind of performance, the athlete has to produce an all-out-effort that does not require taking any specific decisions and/or choosing between different conflicting action alternatives (e.g., endurance: deciding to quit / slow-down or not; motor skills: choosing and executing the appropriate movement; decision-making: choosing an action between different action alternatives). This observation reinforces the link between the self-control and mental fatigue literature, and highlights the need of multidisciplinary research breaking the traditional barriers between sport psychology and exercise (neuro)physiology to better understand how sports-related performance is regulated.

Self-Control Failures: Can't or Won't?

As we have seen so far in this chapter, a large body of empirical evidence attests to the importance of self-control for sports performance (for a review, please see Englert 2017, 2019). Particularly, the detrimental effects of prior mental exertion on subsequent physical performance has been well supported (Brown et al., 2019; Giboin & Wolff, 2019; see also Pageaux & Lepers 2018). This begs an important question: Why does prior mental exertion have these detrimental effects? Or more generally, what are the operating principles that underlie the application of self-control, and why does it sometimes appear to fail?

To answer these questions, a plethora of theoretical models have been developed in recent years (Baumeister, 2003; Kool & Botvinick, 2014; Kurzban et al., 2013; Shenhav et al., 2013; Shenhav et al., 2016; Wolff & Martarelli, 2020). While most researchers seem to agree on the observation that applying self-control is perceived as effortful and produces some form of cost, there is less agreement on the nature of this cost (Shenhav et al., 2017). Broadly, one theoretical branch proposes that the exertion of self-control reduces the *capacity* to further apply self-control (Baumeister, 2003), while the other branch proposes that it reduces the *willingness* to apply self-control (Inzlicht & Schmeichel, 2012).

Photo by Karolina Grabowska from Pexels

Can't: Does the Application of Self-Control Deplete a Limited Resource?

One of the most prominent theoretical explanations for the observation that we do not apply self-control consistently conceives self-control as a limited resource (Muraven et al., 1998). Such resource-based accounts assume that individuals are less adept at controlling themselves after having previously engaged in another self-control demanding task (e.g., Audiffren & André, 2015; Englert, 2017, 2019). The resource-based account that has shaped the last 20 years of psychological self-control research is the strength model of self-control (e.g., Baumeister et al., 2007). The strength model postulates that there is only a limited amount of self-control strength available at a given point of time (e.g., Baumeister et al., 2007). Supposedly, all actions which require self-control draw upon this finite resource, meaning it is not domain-specific. Importantly, according to the strength model, the resource can become temporarily depleted after a primary self-control act and is not immediately replenished, which is a state labelled as *ego depletion* (e.g., Muraven et al., 1998). The strength model of self-control has been frequently adopted to explain sports-related performance in several domains (e.g., endurance performance, impulse regulation, performance under pressure; for an overview, Englert, 2017, 2019; see also Ntoumanis, 2014). Thus, according to the strength model of self-control, the detrimental effect of prior mental exertion on subsequent sports performance is due to ego depletion: The self-control demanding task depletes the participants' self-control strength, thereby leaving them unable to perform the sporting task as efficiently as their non-depleted peers, who had performed a less self-control demanding primary task.

Despite their popularity and intuitive appeal, resource-based accounts have recently been questioned on empirical (e.g., Wolff, Baumann, & Englert, 2018; Wolff, Sieber, et al., 2019) and on theoretical grounds (e.g., Inzlicht & Berkman, 2015; Inzlicht & Schmeichel, 2012; Kurzban et al., 2013). In 2016, the results of a preregistered replication report did not find any significant empirical evidence for the ego depletion effect (Hagger et al., 2016) and also other replication attempts often failed to support the assumptions of the strength model (e.g., Blázquez et al., 2017; Vohs et al., 2021; Witte & Zenker, 2017), raising questions regarding its validity. In addition, the robustness of the ego depletion effect has further been questioned by research pointing towards evidence for publication bias and to a large body of grey literature in ego depletion research (Wolff, Baumann et al., 2018). It is important to note that most of the published replication failures have been outside the sports context and two recent sports-related meta-analyses of the published literature revealed that prior mental exertion was related to lower endurance, motor skills and sports-related decision-making performances (Brown et al., 2019; Giboin & Wolff; 2019). In addition, if prior mental exertion depletes a resource, then the performance impairment on the secondary task should scale as a function of the primary tasks' duration (Hagger et al., 2010). While some researchers have found such a relationship (Boat et al., 2020; Brown & Bray, 2017), other large scale studies have failed to do so (Wolff, Sieber, et al., 2019), and the two meta-analyses by Giboin and Wolff (2019) and Brown et al. (2019) revealed that task duration was unrelated to the subsequent drop in endurance performance. In light of these findings, researchers have increasingly turned to explain the application of self-control as a reward-based choice, thereby circumventing the notion of a limited (but not yet identified) self-control resource (Kurzban et al., 2013).

Won't: Does Self-Control Reflect a Reward-Based Choice?

Emerging evidence on the effect prior mental exertion has on subsequent performance is not fully in alignment with the notion of limited resources. In addition, it has been argued that without specifying and identifying *which* physiological resource becomes depleted when self-control is applied, then the notion of resources represents an unnecessary assumption (Inzlicht & Schmeichel, 2012). To illustrate, if you do not perform well on a secondary task after having applied self-control in a primary task, then this drop in performance must not necessarily mean you *can't* perform well. It might simply mean you *won't* be willing to perform another effortful self-control task. Indeed, research shows that the effects of prior mental exertion can be readily offset; for example, by incentivizing the secondary task with money (Muraven & Slessareva, 2003), thereby indicating that subsequent performance impairments might rather be a motivational phenomenon. This finding is hard to reconcile with the notion of limited resources. However, it also shows that applying self-control is indeed costly and people are only willing to incur these costs if the prospective outcome is worth the effort. In line with this reasoning, recent theoretical and empirical work has focused on explaining the costs of self-control beyond limited resources, as well as on the decision processes that govern the application of self-control (e.g., Kurzban et al., 2013; Shenhav et al., 2013; Wolff & Martarelli, 2020).

Beyond Limited Resources: Why is Self-Control Costly?

If self-control indeed does not rely on a global depletable resource but is nevertheless costly to apply, what is it that makes self-control costly? Various explanations have been put forward to explain the costs of self-control and these must not be mutually exclusive (Shenhav et al., 2017).

One explanation that has been supported by recent computational work is that applying self-control produces the sensation of effort due to functional processing constraints in the brain (Feng et al., 2014). According to this view, the brain has developed a preference for sharing neural representations (i.e., a preference for multiplexing) between various mental operations because this facilitates learning (Musslick et al., 2016). The reliance on shared representations for different operations severely limits our capacity for multitasking (i.e., for doing multiple tasks simultaneously), and tasks that tap into the same neural representation require self-control to avoid the detrimental impact of "cross-talk" that occurs when two tasks compete for the same local processing resource (Cohen et al., 1990). To illustrate, during an incongruent Stroop trial, the automatic response would be to categorize the word according to its meaning and this interferes with the task demand of categorizing it according to its font color. The perceived effort that co-occurs with applying self-control then indexes the costs that arise when tasks compete for the same neural representation and require self-control to prevent cross-talk (Shenhav et al., 2017). This explanation can account for replication failures in ego depletion research, where, instead of performing worse, participants sometimes even improved on a self-control demanding secondary task over time (Wolff, Sieber, et al., 2019): Longer exposure to an initially self-control demanding task is expected to make this task less reliant on shared representations and allow for a more automatic task execution (Cohen et al., 1990). This might be one reason for the heterogeneous findings in regard to the effect of primary task duration on subsequent performance in the ego depletion and mental fatigue literature.

Beyond costs that are intrinsic to the application of self-control, it has been proposed that self-control produces opportunity costs (Kurzban et al., 2013). According to this view, applying self-control towards one goal implies that one has to forego behavioral alternatives that might be pursued instead. Thus, while one is responding to an incongruent Stroop trial, one cannot use valuable processing capabilities for a task that might be more rewarding. The perceived effort that arises when self-control is applied is then thought to signal the incurred opportunity costs. This explanation can, for example, explain replication failures in ego depletion research, where participants perceived to be depleted (i.e., they perceived the task to be very costly) and the amount of perceived depletion scaled as a function of task duration (i.e., the longer the task, the costlier it felt), but did not show signs of impaired performance (Wolff, Sieber, et al., 2019). Thus, although a task produced very high opportunity costs, this did not impair performance because presumably no resource had been depleted. Likewise, an opportunity cost account on self-control can explain why monetary incentives offset ego depletion effects: If applying self-control yields a sufficient reward then it should make the costs worthwhile.

Taken together, functional processing constraints and opportunity costs provide compelling alternative explanations as for why the application of self-control is costly. An opportunity costs account also points to the conditions under which people are willing to incur these costs: the rewards need to outweigh the costs of self-control.

Self-Control as a Reward-based Choice: The Expected Value of Control (EVC)

In light of the well-established costs of applying self-control, researchers have become increasingly interested in explaining the conditions under which people are willing to incur these costs. Similar to opportunity cost accounts of self-control, most recent theoretical accounts conceptualize self-control as a reward-based choice, in which the benefits of an ongoing activity are pitted against the costs of the self-control that is required to continue with this activity (Kool & Botvinick, 2014; Shenhav et al., 2013, 2016). For example, while one might see substantial prospective benefits in running (e.g., getting in better shape), this benefit needs to outweigh the self-control costs one incurs when running despite being tired. One recent theory that has gained a considerable amount of traction is the Expected Value of Control (EVC) theory (Shenhav et al., 2013, 2016). EVC theory integrates assumptions from other reward-based theories and provides a mathematically explicit and mechanistically coherent framework for explaining self-control. In a nutshell, EVC theory proposes that people try to maximize the EVC. This is achieved by comparing the perceived prospective rewards that can be attained by a self-control demanding action (e.g., getting in better shape by running) with the costs of applying a given amount of self-control (e.g., sustaining the fatigue due to running and the opportunity costs of not being able to do something else while running) and by taking into account the temporal delay with which these rewards will be obtained (e.g., getting in better shape with running will take a couple of weeks and this delay in rewards affects the EVC of applying control towards getting fitter). Recent simulation studies have provided support for this proposed computational basis of self-control (Lieder et al., 2018; Musslick et al., 2015). In regard to its mechanistic basis, the EVC theory proposes that the dorsal Anterior Cingulate Cortex (dACC) computes the EVC and specifies the control signal where the EVC is maximized. The specified self-control command (e.g., resist the impulse to slow down during the run) is then executed by structures in the lateral Prefrontal Cortex (lPFC). These proposed mechanistic underpinnings are well supported by neuroscientific evidence (Shenhav et al., 2013). Importantly, emerging evidence in the sports context has provided ample support for the proposed role of lPFC during self-controlled sports performance (for an overview, see Wolff, Hirsch, et al., 2021). For example, a systematic review showed that lPFC activity covaried with the difficulty of an endurance task (Rooks et al., 2010). Thus, when the sporting task was more self-control demanding, because it required more effort, then activity in a key area for applying self-control increased. Linking this pattern more directly to self-control, one study investigated the effects of forming implementation intentions on lPFC activation during a strenuous static muscular endurance task (Wolff, Bieleke et al., 2018). Compared with a control group, participants who had formed an implementation intention exhibited a less pronounced increase in lPFC activation during the strenuous task. This finding is in line with research outside the sports setting showing that implementation intentions make goal-pursuit less self-control demanding (Bayer et al., 2009). Further support for the lPFC's role in dealing with the self-control demands of sports comes from research showing that individuals who score high on a self-report measure of self-control display a less steep increase in lPFC activation and mental exertion during an isometric handgrip task (Wolff, Schüler, et al., 2019). Thus, high self-control might allow people to process self-control demands more efficiently (as indicated by less pronounced increase in lPFC activation) and thereby reducing the perceptual costs of performing a physically demanding task (as indicated by a less pronounced increase in mental exertion).

Conclusion

In the previous sections we have explicated different theoretical explanations for the costliness of applying self-control and have discussed how sports-related performance is likely to hinge on effective allocation of self-control. We have also briefly presented the negative impact of prior mental exertion on subsequent sports-related performances. With the importance of self-control in sports being widely acknowledged and the rapid theoretical progress that has been made in recent years, several fascinating research questions remain. To conclude this chapter, we would like to discuss a set of research questions that we deem to be particularly interesting for further advancing our understanding of self-control in sports.

The Relevance of Sport-Specific Expertise for Self-Control Performance

It is reasonable to assume that athletes who are used to controlling their impulses during a sporting competition are more adept at doing so, meaning their self-control performance should not be as strongly affected by previous self-control demands as in beginners. To the best of our knowledge, there are only very few studies which have focused on this issue in sports-related settings (e.g., Martin et al., 2016). A notable exception is a recent study by Englert and colleagues (2020), in which they asked elite and amateur rifle shooters to perform two 1-hour shooting rounds consisting of 50 shots each. The shooters also reported their perceived level of self-control strength at the beginning of each shooting round and after 10 shots each. The results revealed that in amateurs, the level of perceived self-control strength decreased significantly over the course of each shooting round, while their shooting accuracy also decreased over time. Interestingly, there was neither a decrease in perceived self-control strength nor a significant drop-off in shooting accuracy in elite performers. These results illustrate how expert performers might be less likely to suffer from multiple self-control demands during a sporting competition and how this helps them to keep performing at a high level (see also Englert et al., under review). In a similar fashion, Martin et al. (2016) asked eleven professional and nine recreational road cyclists to complete a 20-min cycling time trial following a 30 min Stroop task (mental exertion condition) or a 10 min control task (control condition; order counterbalanced). The results revealed no significant differences in time trial performance between the two conditions for the professional cyclists, while recreational cyclists performed worse in the mental exertion condition. The question is though, why is that the case? One possible explanation might be that in order to achieve an elite status, athletes must generally be especially adept at controlling their impulses across several domains (e.g., forcing yourself to go to practice every day, to not eat too much candy, to not go out before a game day). According to De Ridder and colleagues (2012), some individuals are generally better at controlling themselves than others, as for some it might be a constant struggle to resist the last piece of cake, while for others it is rather easy. The general ability to control your impulses is referred to as trait self-control (Tangney et al., 2004). In line with this assumption, Wolff, Bertrams, and Schüler (2019) found out that youth soccer players with higher levels of trait self-control were more likely to be selected for a talent development program than players with lower levels of trait self-control. In the same vein, in a study by Toering and Jordet (2015), Division One soccer players in Norway were generally more adept at controlling their impulses than amateur players. If high levels of trait self-control are indeed required to achieve elite status in a specific sport, this would have an important impact on player drafting strategies: Tryouts should not only focus on sport-specific skills and the well-known psychological skills, but also assess each athletes' self-control skills. A second explanation might be that repeatedly being confronted with the multiple self-control demands of a sporting competition makes the demands less demanding. For instance, for an elite rifle shooter it should be less difficult to ignore distracting stimuli than for an amateur, simply because he or she is used to it. If this is actually the case, even players with lower levels of trait self-control can achieve elite status. Given the fact that not all professional athletes seem to be capable of always regulating their impulses, this second explanation seems more likely. Future research is therefore highly necessary, to dig deeper into the relationship between sport-specific expertise and (self-control) performance.

Boredom as an Overlooked Self-Control Demand

Throughout this chapter, we have implicitly linked self-control with the completion of challenging and difficult tasks like completing an incongruent Stroop task or running a marathon. This is in line with the bulk of self-control research in the sports setting and beyond. However, recently it has been proposed that boredom, a sensation that occurs when tasks are over- or underchallenging and/or feel meaningless (Westgate & Wilson, 2018), might pose a substantial self-control demand (Wolff & Martarelli, 2020; Martarelli & Wolff, 2020). More specifically, boredom is thought to act as a signal that one's resources should be deployed elsewhere (Bieleke & Wolff, in press), thereby making it harder to continue with an ongoing course of action (Bench & Lench, 2019; Danckert & Eastwood, 2020; Westgate & Wilson, 2018; Wolff & Martarelli, 2020). Supporting the link between boredom and self-control, preliminary evidence outside the sporting context shows that boredom makes it more difficult to adhere to a goal and self-control moderates how well people deal with these difficulties (Danckert et al., 2020; Bieleke et al., 2010; Wolff et al., 2020). Surprisingly, although the relevance of boredom in the context of repetitive athletic training has been emphasized already in the early parts of the 20th century (Davies, 1926), research on boredom and self-control in sports is scarce (Wolff, Bieleke, Martarelli, & Danckert, 2021). We know of only one study that has assessed the link between both concepts in the sporting context: Wolff and colleagues showed that boredom and self-control combine into distinct latent personality profiles that are linked to the weekly amount of exercise (Wolff, Bieleke, Stähler, & Schüler, 2021): One profile was characterized by a combination of low boredom and high self-control and this was linked with more exercise. The other profile displayed the reverse pattern and was linked with relatively lower levels of exercise. Taken together, conceptual work, empirical evidence from outside the sporting context and first evidence from the sporting context all point towards a close link between boredom and self-control. Investigating how boredom modulates the self-control demands of sports and how boredom might be alleviated will be important and fascinating questions for future research.

Can Effort Be Valuable?

In this chapter, we have emphasized the intrinsic relationship between effort and self-control and have reiterated that the sensation of effort feels costly and that people, in general, try to avoid it. However, at times sport seems to be somewhat at odds with these premises. To illustrate, hobby runners who sign up for a marathon voluntarily pay entry fees for an event they have no hope of winning and apply considerable amounts of self-control to complete the race (Maxcy et al., 2019). Indeed, it has been argued that people do this not despite the associated effort but rather because it requires effort (Loewenstein, 1999). In this case, instead of reducing an activity's value, effort appears to add value. This effort paradox has only recently been recognized by self-control researchers (Inzlicht et al., 2018) and sport seems to be ideally suited to further investigate this phenomenon (Wolff, Hirsch, et al., 2021). EVC theory indicates two ways how effort might indeed add value. First, the amount of effort that has gone into an achievement might affect its perceived value. For example, having mustered the self-control to go out for a run after a hard day at work might feel particularly rewarding. Second, applying self-control might become a secondary reinforcer in its own right. For example, an athlete who repeatedly learns to associate effort with value (e.g., "hard training makes me stronger!") might start to seek out effortful activities irrespective of the outcome they yield. It is important to note that while ECV theory provides testable ways how effort might add value, this has so far been a theoretical blind spot that requires more research (Inzlicht et al., 2018). Therefore, investigating this effort paradox, particularly in the sports setting, appears to be a particularly promising question for future research.

Better Understanding Perception of Effort to Improve Our Knowledge on Self-Control

As previously described in this chapter, self-control is associated with the sensation of strain and labor. This sensation is traditionally defined in the exercise science literature as the perception of effort or the sense of effort (Marcora, 2010; Pageaux, 2016). Interestingly, as self-control is known to interact with mental fatigue, perception of effort has been identified as the key variable explaining the observed decreased performance in its presence (Marcora et al., 2009). Perception of effort is also, to the best of our knowledge, the only variable systematically altered by both physical and mental exertion inducing fatigue (Le Mansec et al., 2018; Pageaux & Lepers, 2016). The sensation of effort is also present in the physical and mental domain (Preston & Wegner, 2009). Indeed, effort is perceived when engaging in various tasks such as jogging, walking up the stairs, completing Sudoku, or revising for an exam. Therefore, it seems tempting to propose that investigating the perception of effort could be an ideal way of improving our knowledge of self-control. Other evidence of the potential interest of better understanding perception of effort to better understand self-control, is the close link between self-control and performance in the physical and mental domains (e.g., Englert, 2017, 2019). As self-control, effort and its perception are widely recognized in the psychophysiology literature to be a key determinant of performance (see the motivational intensity theory: e.g., Brehm & Self, 1989; Richter et al., 2016; and the psychobiological model of endurance performance: e.g., Marcora, 2019; Pageaux, 2014). Self-control is also interacting with pain (Silvestrini & Rainville, 2013; Silvestrini et al., 2020), another perception that is known to be inherently costly and to interact with performance (Torta et al., 2017). While this accumulation of evidence reinforces the rationale of better understanding perception of effort to improve our knowledge of self-control, it has to be acknowledged that so far, most of the research on self-control and perception of effort is performed in “silos”. Merging the literature from psychology, psychophysiology, neuroscience and exercise neurophysiology could be of great interest to better understand the overlap between self-control and perception of effort. Such multidisciplinary research would allow us to gain unique integrative knowledge of the underlying neurophysiological mechanisms of self-control and perception of effort. This will most likely lead to the opportunity of creating, tailoring, and implementing unique interventions aiming at improving performance, such as brain endurance training (Dallaway et al., 2021; Marcora et al., 2015), mindfulness (Bernier et al., 2009; Stocker et al., 2019), or hypnosis (Barker et al., 2013; Pates et al., 2001). The rationale for researchers from the aforementioned disciplines to team together and unify their strength is strong as it cannot be ignored that our mind, and therefore our brain, interacts with our body to ensure optimal performance. Such a step forward approach would first require some clarification and consensus on the different definitions and constructs used in the exercise science literature to investigate the perception of effort (for more information, see Halperin & Emanuel, 2020; Pageaux, 2016).

Learning Exercises

1. How can you define self-control?
2. Why is self-control important in sport and exercise settings?
3. What exactly is the “two-task paradigm”?
4. What does “ego depletion” mean and how does it affect sports-related performance?
5. How is the research on ego-depletion and mental fatigue closely related in the context of sports-related performance?
6. How can self-control application be understood as a reward-based choice?
7. What is the “Expected Value of Control”?
8. Which brain areas are primarily involved in self-control processes?
9. Why is self-control costly? Can effort be valuable?

Further Reading

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Chapter 23
Music in Sport: From Conceptual Underpinnings to Applications

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Chapter Overview

This chapter provides an overview of the key concepts, theory, underlying mechanisms, empirical research, and application relevant to the use of music in sport. The chapter begins with a colorful introduction to the subject matter, in which the use of music in sport is set within a historical frame. Thereafter, a theoretical model is presented that coaches and practitioners can use as a reference point in the design of music-related interventions. This leads into consideration of the mechanisms—emotional, perceptual, and rhythm-related—that underlie the effects of music in sport. Throughout the chapter, the taxonomy of pretask, in-task, and post-task applications of music serves as a common denominator to aid the absorbability of the material. This is reflected in both a critical appraisal of recent literature and consideration of applied aspects. The key contribution of this chapter is that comprehensive guidelines are provided to facilitate athletes and coaches in their application of music. The centrepiece of these guidelines is a new framework that presents factors relevant to optimizing music selection in sport.

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Introduction

In the first two decades of the 21st century, technological advances in personal listening devices sparked an explosion in the use of music by athletes. As a consequence, the influence of music on the athlete's psyche has captured the interest of researchers and practitioners alike. Music has, of course, been widely used since ancient times for a broad variety of purposes: to soothe bawling infants, to rejuvenate senior citizens, to punctuate civil ceremonies, to send soldiers into the fray, and even as a form of therapy (Thaut, 2008). The well-known neuropsychologist, Daniel Levitin, wrote that music is unusual among human activities for both its ubiquity and its antiquity (Levitin, 2008).

Greek philosophers from the 5th century BC were widely known to "prescribe" music. The mode or key in which the music was written was thought to carry specific benefits. For example, Plato declared that the Dorian mode was conducive to steadfast endurance, whereas the Phrygian mode was considered appropriate for acts of peace and acquiescence. Mathematician *par excellence* Pythagoras is credited with discovering the 12-note *chromatic scale*—think of all of the notes from C to C on a piano. Most contemporary Western musicians and composers borrow from the Pythagorean system of tuning which is over 2500 years old.

The modern Olympic Games have served a seminal role in formalizing the link between music and sporting endeavor. Prominent composers such as Claude Debussy, John Williams, and Vangelis have been stirred by the Olympic ideals. Vangelis's *Chariots Of Fire* stands as one of the defining compositions in fusing music with the notion of athletic prowess. The piece was popularized through association with the eponymous movie that depicts the story of two athletes who graced the 1924 Paris Olympics: Eric Liddell, a devout Scottish Christian who ran for the glory of God, and Harold Abrahams, an English Jew who ran to combat prejudice.

Music has been integral to many Olympic events such as rhythmic gymnastics or figure skating, and the best-known artists of the day performed at the opening and closing ceremonies of each Olympiad. Among the most memorable performances was that of the late, great American songstress Whitney Houston with *One Moment In Time*, the anthem of the 1988 Seoul Olympics. But it is not only Olympiads that provide a vehicle for musical expression in the sporting realm.

Pay a visit to your local football, soccer, or rugby team on a weekend and you will hear chants that have been passed down through generations of fans. At Liverpool FC it's the anthemic *You'll Never Walk Alone*, which was popularized by Gerry and the Pacemakers in the 1960s. At Yale's football stadium, it's the distinctive long cheer taken from Aristophanes' play *The Frogs* (c. 405 BC):

> Brekekekex, ko-ax, ko-ax, Brekekekex, ko-ax, ko-ax,
> O-op, O-op, parabalou, Yale, Yale, Yale,
> Rah, rah, rah, rah, rah, rah, rah, rah, rah, Yale!
> Yale! Yale!

Oftentimes, musicians compose pieces for a particular team or even a special sporting occasion. One of the best-known examples to embrace both a team *and* a sporting occasion is *Three Lions (It's Coming Home)*, which became the hit song associated with the Euro '96 Soccer Championships. The chorus belted out by the England faithful—"It's coming home, it's coming home, football's coming home"—alluded to the fact that England, considered to be the spiritual home of soccer (known as "football" in the UK), had not won a major championship since the 1966 World Cup. The music lent a certain aura to Euro '96 that bridged the gap between a mere soccer tournament and a stage for the nation's hopes and dreams.

Athletes have made extensive use of music in order to fuel their performances and the music-and-sport literature reveals a common taxonomy that has been applied to the categorization of related interventions. The taxonomy is predicated on when such interventions are used: *Pretask*, *in-task*, and *post-task*. Pretask music generally serves a "psych-up" or "psych-down" function and can be used to prime athletes or engender an optimal level of activation either for training or competition. Sometimes pretask music is used to regulate a particular mindset without having either a psych-up or psych-down function. In terms of the psych-down function, music is a particularly potent tool in tempering precompetition anxiety. The celebrated British athlete, Dame Kelly Holmes, generated a great deal of media interest for her use of the soulful ballads of Alicia Keys at the 2004 Athens Olympics. The expectations of an entire nation can weigh rather heavily on an athlete's shoulders but Holmes prevailed, and made history by winning two middle-distance golds (800 m and 1500 m).

The in-task application of music takes two forms—*synchronous* and *asynchronous*. Synchronous music entails synchronization between an athlete's movement patterns and the rhythmical qualities of a piece of music. In light of technological advances, Karageorghis (2020) delineated two distinct forms of synchronization: (a) *Active synchronization* entails a motor process in which an athlete or group of athletes/team consciously synchronize their movement rate with the rhythmical qualities of music; and (b) *passive synchronization* entails a process in which a digital interface adapts the tempo of music in real-time or assigns a track at a tempo to match the movement rate of an athlete or group of athletes/team. Asynchronous music is akin to ambient music where there is no conscious or planned synchronization taking place. Such music can, however, be played loudly, while we tend to think of ambient music as just being part of the sonic background.

When used in-task, a central role of music is to lower perceived exertion and thereby increase the amount of work performed (i.e., to engender an ergogenic effect). It is notable that in-task music can temper the shift toward negative affect (i.e., displeasure) that is typically associated with more intense exercise (see Bird et al., 2019; Stork et al., 2019). Music also provides a rhythmic cue that serves a metronomic function in terms of regulating movement patterns; particularly when used in the synchronous mode (Grahn, 2012; Karageorghis et al., 2019).

Post-task music is proposed to aid recovery from competition or training (Terry & Karageorghis, 2011). This application has been dichotomized by Jones et al. (2017) into *respite music* (used in between high-intensity interval bouts) and *recuperative music*, which is used at the end of a training session or competition to guide the athlete back toward homeostasis. The respite function was recently redefined by Karageorghis (2020) in terms of *active* (movement based) and *passive* (static) forms of recovery. This, however, creates an interesting conceptual anomaly, as respite–active music is also a form of in-task application! Nonetheless, the goal of respite–active music is to facilitate recovery following high-intensity activity, such as circuit training or sprint-interval training.

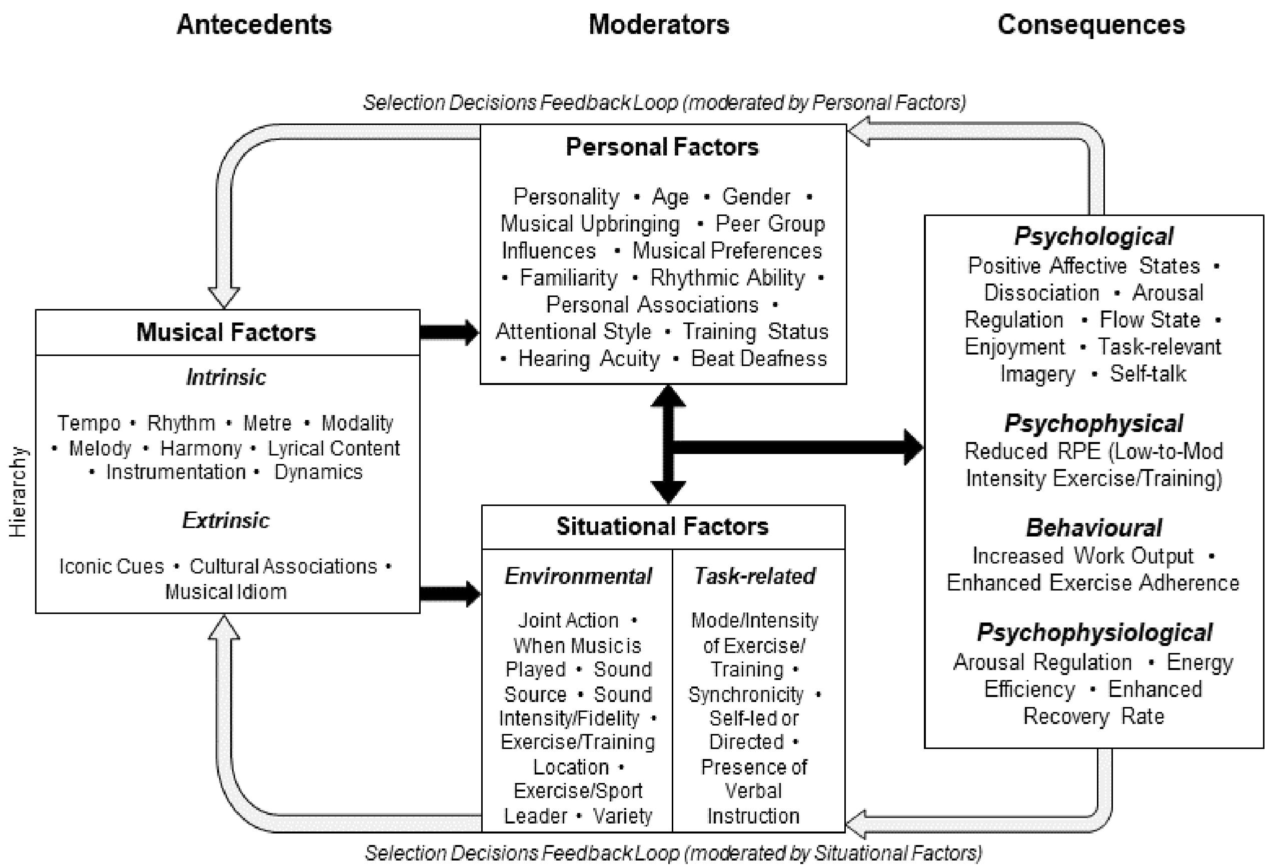
This chapter will consider theoretical underpinnings for the application of music in sport, outline underlying neurophysiological mechanisms, provide a critical review of recent sport-related studies using the aforementioned taxonomy, and present a broad range of applications to hopefully inspire athletes and their coaches.

A Theoretical Model for Music Applications in Sport

Karageorghis (2016) published a theoretical model detailing the antecedents, moderators, and consequences of music use in exercise and sport (see Figure 23.1). Herein, we will focus solely upon the implications of the model for sport participation and training. Moreover, we will not discuss every detail of the model; the interested reader is referred to the original 2016 publication and also to chapter 2 of the Karageorghis (2017) text. The model embraced several aspects of previous models (e.g., Karageorghis et al., 1999; Terry & Karageorghis, 2006), but took an ecumenical and fully integrative approach, particularly in relation to proposed antecedents and moderators. Moreover, the model is *heuristic* in nature and not *mechanistic*, meaning that it provides a fisheye view to facilitate fluid understanding of what is, in actuality, a highly complex array of relationships, processes, and neural mechanisms.

Figure 23.1

A Theoretical Model of the Antecedents, Moderators, and Consequences of Music Use in the Exercise and Sport Domain



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The antecedents or precursors are the intrinsic and extrinsic qualities of music, moderators are those factors that influence the strength of the relationship between a musical stimulus and an athlete's responses to it (e.g., age and attentional style), and consequences relate to the main outcomes associated with music use during sport-related activities (e.g., arousal regulation, reduced rating of perceived exertion [RPE], or enhanced recovery). The model is predicated on ~50 years of empirical research (see Karageorghis & Priest, 2012a, 2012b; Karageorghis & Terry, 1997; Lucaccini & Kreit, 1972; Smirmaul, 2017; Terry et al., 2020, for reviews).

The model includes variables relating to athletes themselves, the nature of the task in which they are engaged, and the specifics of the sporting context (see Figure 23.1). Moreover, both individual and group-based training are considered. Given that the model is heuristic in nature and thus embraces a broad range of factors, only segments of it can be tested in any single empirical study. The complexity of relationships represented within the model is such that individual hypotheses are not made explicit in pictorial form; rather these are summarized in narrative form (see Karageorghis, 2016). The model postulates a series of reciprocal interactions and feedback loops among the antecedents, moderators, and consequences of music use. Input, in this instance, music, is identified, coded, and moderated by a broad range of personal and situational factors.

To touch on intrinsic musical factors (see Antecedents in Figure 23.1), the temporal aspects of music such as tempo, rhythm, and meter can bear strong influence on an athlete's level of activation. Contrastingly, aspects such as modality (e.g., major vs. minor) and harmony (how notes are combined) may be salient in terms of evoking affective responses (Juslin, 2013). Rhythm and tempo will lead to differential responses depending on the age or personality profile of athletes and the nature of the task in which they are engaged (e.g., Franěk et al., 2014; Karageorghis et al., 2019; Liljeström et al., 2013).

It is thought that extraverts are likely to prefer stimulative music (cf. Eysenck, 1967; McCown et al., 1997), which is characterized by a fast tempo (> 120 bpm), prominent rhythmical features, and exaggerated bass tones. Along similar lines, the melodic and harmonic qualities of music will lead to differential responses depending on an athlete's cultural background. Lyrics contain semantic information and their effects on the athlete will depend on the way they receive them as well as the relevance of lyrics to a given athletic task (Karageorghis, 2017; Sanchez et al., 2014).

Among the extrinsic properties of music, iconic cues pertain to how structural elements of a piece of music relate to the tone of certain emotions. For example, music that is slow and soft may sound "relaxing" because there are intrinsic commonalities with sedation and restiveness (see e.g., North & Hargreaves, 2008). Because such cues are grounded in the structure of music, it is expected that the same music should hold similar "iconic meaning" for different athletes (i.e., irrespective of their ethnic or cultural background). Cultural associations are often forged through the mass media and are, therefore, likely to be relevant to large sections of the population. Taking the earlier-cited example of Vangelis's *Chariots Of Fire*, the piece immediately conjures images of athletes striding over the sands at St. Andrews, Scotland and of striving for Olympic glory. Such imagery is fused in the collective consciousness due to the immediate associations with Hugh Hudson's Oscar-winning movie.

The model depicts a reciprocal relationship between personal and situational factors given that, in a sport setting, the music should be *functional* or carefully coordinated with the tasks and specifics of the session (cf. Kodzhaspirov et al., 1986). Moderators such as personal preferences and attentional style (e.g., associative vs. dissociative; see Hutchinson & Karageorghis, 2013) will interact with the social environment to determine an athlete's response to music. There is a wealth of empirical evidence showing that gender and age moderate athletes' response to pieces of music (e.g., Crust, 2008; Karageorghis et al., 2010, Karageorghis, Bigliassi et al., 2018). There is a tendency for women to rate the rhythmical qualities and danceability of music more highly than men; nonetheless, men tend to value the importance of cultural associations to a greater degree than women, and prefer styles that might be described as "heavier" (e.g., Colley, 2008; Hallett & Lamont 2017).

To touch on the consequences (see the right-hand side of Figure 23.1), the two strongest and most consistent appear first (psychological and psychophysical), followed by behavioral consequences, and finally, psychophysiological consequences, that are the least consistent (see Karageorghis & Priest, 2012b; Terry et al., 2020). Several empirical studies show that athletes appear to experience several of the consequences in unison. For example, appropriate music use can result in enhanced affect that is coupled with greater work output (Karageorghis et al., 2010; Olson et al., 2015; Terry et al., 2012).

In Figure 23.1, you will notice the inclusion of a feedback loop from the consequences back to the music factors. This relates to how the consequences that an athlete might experience influence their future music-selection decisions, and how this process is moderated by personal factors and situational factors. Accordingly, the model predicts that an athlete's response to music will be evaluated by them with reference to the moderator factors, and that their evaluation will serve to shape future selection decisions. The implication is that an athlete is more likely to reselect pieces of music that are deemed to lead to positive consequences and vice versa.

Mechanisms that Underlie the Effects of Music in Sport

Following a 30-year period in which a large number of observational and descriptive-type studies entered the music-in-sport literature, the past 20 years have witnessed a steady stream of studies and chapters that have addressed the underlying mechanisms (e.g., Bigliassi et al., 2018; Grahn & Brett, 2007; Karageorghis et al., 2017; Kornysheva et al., 2010). This subsection will outline a typology of three mechanisms that are commonly advanced to explain how music takes effect in the sport context: (a) in influencing athletes' affective and emotional states; (b) as a dissociative technique, particularly during endurance events/sessions; and (c) as a facilitator of auditory-motor synchronization and rhythmic action.

Affect and Emotions

The common reasons athletes give for using music include the control of arousal, the regulation or modulation of affective states, and the elicitation of specific emotions (e.g., liveliness, calmness, or aggression; Laukka & Quick, 2013). We use the term *affect* to refer to a neurophysiological state that is consciously accessible as a simple primitive, nonreflective feeling (Russell & Barrett, 1999). We use the term *emotion* with reference to feelings that are typically brief, intense, and attributable to a discernible cause (Beedie et al., 2005). For more on the conceptual distinctions between affect and emotion, please see Chapter 12 (Zenko & Ladwig, 2021).

Juslin (2013) offered a theoretical framework that proposed eight psychological mechanisms through which music influences affective and emotional responses. In the interests of brevity, we will focus here on just four of these mechanisms and duly refer the reader to Juslin's paper for the full complement. The *brain stem reflex* refers to the process by which the fundamental acoustic properties of music stimulate responses through signaling a potentially important or urgent event. For example, fast, loud music would automatically stimulate the listener by activating the central nervous system irrespective of how the music is subsequently appraised. This stimulation results in elevated heart rate (HR), blood pressure, body temperature, skin conductance, and muscle tension (Chapados & Levitin, 2008). Soft, slow music has the converse effect and thus decreases sympathetic arousal.

The second mechanism offered by Juslin (2013) is the biomusicological process of *rhythmic entrainment*. The rate of movement and bodily pulses such as HR and respiration rate are drawn toward synchronization with the rhythmical qualities of music. Invariably, athletes express a preference for musical tempo to remain relatively high during intense training sessions (Karageorghis & Jones, 2014; Laukka & Quick, 2013). Along similar lines, given the propensity for brainwaves to entrain with tempo (e.g., Will & Berg, 2007), music can have a priming effect pretraining or as part of an athlete's precompetition routine (Loizou & Karageorghis, 2015; Pettit & Karageorghis, 2020). Slow, calming music can also be used to combat the symptoms of precompetition anxiety (Kuan et al., 2018; Laukka & Quick, 2013).

Scherer and Zentner (2001) highlighted that music can influence the human organism by serving as a trigger for emotional associations, a process that may rely on subcortical mechanisms. Related to this notion, the third of Juslin's (2013) hypothesized mechanisms, *evaluative conditioning*, refers to the repeated pairing of a particular piece of music with other positively or negatively valenced stimuli. For example, a specific piece may, through repetition, become inextricably linked with part of an athlete's pre-event routine. This is a form of classical conditioning, wherein a previously neutrally valenced conditioned stimulus (i.e., a piece of music) gains the ability to evoke the same emotional response as a positively valenced unconditioned stimulus (i.e., a sense of being mentally ready).

Visual imagery is another particularly relevant mechanism from a sports perspective (Kuan et al., 2018). Juslin (2013) explained this in terms of emotions induced due to the music evoking memories of an individual's specific life events (e.g., imaging a previously successful sporting performance conjures the associated emotions). Music is effective in stimulating visual imagery (e.g., McKinney & Tims, 1995), and athletes are generally adept in using visual imagery to, for example, induce relaxation or achieve an appropriate precompetition mindset (Gregg et al., 2005; Karageorghis, Bigliassi et al., 2018). It appears plausible, therefore, that emotional responses to music listening originate, in part at least, from the visual images generated by the listener (Lundqvist et al., 2009).

Dissociation and Perception of Exertion

Music is a stimulus that promotes *dissociation* or an outward-type of focus and so it can distract athletes from pain as well as from fatigue-related cues. Neural mechanisms that influence the perception of exertion are thought to underlie some of the documented effects of music in the sport context. The afferent nervous system, which transmits impulses (e.g., pain and fatigue) toward the spinal column and brain, exhibits a limited channel capacity (analogous to internet bandwidth). Consequently, sensory stimuli such as music may inhibit the physiological feedback signals associated with physical exertion (Hernández-Peón et al., 1961; Rejeski, 1985). A study using electroencephalography (EEG) showed that music is effective in downregulating theta waves (4–7 Hz) in the frontal, central, parietal, and occipital regions of the brain (Bigliassi et al., 2016). This process has been directly associated with the suppression of fatigue-related symptoms (see Craig et al., 2012).

The aforementioned sensation-inhibiting capacity of music is far less pronounced at higher physical activity intensities (i.e., > 75% VO_2max) when the signal strength of physiological feedback is more potent (Ekkekakis, 2003; Tenenbaum, 2001). Nonetheless, even during high-intensity physical activity, affective stimuli such as music appear to retain some influence on how athletes feel and therefore how they interpret the sensations of physical effort and fatigue (e.g., Olson et al., 2015; Terry et al., 2012). In recent neurophysiological work, again using EEG, it was demonstrated that music reduced brain connectivity across frontal and central regions of the cortex (i.e., the sensorimotor regions); a phenomenon that is associated with reduced exercise consciousness (Bigliassi et al., 2017).

Rhythmic Responses to Music

From an evolutionary perspective, it seems that humans have developed a genetic predisposition to respond to music (Levitin, 2008; Patel, 2008; Phillips-Silver & Keller, 2012) and this is important in helping to explain the potential benefits of music in the realm of sport. The coupling of perception and movement is guided by recurrent patterns in the structure of music (Leman et al., 2013). Coupling pertains to the connection between agents that enables them to communicate and receive information about each other's actions (Himberg, 2017). In the case of entrainment, coupling is normally mutual or bidirectional, allowing two agents to perceive and influence each other.

In the application of synchronous music to an activity such as running, until recently, the coupling was unidirectional, as the athlete could follow the musical rhythm, but the rhythm did not alter in response to their movement rate. Athletes can now use accelerometers and digital interfaces that facilitate mutual synchronization (e.g., Moens et al., 2014; D-Jogger); this relates directly to the earlier-described notion of *passive synchronization*. The central processing demands that pertain to passive synchronization are, conceivably, of a lesser order when compared to unidirectional coupling (i.e., active synchronization), albeit comparative studies have yet to emerge in the music-in-sport literature.

It has been proposed that a central pattern generator or pacemaker in the brain may serve to regulate temporal functioning and govern the rhythm response—the innate human predisposition to synchronize movement with musical rhythms (Schneider et al., 2010). This mechanism would coordinate afferent nerve signals with their efferent counterparts that control movement, and also regulate locomotion, neurovascular control, and sensory integration. The supplementary motor area of the brain is another likely seat of the rhythm response, as this sector is activated both during the perception of musical rhythms and in the rhythmic ordering of motor tasks (Zatorre et al., 1996).

The process of synchronizing movement with music, often referred to as auditory-motor synchronization (Bood et al., 2013; Karageorghis et al., 2019; Schmidt-Kassow et al., 2013), is a form of rhythmic entrainment (see Juslin, 2013). In mechanistic terms, training in synchrony with music can lower the metabolic cost of the activity by promoting greater neuromuscular and kinetic efficiency (Bacon et al., 2012; Roerdink, 2008; Terry et al., 2012). Now that we have covered some of the key underlying mechanisms, we will go on to critically review empirical research studies in the area of music and sport.

The Scientific Study of Music in Sport

In recent decades, numerous studies have explored the application of music as a regulator of emotion and as an ergogenic aid in the sporting realm (see Terry et al., 2020). Karageorghis and Priest (2012a, 2012b) highlighted the advantages of applying music to athletes' precompetition routines as well as to their training regimens. More recently, a meta-analysis by Terry et al. (2020) that embraced sport and exercise, showed that music had a small but significant effect on physical performance (g = 0.31). We will review the literature in line with the taxonomy of pretask, in-task, and post-task applications of music in sport.

Pretask Music

Many of the studies exploring the effects of music prior to sports performance have focused on the dichotomy of stimulative vs. sedative music (e.g., Eliakim et al., 2007; Karageorghis, Bigliassi et al., 2018). Albeit many of sports' governing bodies have prohibited the use of personal music devices in the competitive arena, pretask music has been commonly used during warm-up and as part of a pre-event routine. In his review, Smirmaul (2017) suggested that research into pretask music lacked systematic organization, was methodologically constrained, and appeared only infrequently in the broader sports science literature. Moreover, he highlighted that the findings pertaining to the pretask application of music were inconclusive in terms of ensuing ergogenic effects.

It appears that, as might be expected, pretask music has a more pronounced effect on brief or anaerobic tasks, such as grip strength or Wingate Anaerobic Test (WAnT) performance, when compared to tasks of longer duration (Smirmaul, 2017). In an early related study, Hall and Erickson (1995) administered a stimulating musical piece (*Gonna Fly Now* by Bill Conti) and found that it contributed to faster times over a 60-m dash when compared to a no-music control. The researchers *only* administered a stimulative music condition and so we do not know the effects of an alternative music condition or sound per se on sprint performance (e.g., sedative music or crowd noise).

Yamamoto et al. (2003) reported that 20 min of slow-tempo music lowered levels of arousal prior to an all-out effort on a cycle ergometer, whereas fast-tempo music had the converse effect. Neither condition had any influence on performance (i.e., power output). The slow-tempo music did, however, decrease plasma norepinephrine concentration, while the fast tempo increased plasma epinephrine, which is implicated in the fight-or-flight response. Eliakim et al. (2007) examined the influence of stimulative music played while participants warmed-up to perform the WAnT and did not find any ergogenic effect. Nonetheless, the music did elevate HR levels prior to execution of the task (i.e., the music upregulated physiological arousal).

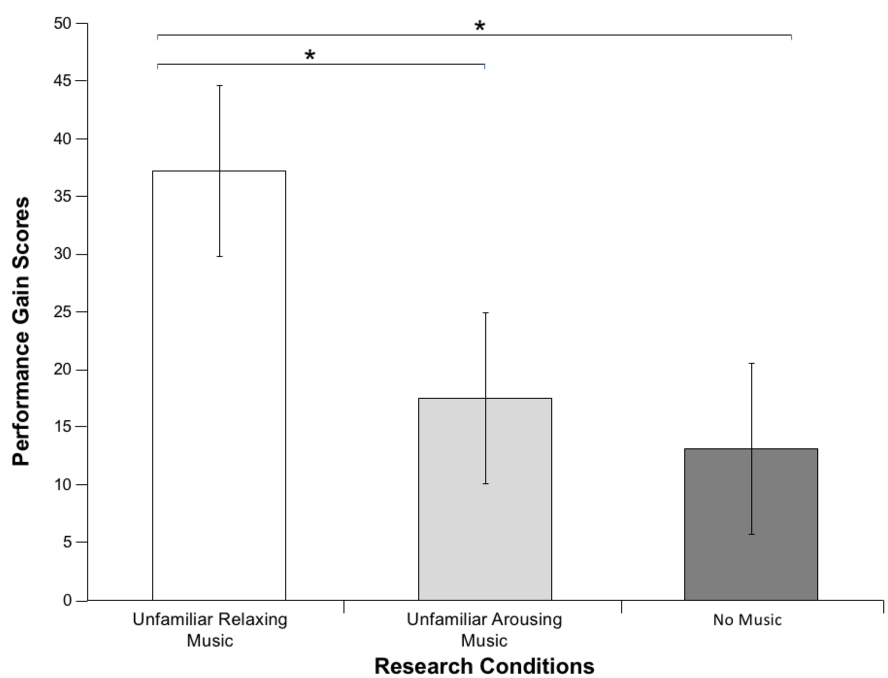
More recently, Karageorghis, Cheek et al. (2018) conducted a study into grip strength that entailed five pretask music conditions, which were administered to male athletes: fast/loud (126 bpm/80 dBA), fast/soft (126 bpm/70 dBA), slow/loud (87 bpm/80 dBA), slow/soft (87 bpm/70 dBA) music, and a no-music control. They found that fast-tempo music played at a high intensity led to the highest grip-strength scores, whereas at a low-intensity, it led to much lower grip strength. In addition, affective valence scores were highest with fast/loud music. Thus, the use of fast/loud pretask music could enhance affective valence and arousal levels when athletes prepare for a simple or gross motor task (e.g., sprinting or powerlifting).

The application of music in the context of target-based sports (e.g., archery, bowls, darts, and shooting) is done primarily with a view to downregulate arousal levels prior to competition. Kuan (2014) conducted a study with unfamiliar relaxing and arousing music applied to elite shooters and weightlifters. He found that unfamiliar, relaxing music was more conducive to mental imagery than arousing music prior to a simulated competition in both contexts. The mental imagery accompanied by relaxing music led to performance gains for both sets of athletes.

In a follow-up study, Kuan et al. (2018) investigated the effects of relaxing and arousing music during imagery training in preparation for dart-throwing performance (Figure 23.2). Participants were assigned to one of three conditions: unfamiliar relaxing music, unfamiliar arousing music, or a no-music control. Measures of galvanic skin response, peripheral temperature, and HR showed that, as expected, listening to relaxing music served to lower arousal (see Figure 23.3, Figure 23.4, and Figure 23.5). Notably, the relaxing music elicited the greatest performance gains as well as more adaptive profiles on the revised Competitive State Anxiety Inventory-2 (CSAI-2R; i.e., precompetition anxiety was perceived as being more facilitative to performance).

Figure 23.2

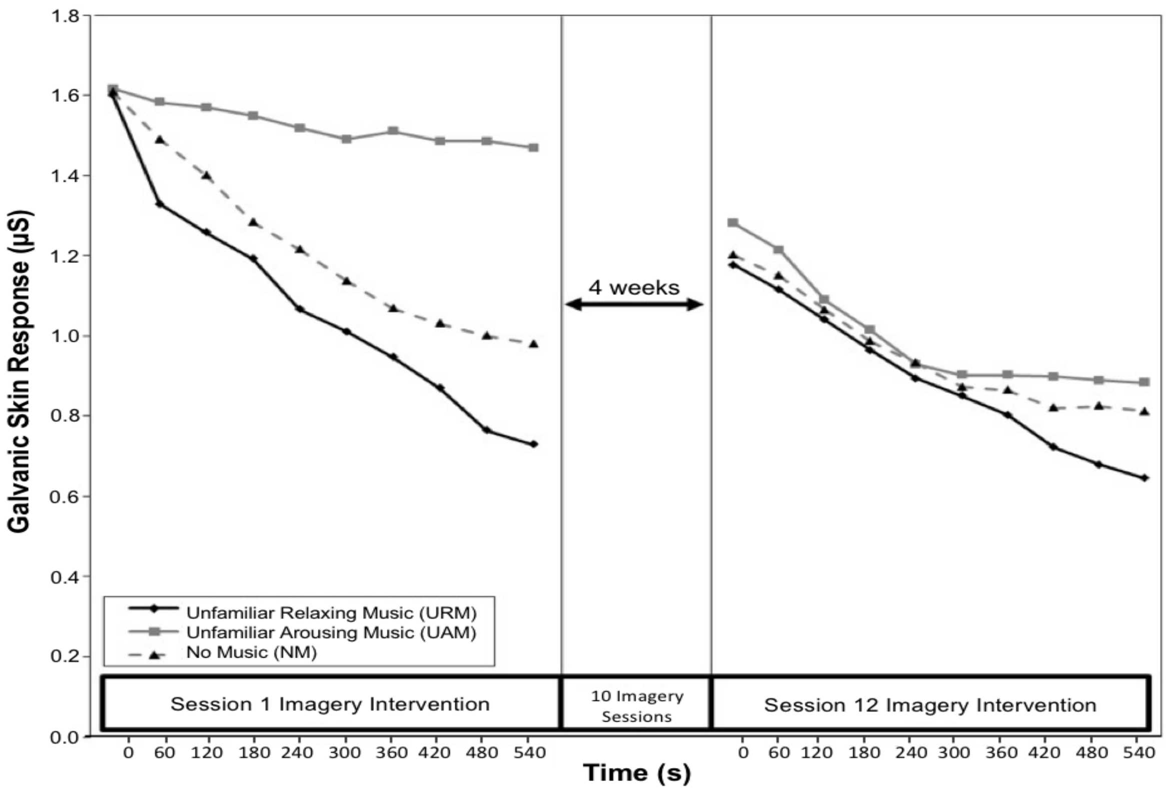
Dart-throwing Performance Gain Scores for Unfamiliar Relaxing Music, Unfamiliar Arousing Music and No-music Conditions



Note. *$p < .05$. Error bars represent standard deviation. Reproduced from Kuan, G., Morris, T., Kueh, Y. C., & Terry, P. C. (2018). Effects of relaxing and arousing music during imagery training on dart-throwing performance, physiological arousal indices, and competitive state anxiety. *Frontiers in Psychology, 9,* 14, https://doi.org/10.3389/fpsyg.2018.00014 under a Creative Commons Attribution Licence (CC BY).

Figure 23.3

Mean Galvanic Skin Response (GSR) From t_0 to t_{540} in Sessions 1 and 12



Note. Measures were only taken in Session 1 and Session 12. Reproduced from Kuan, G., Morris, T., Kueh, Y. C., & Terry, P. C. (2018). Effects of relaxing and arousing music during imagery training on dart-throwing performance, physiological arousal indices, and competitive state anxiety. *Frontiers in Psychology, 9,* 14, https://doi.org/10.3389/fpsyg.2018.00014 under a Creative Commons Attribution Licence (CC BY).

A recent study by Rebadomia et al. (2019) that integrated a brainwave entrainment technique with music showed that alpha (12 Hz) wave-synchronized music substantially increased participants' throwing distances (shot put, discus, and javelin) and the theta (4–7 Hz) wave-synchronized music significantly reduced throwing distance. Although the study is limited given that it employed a quasi-experimental design and there were only six participants, it supported earlier findings (e.g., Kuan, 2014; Kuan et al., 2018) showing that the use of relaxing music can influence performance in both fine-motor and power/motoric sports.

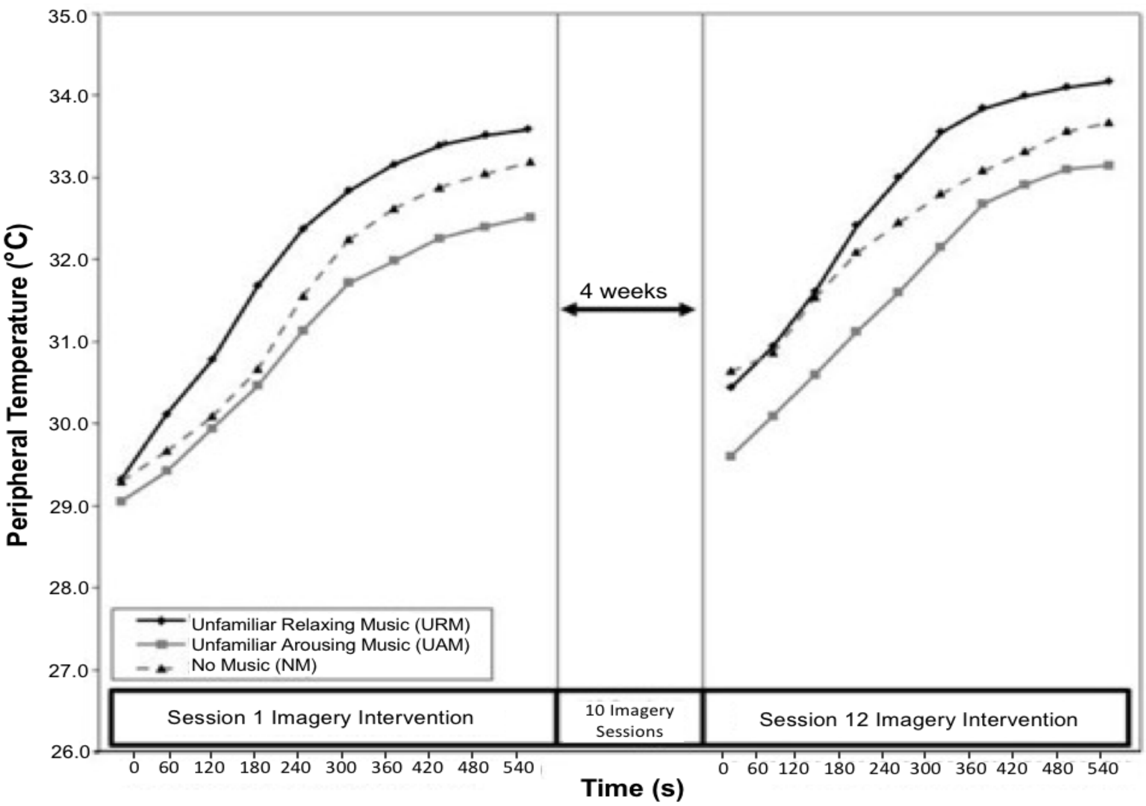
Research has shown that pretask music can be used to: (a) manipulate emotional states; (b) enhance athletic performance in short-duration sports (e.g., sprint events); (c) promote task-relevant imagery; and (d) assuage precompetition anxiety. There is, however, relatively limited research in this area, creating considerable scope for further applied work into how music can help athletes to attain optimal preperformance states.

In-Task Music

Music is a tool that can be applied in-task for training and, in some instances, competition. Several studies support the application of music for continuous, endurance-type performance. Researchers have been interested in two main in-task applications of music—synchronous and asynchronous.

Figure 23.4

Mean Peripheral Temperature (PT) From t_0 to t_{540} in Sessions 1 and 12



Note. Measures were only taken in Session 1 and Session 12. Reproduced from Kuan, G., Morris, T., Kueh, Y. C., & Terry, P. C. (2018). Effects of relaxing and arousing music during imagery training on dart-throwing performance, physiological arousal indices, and competitive state anxiety. *Frontiers in Psychology, 9,* 14, https://doi.org/10.3389/fpsyg.2018.00014 under a Creative Commons Attribution Licence (CC BY).

Synchronous Music

Synchronous in-task music is used for psychological benefits as well as an ergogenic aid, and often accompanies endurance-based tasks such as running or indoor cycling (Karageorghis & Priest, 2012b). The application of synchronous music is more likely to result in ergogenic effects than the asynchronous application (Karageorghis & Priest, 2012a; 2012b). When athletes train in sync with music, they tend to work harder and for longer (Terry et al., 2012).

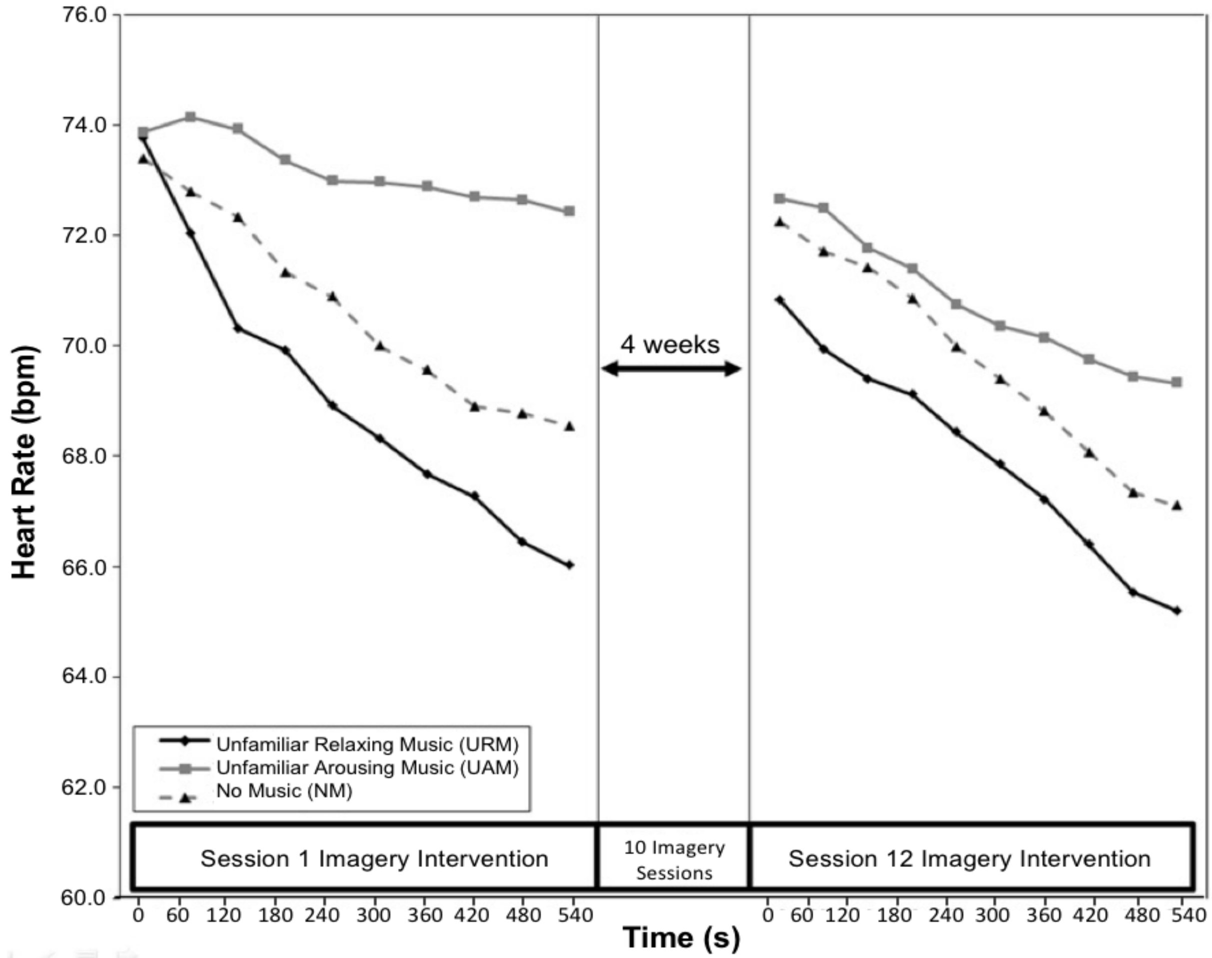
A number of studies have explored the effects of synchronous music during endurance-based activities such as running and cycle ergometry. Terry et al. (2012) tested elite Australian triathletes who performed a treadmill running task. Participants endured for longer in the presence of two synchronous music conditions (motivational vs. neutral). The researchers found that time-to-exhaustion was 18.1%

and 19.7% longer when running in sync with motivational and neutral music, respectively, when compared to a no-music control. Furthermore, mood responses and feeling states were more positive under motivational music compared to either neutral or no-music conditions. A potential limitation was that the sterile laboratory environment may have been so unstimulating for the demanding endurance-based task, that the music served as a welcome distraction from rather dull surroundings.

Karageorghis et al. (2010) examined the effects of synchronous music using more complex motor tasks than running or cycle ergometry. They used a series of strength-endurance, circuit-type tasks performed to exhaustion under three conditions (each at a tempo of 120 bpm): motivational music (i.e., that inspires movement), motivationally neutral music, and an auditory metronome. Exercises such as sit-ups, standing squats, and heel raises are a staple of many athletes' training regimens. Interestingly, Karageorghis et al. (2010) found that women recorded significantly higher strength-endurance performance and affective valence scores than men, when exposed to the two music conditions. There is scope for further examination of gender differences in response to music while experimentally manipulating the complexity of motor tasks.

Photo by Anete Lusina from Pexels

Figure 23.5
Mean Heart Rate (bpm) From t_0 to t_{540} in Sessions 1 and 12



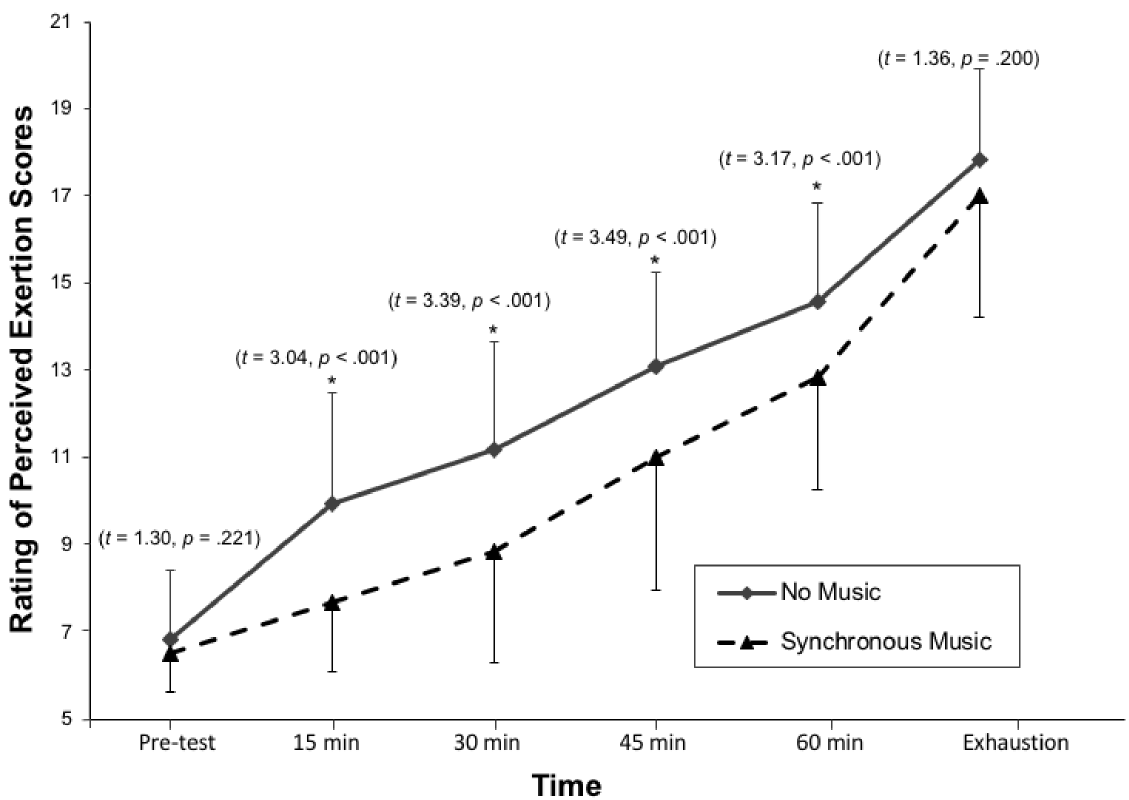
Note. Measures were only taken in Session 1 and Session 12. Reproduced from Kuan, G., Morris, T., Kueh, Y. C., & Terry, P. C. (2018). Effects of relaxing and arousing music during imagery training on dart-throwing performance, physiological arousal indices, and competitive state anxiety. *Frontiers in Psychology, 9,* 14, https://doi.org/10.3389/fpsyg.2018.00014 under a Creative Commons Attribution Licence (CC BY).

In an applied study, Karageorghis et al. (2019) examined the effects of synchronous music over a one-month period of speed-endurance training. Twelve recreational athletes were assigned to one of two groups: (a) Sprint training coordinated with synchronous music; or (b) a control condition with conventional sprint training and no music. The findings showed that, after a month of training, participants in the synchronous music group executed the 400-m time trials 5.07% faster than the control group. The authors suggested that longer periods of monitoring and application of synchronous music would provide greater insight into the possible benefits of synchronous music protocols in a sport training context.

The effects of synchronous music on psychophysiological parameters and running performance in hot and humid conditions was investigated by Nikol et al. (2018). Runners completed two running trials in simulated situations, recreating 31°C heat coupled with 70% humidity, under conditions of synchronous music and no music. Participants ran on a treadmill located inside a climate chamber for 60 min at 60% $V0_2$max and continued to run at 80% $V0_2$max, until they reached voluntary exhaustion. Time to exhaustion was 66.59% longer in the synchronous music condition when compared to control. Moreover, RPE scores were lower at each time point (15, 30, 45, and 60 min) of the steady-state part of the protocol (i.e., 60% $V0_2$max) in the synchronous music condition (see Figure 23.6). The results illustrate how runners can benefit from synchronous music under hot and humid conditions. However, the study did not include an asynchronous music condition and so it is not known whether synchronization per se was responsible for the observed effects. The study highlights the need for more studies that compare synchronous vs. asynchronous music (see also, Terry et al., 2020).

Figure 23.6

Participants' Rating of Perceived Exertion Under Two Conditions



Note. Error bars represent standard deviation. Created using data from Nikol, L., Kuan, G., Ong, M., Chang, Y-K, & Terry, P. C. (2018). The heat is on: effects of synchronous music on psychophysiological parameters and running performance in hot and humid conditions. *Frontiers in Psychology, 9,* 1114, https://doi.org/10.3389/fpsyg.2018.01114 under a Creative Commons Attribution Licence (CC BY).

Asynchronous Music

The asynchronous application of music has, by a wide margin, attracted the greatest research interest in the music-and-sport literature (see Terry et al., 2020). This application of music occurs when human movement is not consciously synchronized with the rhythmical qualities of music (Karageorghis & Terry, 1997). There have been studies into the psychological, psychophysical, psychophysiological, and ergogenic effects of asynchronous music in a sporting context (e.g., Birnbaum et al., 2009; Karageorghis et al., 2013). The main benefit of using asynchronous music is that it can create a more pleasant training environment and enhance training experiences. Its application can reduce RPE by ~10%, but only during submaximal training intensities, given that physiological cues predominate attention during high-intensity tasks, such as all-out rowing ergometry (Karageorghis & Priest, 2012a). Asynchronous music can also enhance positive affect or reduce negative affect; even at relatively high work intensities (e.g., Hutchinson et al., 2018; Karageorghis & Jones, 2014).

Stork et al. (2015) conducted a study that applied asynchronous music to the WAnT, with four 30-s "all-out" bouts. The peak and mean power achieved by participants was higher in the music condition when compared to a no-music control. A potential limitation of the study is that self-selected music was used, and therefore the psychoacoustic properties of the music were not standardized across participants. Stork et al. (2019) conducted a follow-up study on the effects of experimenter-selected asynchronous music on Sprint Interval Training (SIT). Their findings showed that postexercise enjoyment was higher with the music condition when compared to podcast and no-audio controls. Also, the affective responses throughout the SIT trial were more positive in the music condition. These findings are relevant to athletes who engage in high-intensity, interval-type training.

Research has shown that in-task music can be used to: (a) engender an ergogenic effect (particularly when used in the synchronous mode); (b) enhance athletic performance when applied longitudinally; (c) reduce RPE by ~10% in submaximal training tasks; and (d) enhance affect at a range of training intensities. There is a dearth of research comparing synchronous vs. asynchronous music and this should be a focus for future studies.

Post-Task Music

The use of post-task music for movement-based recovery, also known as *active recovery*, or static recovery, often referred to as *passive recovery*, is an approach that has seldom been examined by researchers (Karageorghis, 2017). One of the most common uses of post-task music for athletes is to regulate or modulate affective valence and arousal (i.e., engender positive feelings) after intense training or competition (Karageorghis, 2016). You will recall that post-task music can be applied in respite forms (i.e., in between high-intensity exercise bouts) and as a recuperative tool (i.e., at the end of a training session or competition).

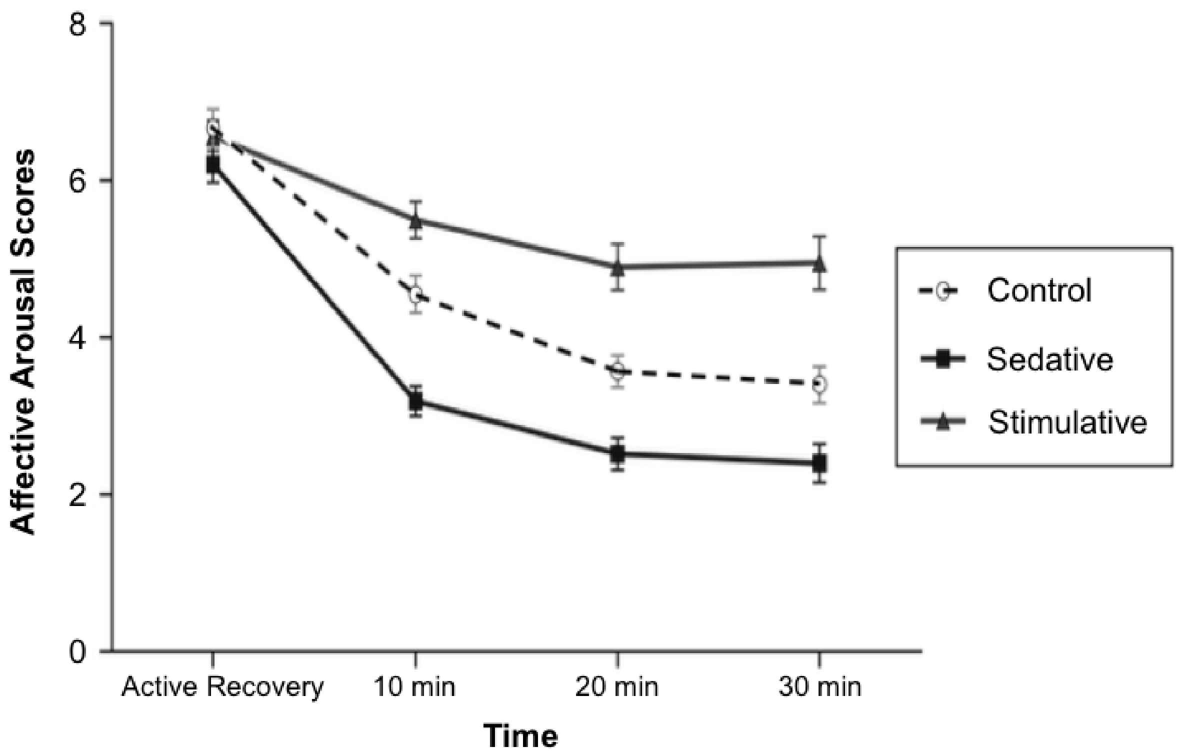
Jones et al. (2017) examined the psychophysiological effects of *respite–passive music* (i.e., music used for static recovery) on acute recovery from high-intensity, 5-min running bouts performed by male middle-distance runners. Upon completion of each running bout, participants were exposed to slow-tempo music (55–65 bpm), fast-tempo music (125–135 bpm), or a no-music control. A range of measures were taken that included affective responses, RPE, gas exchange, and pulmonary ventilation. The researchers found that fast-tempo music resulted in higher scores on the Feeling Scale (i.e., enhanced affective valence) over the entire 3-min static recovery period compared to a no-music control.

Karageorghis et al. (2021) investigated the effects of *respite–active music* (i.e., music used for active recovery). They administered medium-tempo (120–125 bpm), fast-tempo (135–140 bpm), and no-music control conditions using a high-intensity interval training (HIIT) protocol. They reported that the medium-tempo music condition improved affective valence during exercise and active recovery. Both medium- and fast-tempo music increased dissociation, exercise enjoyment, and remembered pleasure relative to the control condition. In addition, medium-tempo music was shown to reduce RPE during recovery periods. Jones et al. (2020) contrasted two music conditions (respite–active and continuous) with a no-music control using a HIIT protocol. In contrast to Karageorghis et al., they found that music did not influence affective valence during either exercise bouts or recovery periods. Nonetheless, Jones et al. reported that the continuous application of music resulted in greater post-task enjoyment and remembered pleasure than respite–active music. In this instance, the music tempo, which was in the range 120–140 bpm, may not have been optimal for use in active recovery toward the high end of this range.

Finally, with the notion that slow, sedative music can facilitate the recovery process that follows exhaustive exercise (i.e., a recuperative music application), Karageorghis, Bruce et al. (2018) investigated the effects of two music conditions vs. a no-music control on psychological and psychophysiological recovery indices. The two music conditions were slow, sedative music (M_{tempo} = 71 bpm) and fast, stimulative music (M_{tempo} = 129 bpm). The authors found that slow, sedative music facilitated the downregulation of affective arousal (see Figure 23.7). The greatest decrease in affective arousal between active and passive recovery phases was evident in the slow, sedative condition. Women had a more pronounced reduction in arousal than men in response to the slow, sedative music condition. HR measures showed that fast, stimulative music inhibited the return of HR toward resting levels. There was a main effect of condition for affective valence suggesting that the slow, sedative condition induced more positive affective responses when compared with the control and fast, stimulative conditions.

Figure 23.7

Twoway Condition × Time Interaction for Affective Arousal (p < .001)



Note. Adapted from Karageorghis, C. I., Bruce, A. C., Pottratz, S. T., Stevens, R. C., Bigliassi, M., & Hamer, M. (2018). Psychological and psychophysiological effects of recuperative music post-exercise. *Medicine & Science in Sports & Exercise, 50*(4), 739–746, https://doi.org/10.1249/MSS.0000000000001497 under a Creative Commons Attribution Licence (CC BY).

Research has shown that post-task music can be used to: (a) enhance affective responses following exhaustive training sessions; (b) improve the experience of training sessions predicated on HIIT-type protocols; and (c) facilitate physiological recovery but notably not when the tempo is high.

Post-task music has been the least investigated music application and so there is potential for a broad range of research. A particularly valuable line of work would be to use physiological (e.g., blood lactate), psychophysiological (e.g., electroencephalography; EEG), and neurophysiological (e.g., functional near-infrared spectroscopy; *f*NIRS) measures alongside subjective measures of recovery (e.g., the Feeling Scale; Hardy & Rejeski, 1989).

How to Apply Music in Sport

Athletes are able to derive benefit from the use of music before, during, or even after sport, as detailed in the earlier sections of this chapter. Invariably, athletes' needs will differ and so the first thing to make clear is that there is no simple, "one-tune-fits-all"-type solution. In this section, we explore how music can be used for performance enhancement, considering, among other factors, athletes' preferences, sport-specific requirements, and a range of musical factors (e.g., rhythm and lyrics).

Using Music Before Sport

For coaches and athletes wanting to harness the power of music, careful consideration of the use of pretask music is a good point of origin. Commencing a training session or competition in the "right" physical and mental state is often crucial for performance success. Music can help in fine-tuning an athlete's emotional state and controlling their thought patterns before sport (Bishop, 2010).

Many athletes benefit from starting a competition with an elevated level of arousal. Fast and loud music induces physiological changes such as increases in HR, blood pressure, and muscle tension. This happens irrespective of how much athletes actually *like* the music (see e.g., Chapados & Levitin, 2008). Fast, loud music can therefore help a sprinter to rocket out of the starting blocks and may provide a tennis player with a mental edge over an opponent. For sprinters, The Prodigy's *Run With The Wolves* (166 bpm) might represent a good example, and for tennis players, Black Eyed Peas' *Boom Boom Pow* (130 bpm). The latter track was famously used by Andy Murray (former world #1 men's singles player).

To Each Their Own

Not all athletes need or want to be as happy as a lark just before a training session or competition. Some will choose to listen to dark and aggressive music, such as heavy metal, in order to feel confident and strong (Karageorghis, 2017). Powerlifters might pick tracks such as Linkin Park's *One Step Closer* (95 bpm), while snowboarders might go for *Lords Of The Boards* by the Guano Apes (104 bpm) to feel self-assured before a sharp descent or a 70-foot jump.

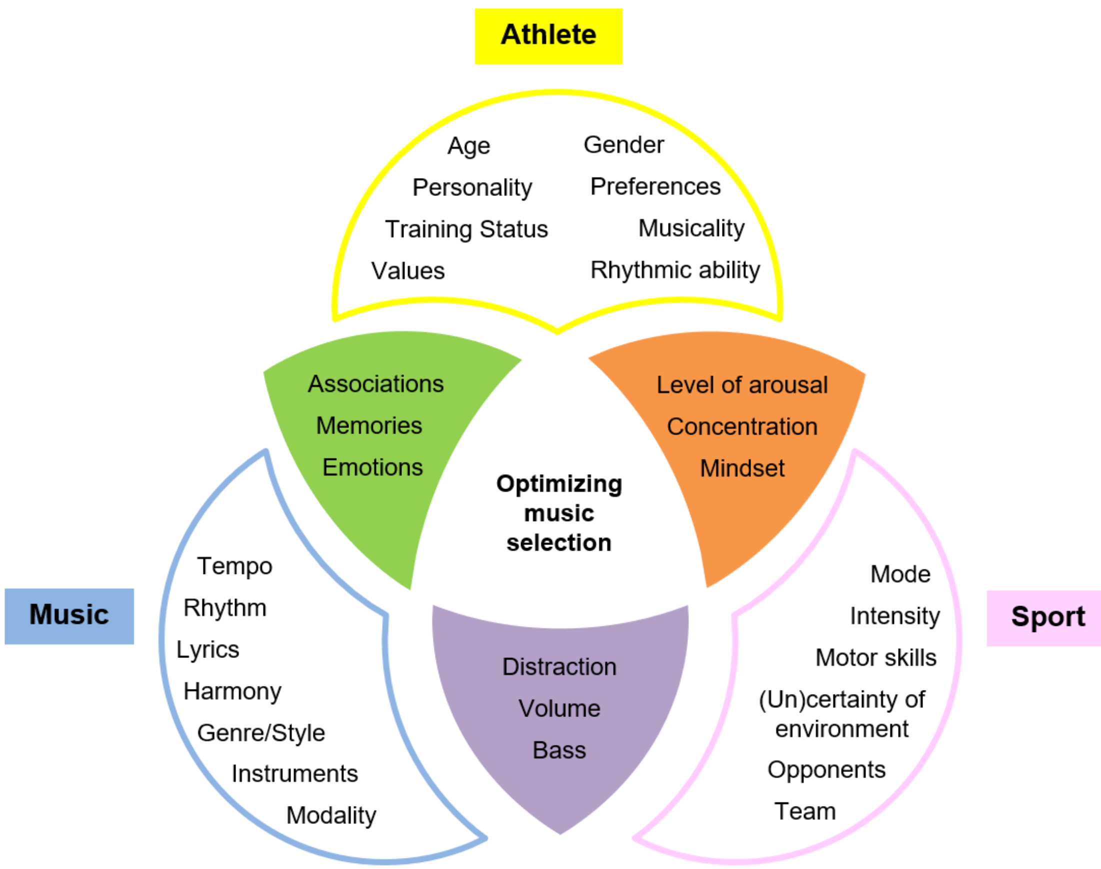
Each athlete needs to experience a level of arousal that is compatible with their upcoming task(s), but even for rather similar tasks, their personal preferences can differ. Some may interpret their heightened arousal as positive excitement, while others may dislike these sensations and feel anxious or stressed. Music can steer athletes toward a positive interpretation of their feelings of excitement, pressure, or anxiety before sporting competition (Smirmaul, 2017).

Figure 23.8 depicts how the athlete's characteristics, components of the sport, and attributes of a musical piece relate to one another in determining the optimal musical choice for performance enhancement in sport. It's not *always* music of the fast/loud variety that does the trick. Music that is soft and slow can help an athlete to relax and attain a calm mindset (Bishop et al., 2007), which might be beneficial for athletes who prefer to begin their training or competition in a relatively placid state.

Music chosen for the downregulation of arousal can be sourced from many musical genres, depending on an athlete's preferences (e.g., pop, folk, or reggae). Pieces with relatively simple and slow rhythms tend to work well in terms of decreasing affective and physiological arousal (Karageorghis, 2016). Classical music, ballads, or ethnic songs can all work effectively. Athletes might try Johann

Pachelbel's well-known *Canon in D* (72 bpm), Katie Melua's *Nine Million Bicycles* (82 bpm), or *Empire* by Shakira (80 bpm).

Figure 23.8
Factors Relevant to Optimal Music Selection in Sport



The Importance of Familiarity

Familiar music can simply make athletes "feel good" (i.e., enhance their affective valence). Listening to pretask music that triggers happy memories or reminds athletes of their role models/heroes, can positively impact their emotional state and increase self-efficacy (Bishop et al., 2007; Karageorghis, Cheek et al., 2018).

Perhaps basketball players will have a penchant for LeBron James and Kevin Durant's rap *It Ain't Easy* (88 bpm), while soccer players prefer *World At Your Feet* by Embrace (124 bpm). Gymnasts might settle their nerves with Ludovico Einaudi's *Nuvole Bianche* (133 bpm), a soothing piano piece that conjures images of the Olympic performance of gymnast Lieke Wevers in 2016. Other tracks with positive extramusical associations include Katy Perry's *Roar* (90 bpm) and Kanye West's *Touch The Sky* (106 bpm; ft. Lupe Fiasco).

A Musical Aide-Mémoire

By facilitating the recall of previous successful or enjoyable sporting experiences, music can bolster motivation and self-confidence. Through the earlier-described process of *evaluative conditioning*

(Juslin, 2013), familiar music can even evoke psychological and physiological reactions of which an athlete is not consciously aware (Terry et al., 2020).

Musical pieces can be selected to help athletes remember crucial tactical or technical instructions. In learning correct technique for the shot put, for example, young athletes can use the lyrics of *Push It* (130 bpm) by Salt-N-Pepa. This encourages them to "push" rather than try to "throw" the shot; the most common technical error. When music is an integral aspect of performance, such as in ice dancing and synchronized swimming, athletes can use the soundtrack of their routine to mentally rehearse their performance as part of their precompetition preparations.

The minutes just before a game or competition can be particularly stressful. Music can help athletes to remain suitably focused on the task at hand (Laukka & Quick, 2013). Athletes can also use motivational or inspiring lyrics to prompt use of a personal mantra. Repeating part of a chorus from uplifting pieces such as Sia's *The Greatest* (96 bpm; feat. Kendrick Lamar) or singing along to the lyrics of *The Power* (109 bpm) by Snap! can bolster an athlete's self-efficacy and serves to distract them from unhelpful thoughts.

Building Team Cohesion

As all members of a team should feel comfortable with a playlist used to promote cohesion, selecting music in team sports can be a challenging process. It is, nonetheless, well worth getting at least some buy-in from all team members (see e.g., Karageorghis, Bigliassi et al., 2018). Team songs can be played during the team's travels or as a sonic background in the changing room. Simply moving in synchrony during a warm-up routine increases social harmony as well as a sense of belonging (Cross et al., 2019). Music can thus instill a strong sense of esprit de corps, enhancing a team's cohesion and collaboration (Høigaard et al., 2013).

A team anthem or collective playlist can remind athletes of previous successes as well as past collective struggles. This can strengthen the belief of individual players in the team's abilities, enhancing commitment and resilience even during periods of repeated losses (Morgan et al., 2017). Athletes who believe in their team's abilities and its members' qualities are more disposed toward "giving their all" (Ronglan, 2007). A team might choose to use a track such as *Firework* by Katy Perry (124 bpm) or the New Radicals' *You Get What You Give* (114 bpm) to strengthen the perception of team cohesion in the prematch phase.

With a Little Help From Our Fans

Music can motivate a crowd of sports fans, creating an atmosphere of passion and excitement. On home turf, this is an integral part of the home advantage phenomenon (Karageorghis, 2017). The sound of a supportive crowd belting out a well-known chorus or chanting a player's name can raise athletes' spirits and the sense of collective efficacy (Bray & Widmeyer, 2000; Karageorghis & Terry, 2011). In many sports, individual athletes or teams select a "walk-on song" that represents their values and enables fans to identify more closely with them. Such applications of music can be valuable in creating a sense of community among athletes, spectators, pundits, and even sponsors.

The New Zealand rugby team's haka is a good example of the use of music (also incorporating tribal chanting and dance) to increase team spirit. Fans the world over know and look forward to the traditional battle-chant with which the All Blacks express their determination and lay down the challenge to their opponents. Many teams can be at least mildly intimidated by such bravado and indeed the central purpose for the All Blacks is to fill their adversaries with dread.

Using Music During Sport

Many sportspeople have noticed that their training sessions pass easier when they listen to music. Precisely how beneficial music can be depends on many factors, such as an athlete's personality, as well as the intensity and duration of their effort. Whether or not music can be helpful also depends on the complexity and type of task that is being executed. We will go on to explore how the power of music can be tapped during sport or training.

Dissociation and Distraction

During sport activities of low-to-moderate intensity, music can reduce feelings of discomfort and fatigue by hindering the transmission of sensory information from the body to the brain (Bigliassi et al., 2017). Athletes thus perceive their effort as being lower in relative terms. Given that athletes base their intended speed or power output on these perceptions of effort (Venhorst et al., 2018), music can make them run faster or push harder, compared to when music is not available (Karageorghis, 2016). Note that during very high intensities (e.g., sprinting or "Insanity" sessions) music is relatively ineffective in reducing perceived exertion.

Maintaining Appropriate Focus

Even if it does not affect athletes' perceived exertion, musical distraction can make it seem as though time is passing by faster. It also facilitates positive thoughts (Karageorghis, 2016) and thus can render the experience of mundane activities such as circuit training or repetitive drills in sports like volleyball or tennis, more pleasurable.

During long training sessions, such as running or swimming, athletes should select tracks with a steady beat. Concentrating on a regular rhythm helps athletes to stay focused on the task at hand and maintain regularity in their movement patterns. This approach has been shown to make endurance activities more energy efficient, particularly when the music is used synchronously (Bacon et al., 2012). Pieces with a predictable structure and simple melodic themes "suck athletes in" and can lock with their movement pattern. Good examples include Fedde Le Grand's *Put Your Hands Up 4 Detroit* (128 bpm) and *Pump It Up* by Endor (129 bpm).

Supramaximal Efforts

When athletes train or compete at high intensities, music cannot block pain and discomfort from entering their focal awareness (Karageorghis et al., 2011; Terry et al., 2020). Nevertheless, listening to easy-to-absorb, preferred music can increase athletes' motivation, enjoyment, and affective state (Stork et al., 2019). During high-intensity training such as SIT, appropriate music is fast (>125 bpm; Maddigan et al., 2019), uplifting, loud (> 70 dBA), and characterized by a steady beat (Karageorghis, 2016). Lyrics are *somewhat* less important, as it is hard for athletes to process lyrical content during highly strenuous training sessions (Karageorghis, 2017). Good examples include Daft Punk's *Harder, Better, Faster, Stronger* (126 bpm) or *Party Rock Anthem* by LMFAO (130 bpm; feat. Lauren Bennett and GoonRock).

Music as a Pacemaker

Moving in time with the beat of a popular song comes rather naturally to most people (Buhmann et al., 2016; Terry et al., 2012). This form of synchronous application of music can help an athlete to maintain an even pace throughout an endurance-based training session and increase their movement efficiency (Bacon et al., 2012; Terry et al., 2012). To use music in a synchronous way, the rhythm and tempo of the chosen tracks need to complement an athlete's movement pattern and rate (Karageorghis et al., 2017). Regular and well-pronounced beats make it easier for athletes to follow the music's meter.

Many runners have experienced how music with the "right" rhythm can seem to slightly hasten their pace and thus bolster their performance (Van Dyck & Leman, 2016). For example, the great Ethiopian distance runner, Haile Gebrselassie, believed that running to the track *Scatman* (136 bpm) by Scatman John provided exactly the rhythmic stimulus he needed to maintain an optimal pace. He used this track as the sonic backdrop to an indoor world best for 2000 m in 1998. Also, for cyclists training indoors, music can help them to sustain an optimal cadence and maintain power output throughout lengthy training sessions (Waterhouse et al., 2010).

Some sports present particular challenges when it comes to syncing movement to the beat. In rowing, for example, athletes execute a full-body movement that leads to a stroke rate of ~25 strokes per min. Their preferred music, however, is often far in excess of 30 beats per minute! A good solution is to select a moderate-tempo track, such as Shakira's *Hips Don't Lie* (feat. Wyclef Jean) or Q-Tip's *Breathe And Stop*—both at a tempo of 100 bpm—and to execute one full stroke over each set of four beats (i.e., a musical measure or bar).

Music in the Competitive Arena

In many artistic sports, music is an integral part of performance. In gymnastics or ice dance, success depends greatly on the judges' evaluation—the correspondence between a piece of music and an athlete's movement pattern is thoroughly scrutinized. Soundtracks for sport routines usually comprise some fast, rhythmic sections that correspond with the most difficult, demanding, and fast-paced movements. They also include more sedate sections, during which an athlete can catch their breath before the next burst of effort. The music punctuates each movement sequence and it seems as though the athlete merges with their auditory accompaniment. A great example concerns Gabrielle Douglas's floor routine during the 2012 London Olympics, wherein she used a high-energy mash-up of *Memories* (130 bpm) by David Guetta feat. Kid Cudi, and Yolanda Be Cool's *We No Speak Americano* (125 bpm) for an impressive acrobatic tumbling series.

Mindlessly using music as acoustic wallpaper is not an approach we would recommend. Music can be an unwanted distraction when athletes are learning new motor skills, or when they need to concentrate on complex decision-making processes (Karageorghis & Terry, 2011). The absence of music could also be preferable when athletes are receiving feedback from their coach or when they need to communicate with teammates.

Using personal in-task music is often not permitted during competitions (e.g., in track and field; Van Dyck & Leman, 2016). We would thus encourage endurance athletes to complete a couple of training sessions each week without music. This makes them less reliant on music and can prepare them for the (likely unpleasant) sensations they will encounter while competing.

Respite and Recuperative Music

Respite Music

In many sports, athletes have a brief period of time in between consecutive physical tasks, ranging from repeated sprint efforts or several games on one day (e.g., in a tournament setting). Well-chosen respite music can help athletes to make optimal use of this (brief) period of recovery (Jones et al., 2017).

Music applied during training can encourage athletes to take sufficient time to recover before going again or initiating another set of activity. This is important in sports where athletes need near maximal power output to perform optimally (e.g., sprint events in swimming or track and field). When training intensity is extremely high (e.g., during supramaximal intervals), respite music could be most effective when used in between intervals. At these moments, athletes can concentrate on the music, which has been found to assuage negative affect (Karageorghis et al., 2021).

Moderately stimulating and optimistic (happy) music with a simple melodic structure and catchy lyrics can be ideal. We would suggest a medium tempo for respite music (i.e., 115–125 bpm); this will help in maintaining the level of psychomotor arousal required for the next task. Examples of suitable tracks include *Get Lucky* by Daft Punk feat. Pharrell Williams and Nile Rodgers (116 bpm) and *Express Yourself* by Madonna (116 bpm).

Recuperative Music

When the referee's final whistle sounds or the coach "calls it a day", athletes have made their last big effort and the best they can do is focus on optimizing their recovery until the next time they enter the fray. Interestingly, there are also musical solutions for the enhancement of recovery and recuperation.

Recuperative music of the slow, sedative variety can accelerate decreases of physiological arousal toward an athlete's resting values. It can also have important psychological effects, as it increases feelings of wellbeing, calmness, and revitalization (Karageorghis, Bruce et al., 2018). Moreover, it reduces stress and might disrupt athletes' negative rumination. Being able to relax and detach from sport is relevant to recovery (Balk & Englert, 2020). Hence, recuperative music might also enhance athletes' long-term wellbeing and motivation. A recuperative playlist for use directly after sporting activity should ideally have a slow tempo that descends from track to track (~90 bpm–~60 bpm; see Table 23.1).

Table 23.1

A Selection of Music Tracks for Recovery

Artist	Track	Tempo (bpm)
Amy Winehouse	Help Yourself	90
Red Hot Chili Peppers	Scar Tissue	89
Corinne Bailey Rae	The Scientist	85
Gregory Porter	Everything You Touch Is Gold	75
will.i.am	Good Morning	60

Most athletes will combine their sport with full-time work or study, and struggle to find sufficient time for rest and recuperation in their crowded schedules. Late-evening training sessions or competitions and spending time in unfamiliar surroundings for away fixtures can make it difficult for athletes to sleep. Relaxing music can be part of a structured bedtime routine that promotes a restful night's sleep. Many types of soft, sedative, and slow music can work, such as Erik Satie's *Gymnopédies* (various tempi) or Enya's *A Day Without Rain* (71 bpm).

Conclusions

This chapter has explored concepts, theoretical approaches, underlying mechanisms, empirical research, and applications relevant to the use of music in the domain of sport. Music is a potentially powerful tool that can be used before, during, or after sport. Across a broad range of applications, music is important in regulating emotion, boosting confidence, and optimizing focus. By reminding members of a team of shared experiences and values, music can instill a sense of esprit de corps, while also bringing players closer to the fans.

In-task music can serve as a type of pacemaker and enable athletes to dissociate from fatigue-related symptoms or unhelpful thoughts and feelings, when their results, performance, or both, might be disappointing. Nonetheless, it should be noted that with overuse, the potency of a piece of music can be diminished. Athletes might lose interest in a playlist or even develop a strong aversion toward it; particularly if it gets associated with failure, anxiety, or frustration. It is therefore advisable for athletes and coaches to have several options at their fingertips (i.e., a variety of playlists). When music is not permitted, athletes can use auditory imagery to hear or sing a piece in their mind. Even when music is imagined, its rhythm can serve as a pacing aid or a catchy lyric can provide a personal mantra.

Carefully selecting pieces of music for use before, during, and after sport is a worthwhile pursuit. Athletes will, invariably, go through a process of trial-and-error to discover which selections work best for them, and when. Analyzing the effects different tracks have on their mindset and thought processes might even teach athletes more about the way their mind and body interact toward the goal of attaining excellence.

Learning Exercises

1. Think of three pieces of music that are associated with sporting endeavor. With reference to the “Music Factors” box in Figure 23.1 (A Theoretical Model of the Antecedents, Moderators, and Consequences of Music Use in the Exercise and Sport Domain) consider why these pieces have such an association.

2. Pick three running stride rates for an athlete (typically, a range of 150–180 strides per minute [spm] is used) and then select a piece of music for each stride rate that would facilitate auditory-motor synchronization. Consider that one step can be taken on each beat (i.e., with music at 150–180 bpm) and that one stride cycle can be taken on each beat (i.e., with music at 75–90 bpm).

3. If pretask music is typically used to recreate an athlete’s ideal mindset, how might we go about establishing—with some accuracy—what an athlete’s ideal mindset might be? This exercise will require some reading in relation to mood–performance relationships in sport or individual zones of optimal functioning.

4. A rowing coach wants to improve the training atmosphere for dry-land workouts. What advice might you offer the coach in order to assist them in optimizing the application of asynchronous music for their athletes?

5. Given the limited scope of research into post-task music to date, can you speculate as to what type of future research might be beneficial in terms of advancing this line of work?

6. A sprinter wants to use music as the auditory backdrop for precompetition imagery. Can you suggest a few suitable tracks and describe why you think they would be beneficial in this context?

7. Using Figure 23.8 (Factors Relevant to Optimal Music Selection in Sport), construct a brief playlist for yourself to be used in the precompetition stage or a playlist for an athlete/team of your choice.

8. Have a look at Table 23.1 (A Selection of Music Tracks for Recovery) and construct a similar playlist, either for yourself or for an athlete of your choice.

9. Select a sport-related workout of your choice (e.g., circuit training, HIIT, pyramid weights session) and construct a playlist—including the bpm of each track—in relation to the pretask, various in-task, and post-task phases. You might draw upon the examples in this chapter for inspiration.

Further Reading

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Chapter 24
Values-Based Coaching: The Role of Coaches in Moral Development

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Chapter Overview

The purpose of this chapter is to highlight ways in which coaches can support moral development in their athletes through Values-Based Coaching (VBC). That is, by placing ethicality, excellence (i.e., of character and thought), and empowerment (i.e., the Three E's) at the forefront of their practice. In providing a theoretical framework that explains the interactive processes that influences coach-athlete moral development and how the moral atmosphere may be [co-]constructed, the present chapter provides a foundation from which researchers can understand and explain the creation of normatively appropriate, morally enhancing, and empowering coaching environments. Our attention then focuses on the tangible processes that may be used to aid the development of the Three Es within both individuals and groups. It is hoped that by enhancing our understanding of the Three Es, coaches may be better supported in their endeavors to promote moral development and empower athletes to stay engaged in sport. Furthermore, in presenting a theoretical framework, it is expected that the present chapter will initiate discussion around normative standards.

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Values-Based Coaching: The Role of Coaches in Moral Development

Sport is in many ways, a dress rehearsal for life; be it receiving feedback, learning about one's roles, responsibilities, obligations, and expectations; developing discipline, organization, and communication skills; or experiencing the highs of victory or the lows of defeat. As a social context capable of impacting others' rights and wellbeing, sport also represents an important setting for the development of ethical thought and action (Bandura, 1991). Despite this important function, few have sought to study why some in sport value development over winning, service over self-enhancement, empowerment over domination, and care over abuse. Fewer still have sought to examine how the personal values people hold and the cultural values they operate within shape attitudes and behavior. Sagiv et al. (2017) define values as what is good and worthy. Cultural values are those that represent the goals of a social collective and are thought to guide and justify social behavior (Schwartz et al., 2012). Personal values are the value systems individuals hold and are viewed as guiding principles that both influence goals and direct intentions to act. Personal values both shape and are shaped by preferences and behavior over time and across situations (Schwartz et al., 2012). In sport, values are co-constructed by those who play, coach, officiate, parent, and dictate the policy, prepare the kit and equipment, cook the food, support the hurt, and cheer from the sidelines.

Sport provides opportunities for those on and off the field to experiment with ethical norms and test the limits of their personal value system (McFee, 2004). Be it the player taking a dive, the parent abusing an official or the fan acting violently, the sporting environment often acts as a form of naturalistic moral laboratory (McFee, 2004). Whilst sport may act as a moral laboratory, contrary to popular opinion, it is unlikely that sport, in as of itself, is a teacher. Sport merely provides opportunities for moments of implicit or explicit learning. It is how we think and act in such moments, that, over time, shape who we are. For learning to happen, a level of reflection needs to occur in which the participants of sport are able to evaluate their thoughts, feelings, and actions (Bandura, 1986). As Durant (2012) notes, "we [do] not act rightly because we have virtue or excellence, but rather because we have acted rightly, virtues are formed through our actions" (p. 96). Both ethicality and excellence, then, are not an act, but are in part, the result of habit.

Although the notion of habits has been a controversial topic within psychology (see Lapsley & Narvaez, 2006), the emergence of social cognitive theories have gone some way in resolving previous concerns. By examining the formation of habits through, for example, the schema model of self-concept (Markus, 1977), the development of moral character can be broken down into cognitive units (i.e., schemas and prototypes) that emerge from repeated experience, guided instruction, observation, and immersive experience (for a full review see Leary, 2007). Through this process, habits continually evolve through training and competition. As such, participants' understanding of contextual standards of right and wrong and the ability to make moral judgements (i.e., Bandura, 2006; Van Bavel et al., 2015) may be influenced by their involvement in sport.

At a local level, coaches and managers play an important role in shaping the culture and moral climate within clubs and training environments more broadly. Researchers in both developmental and sport psychology have emphasized the important role coaches play in the socialization of young people within sport. Be it through tacit gestures, explicit endorsement, or the modelling of appropriate and inappropriate behavior, coaches are thought to play a key role in developing moral agency and constructing the moral environment to which participants of sport are socialized (Weiss et al., 2008). Given the civic importance of this function, it is unsurprising that researchers interested in sport-focused moral psychology have allocated considerable efforts over the preceding decades to develop our understanding of individual differences in moral processing within sport (for a full review see Boardley, 2020) and how this combines to create a moral atmosphere (Benson et al., 2017; Kavussanu et al., 2002; Shields & Bredemeier, 2007; Stephens & Bredemeier, 1996; Benson et al., 2017). Despite these efforts, however, the role sport plays in the moral development (i.e., learning socially accepted values and behaviors [Bandura, 1977]) of sport participants is often overlooked both in terms of coach education and applied practice.

The purpose of this chapter, therefore, is two-fold. First, we aim to provide an introduction into the study of moral psychology in sport. Second, we hope to provide practical advice around placing ethicality, excellence (of character and thought), and participant empowerment at the forefront of sport and sports coaching. We do this by introducing the Three E's (i.e., ethicality, excellences, and empowerment) of Values-Based Coaching (VBC). It is hoped that by providing a simple initialism in these three Es, coaches, clubs and sports organizations will be able to easily recall the content discussed here and use this as a basis for reflecting upon their motives, goals, and behaviors.

Given the enormity of this topic, a broad discussion around descriptive, normative, applied, and metaethics will not take place here. Instead, this chapter will focus on introducing factors relating to moral development that fall within normative ethics; specifically, Deontology (Kant, 1796/2002), Consequentialism, and Virtue Ethics (Aristotle, 4th Century B.C.E./1998). These theories provide the requisite conceptual backdrop to the underpinnings of moral philosophy and cover the vast majority of psychological research interested in moral judgement and action. Unlike others who discuss empowerment from the perspective of motivational climate (Appleton & Duda, 2016; Duda & Appleton, 2016; Duda, 2013), here, self-worth and self-efficacy are viewed as the determinant of empowerment (Conger & Kanungo, 1998) and as such, the antecedent processes of ethicality, and excellences of character and thought are discussed.

It is important to note that there is no one right way to approach moral philosophy and we fully appreciate that the application and importance placed on moral ideologies and foundations differ between sports, coaches, athletes, and teams. The topics presented here are included to provide a guide to aid in the re-evaluation of constructing normatively appropriate standards relevant to specific contexts. With this in mind, VBC is defined by identifying normatively appropriate standards that guide the formation of personal and collective goals and the actuation of subsequent behavior. It is important to note, however, that whilst ideologies and the importance placed on individual values and ethics differ, their inclusion as the foundation to moral systems largely do not (Graham et al., 2013). Through enhancing our understanding of the expected values and ethics of individuals participating in sport and recognizing cultural differences in the rules, expectations, obligations, and outcomes associated with sporting participation, we can begin to develop new approaches to moral education that help redress the ethical issues currently experienced within many sports.

The Three Es of Values-Based Coaching

Ethicality

The question of how we ought to act and make judgements (i.e., normative ethics) has been discussed by philosophers for centuries (e.g., Aristotle, 4th Century B.C.E./1998). The earliest and arguably most influential theories of moral development in psychology (i.e., Piaget, 1932/1965; Kohlberg, 1981, 1984), were heavily influenced by Kant's (1796/2002) deontological ethics. For Kant, the moral status of an act is judged in terms of the rules, duties, or obligations that constrain action (Kagan, 1997). From a Kantian perspective, actions that violate these constraints are viewed as morally prohibited. Within this view, it is implied that responsibility for action is derived based on the freedom of will. In other words, an individual is morally blameworthy if they freely contravene the rules or their duties and obligations to both themselves and others.

In sport, this view of morality may be demonstrated by the blame attached to single or repeat users of prohibited forms of performance enhancing methods or substances. One is often met with a degree of sympathy, while the other is vilified for knowingly and willingly contravening the rules and foregoing their associated duties and obligations. Laboratory-based studies examining how blame is attributed and the influence blame has on perceived moral character support this notion (Siegel et al., 2017). How blame is attributed, however, may be dependent on the context and ethical position of those applying blame. Unlike deontology, for example, consequentialism makes no distinctions regarding rules, duties, and obligations. Instead, actions are morally justifiable according to whether they yield favorable or unfavorable consequences. Consequentialism is often viewed as a cold and calculating ideology that seeks to maximize good while minimizing harm (Smart & Williams, 1973). However, consequentialism comes in many forms, including, but not limited to: Utilitarianism, Ethical Egoism, and Teleological Ethics. In the interests of brevity, each form of consequentialism will not be outlined here. Instead, see the seminal text by Smart and Williams (1973) for a review of these approaches. Within all forms of consequentialism, however, the intent or will of the person is of little importance as it is the act rather than the individual that is judged. For example, Tamburrini (2000) argues that, from a Utilitarian perspective, Diego Maradona's infamous Hand of God Goal[1] against England in the 1986 World Cup is morally vindicated as it had a positive effect on football and helped diffuse international tensions around the Falklands War. In this example, Tamburrini is primarily focused on judging the outcome of the act by its consequences and not by its adherence to the rules of the game, duties and obligations to fellow players, or by Maradona's character as a person. We also see this approach in high performance sport, more broadly. For example, through the adoption of medal-based funding models, which emphasize winning over athlete welfare (Feddersen et al., 2020). Winning medals (i.e., The Gold-Medal Effect) is seen as good for sport and society (Maennig & Porsche, 2008). For example, researchers have demonstrated economic benefits, improved participation, and a perceived increase to quality of life (Barget & Gouget, 2007; Kavetsos & Szymanski, 2010). These benefits, however, are contrasted to the potential abuse of athletes and those involved in the construction of such events (Mountjoy, 2018). For many, the ends may justify the means. For others, they may not.

Both of the views presented thus far have been act/rule-based, rather than based on the person. Within virtue ethics—the third approach to normative ethics discussed here—the primary concern is to do the right thing, at the right time, and for the right reason (Pizarro & Tannenbaum, 2011). As a person-based approach, virtue ethicists argue that a person’s traits, dispositions, and character should also be factored into consideration when evaluating moral issues (Uhlmann et al., 2015).

Specifically, virtue ethics emphasizes the character of the agent and whether they possess desired virtues. Further, they propose that moral evaluations should focus on local features of an act and agent. For example, whether the action violates a rule, whether the agent’s mental state at the time of the action allowed for alternative actions, or whether the act caused harm. As such, virtue ethics is sometimes referred to as the “third way” of normative ethics (Stan Van Hooft, 2014). Although this approach fell out of favor in moral philosophy and psychology during the early twentieth century, in recent times it has seen something of a resurgence (See Pizarro & Tannenbaum, 2011).

From a sporting perspective, differences in these philosophical positions can be observed in the way coaches approach athlete development. Within a recent debate in the sports leadership literature, Cruickshank and Collins (2015, 2016, 2017) and Mills and Boardley (2017a, 2017b), highlight differences in philosophical approaches to moral investigation. On one side of the debate, Mills and Boardley (2017a, 2017b) champion a person-centered and virtue ethics-based approach to the study of sports

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[1] The Hand of God Goal is how Diego Maradona referred to his first goal in Argentina’s Quarter-final victory over England in the 1986 men’s FIFA World Cup. It is clear to see from the footage that Maradona handles the ball into the goal with his arm above his head. Argentina would go on to win the match and eventually the World Cup.

leaders. On the other side of the argument, Cruickshank and Collins (2017) advocate an outcome-based and consequentialist approach:

> For clarity, we still see that work on the full spectrum of leadership behavior, including that of a socially undesirable nature, plus a consideration of the cognitive drivers of leadership behavior, are essential routes forward if researchers are to make a significant stride in practically meaningful knowledge; in short, what leaders do. On the basis of their calls to explore attitudes, character, morality and value congruence, it seems Mills and Boardley are perhaps more focused on who leaders are. (p. 573)

Although these approaches often lead to the same outcome, the process can be markedly different. For example, in attempting to encourage athletes to achieve high performance outcomes, Cruickshank and Collins (2015, 2016, 2017) advocate the use of manipulative, deceitful, cunning, exploitative, cynical, distrusting, controlling, and domineering coaching behaviors. Such behaviors, however, are incompatible with the virtue ethics position adopted by Mills and Boardley. Fundamentally, the researchers here are viewing the same issue through different lenses. In judging the ethicality of an outcome based on the personal success achieved, Cruickshank and Collins' position would appear to fall within a sub-discipline of consequentialism called ethical egoism. In contrast to other consequentialist approaches to ethics that refer to maximizing the greatest good, ethical egoism suggests that moral agents ought to act in their own self-interest (Smart & Williams, 1973). In this instance, a coach may be abusive towards an athlete in the name of achieving personal goals. Although such coaches may also argue that they adopt such methods for the good of the athlete – by pushing them to achieve – one must question the toll in enduring abuse to those who survive. We must also consider what might have been for many athletes whose performance suffered due to such behavior. Rather than extolling such behavior or accepting them as the norm, we should consider how it may damage the coach-athlete relationship and affect an athlete's wellbeing (Jowett & Cockerill, 2002). Everyone enjoys winning, but for some, how they win is also important. For someone who aligns with this view of ethical egoism, winning through manipulation, abuse, and exploitation to advance one's ego may result in the same level of satisfaction as winning in a virtuous manner. Similarly, for those who primarily follow deontological ethics, the act of exploitation, for example, often breaches moral obligations and expectations. This again limits what can be considered ethical behavior within deontology. Given these differences, those involved in sport should be mindful of their own ethical position and of those they work with.

Moral Excellence

Excellence of Character

Aristotle suggests that there are two different kinds of human excellences: (a) excellence of character, and (b) excellence of thought. Excellences of character are often referred to as the embodiment of moral virtues such as fairness, trustworthiness, and honesty. According to Blasi (2005), however, excellence of character can be defined by three higher order virtues: (a) integrity (i.e., self-consistency), (b) moral desires (i.e., possessing moral goals and ambitions), and (c) willpower (i.e., the ability to resist the temptation to morally disengage or transgress). Although to some these may seem similar to the description of ethicality, this view is framed by your dominant ethical position. Those who favour utility, for example, may differ from deontologists in that they view fairness as equity rather than equality. For Blasi, willpower, integrity and moral desires are less susceptible to such debate. Given their global importance to the self, higher order virtues are positioned as a core aspect of the self-concept. Although lower order virtues, such as honesty and fairness are important, Blasi (2009) argues that they are largely context specific. Lastly, deficiencies of character may reflect egoistic or misguided moral desires or as a failure of will (i.e., insufficient determination, perseverance, or courage to act consistently with one's ideals; Shields & Bredemeier, 1995).

Although moral character is viewed as complex and multifaceted (Walker & Hennig, 2004), the core of character is relatively straightforward. When dealing with others, perceptions are created through consistency in words and actions, a belief that the actor holds moral intentions, is able to resist temptation, and can be relied upon (Aquino & Reed, 2002). Similarly, lower order virtues (e.g., compassion and conscientiousness) and emotional responses that indicate empathetic reactions (e.g., care and concern) are viewed as valuable indicators of character (Uhlmann et al., 2015). Further, such responses act as a useful source of social information and permit the perceiver to gauge intent towards prosocial action. That is, whether the individual is worthy of investment and likely to behave in a considerate and cooperative manner. In toxic or abusive cultures, those with power seek to ensure that the athletes are made to feel they have no voice or control (Mountjoy, 2018) making cooperation from the athletes within this environment easier. Based on these evaluations, we may decide that an individual is a 'bad' character if they appear manipulative and untrustworthy (i.e., Machiavellian), self-aggrandizing and acting in their self-interest (i.e., Narcissism), or behaving unfairly to others and lacking empathy (i.e., Psychopathy; Pizarro & Tannenbaum, 2011). Equally, this may extend to perceptions of the individual's intent (i.e., moral desire) and a perceived lack of willpower to resist the temptation to act in a normatively inappropriate manner. The frequency and impact of the action also acts as social information in the evaluation of character (Uhlmann et al., 2015). Deliberate acts that can be explained via multiple motives and are of low impact are thought to possess low informational value. In contrast, automatic decisions that are taken with ease (Critcher et al., 2013) and acts that are harder to explain or have high impact are perceived as character defining (Uhlmann, et al., 2015).

Coaches, therefore, should be mindful of what they practice, how they practice, and why they practice as they do. It should go without saying, but coaches wishing to develop positive and long-lasting relationships with their participants should avoid using manipulative, exploitative, or deceptive means. An example of this is coaches recruiting athletes to college or performance programmes using disingenuous or manipulative tactics when describing the culture. Once the athlete has joined it is very hard for that athlete to then leave a culture that was not accurately described. Honesty, trustworthiness, and fairness should be the norm rather than the exception when coaching (Shields & Bredemeier, 1995). Coaches who place "me" above "we" are likely to be viewed skeptically by their participants, who may assign negative attributions based on the social information self-aggrandizing conveys (Mills & Boardley, 2019). Ultimately, participants will use this social information to make inferences around the coach's motive and character (Mills & Boardley, 2017b). Those who forego their usual ethical standards in order to seek a competitive advantage may also raise concerns around the coach's character. This, of course, depends on whether a similar win at all costs position is shared by participants (i.e., value congruence), but any drastic deviation from typical intentions and behaviors will likely to be viewed skeptically.

Excellence of Thought

Aristotle proposes excellences of thought to be intellectual virtues such as technical expertise and practical wisdom. Despite nearly 40 years of research, defining technical expertise within the realm of sport coaching has been problematic. Authors have historically used win-loss percentages, athlete attributes, length of time in coaching, and level of competition as approaches to define coaching expertise. Côté and Gilbert (2009) have attempted to integrate these definitions and suggest that the effective implementation of coaching expertise requires "the consistent application of integrated professional, interpersonal, and intrapersonal knowledge to improve athletes' competence, confidence, connection, and character in specific coaching contexts" (p. 316). Although the mention of character here is welcomed, possessing virtuous qualities is just one aspect of moral development and fails to consider moral functioning (i.e., moral sensitivity, agency, motivation, and intent) and the alternate philosophical positions available. Should the coach and athlete share similar motivation for moral excellence, they may begin working together to co-construct a moral atmosphere. If not, either the coach, athlete or both may seek to re-align their moral self-concept to find a shared position or one or both may wish to leave the group (Mills & Boardley, 2019).

In terms of practical wisdom, coaches and athletes require a combination of perceptual attunement, complex understanding, motivation for excellence, and the capacity to use this expertise to demonstrate normatively appropriate decision making and behavior (Narvaez & Rest, 1995). Based on Rest's (1986) Four Component Model of Moral Functioning, coaches and athletes should be sensitive to environmental cues and consider the impact of any potential action on the welfare of others. Sometimes interpreting the situation permits a deliberate and considered response (e.g., the decision to engage in or report prohibited forms of performance enhancement), however, other times require a snap judgement (e.g., purposefully initiating contact with an opponent to solicit a foul). In these examples, the athlete is seeking to gain an ill gotten advantage, which may or may not fall outside of the social norms for their specific sport. Although some sports may be more permissive of such transgressions than others, Rest (1986) argues that the moral agent should consider whether the course of action is socially responsible, equitable, and how one ought to act.

As you may recall from the ethicality section earlier, such decisions are largely Kantian and may differ depending on the philosophical position one adopts. Kant (1796/2002) argues that the agent must consider the universalizability of their transgression. Using the doping example again, would the coach or athlete who is encouraging or considering using prohibited forms of performance enhancement wish to see everyone using such substances in sport? From a purely functional perspective (see Petróczi, 2013) the athlete may argue that they are purely motivated to use such substances to push the boundaries of their capabilities and would accept all others doing the same. However, those from a moral perspective may argue that, for example, such an approach would create an environment where free will and moral agency is limited with everyone feeling required to take potentially harmful substances in order to compete. According to Kant, an action is deemed morally acceptable if it can be universalized. That is, everyone could do it. In this case, it is difficult to see how either deontologists, virtue ethicists, or consequentialists (excluding ethical egoism) could argue in favour of the latter. Once the situation is assessed and a judgement around the moral course of action formed, one must then weigh up whether they are motivated to act. Before doing so, however, they must also consider whether competing interests are more dominant and whether the action is likely to garner either an intrinsic or extrinsic emotional response (Narvaez & Rest, 1995). On one hand they may be drawn by the perceived rewards and on the other anticipated guilt, shame, or fear of social reprisal as a result of pyrrhic action. The coach and athlete must then draw on their resoluteness and persevere to turn these intentions into actions. Should one or more of these processes fail, it is likely that a moral failure will occur (Narvaez & Rest, 1995).

Empowerment

Conger and Kanungo (1987) define empowerment as the process of raising others' self-efficacy perceptions. However, Spreitzer (1995) has since broadened this definition to include collective efficacy and self-esteem. Self-efficacy is the individual's belief in his or her ability to successfully perform tasks (Bandura, 1986). Further, collective efficacy is similar to self-efficacy and is defined as a belief that a team or group can function effectively and perform its tasks successfully (Bandura, 1986). Coaches who encourage personal identification (i.e., with the coach) are thought to advocate dependency (Kark et al., 2003). As such, collective efficacy may be more prominent within empowering rather than dependent environments. Finally, self-esteem has been defined as the extent to which an individual takes a positive view of their self (Gergen, 1971). The concept of self-esteem has been well examined within sport and exercise contexts, both in terms of a predictor of mental health (e.g., Standage & Simpkins, 2007) and an outcome of sporting participation (e.g., Slutzky & Simpkins, 2009). Because of its significance for mental health, wellbeing, and quality of life, self-esteem enhancement should be a priority for sports coaches of all levels, but particularly those working within grassroots sport (Fox, 1997). In more recent times, high profile cases of athlete welfare issues including Alberto Salazar (suspended from coaching pending appeal) and Larry Nassar (incarcerated for wide scale abuse of athletes) suggest performance coaches in future may also view self-esteem enhancement with greater importance.

An empowered athlete believes in his or her ability to perform successfully and understands their self-worth (Conger & Kanungo, 1987). Therefore, coaches can have an empowering effect on those they work with in terms of raising their self-efficacy beliefs by delegating responsibility, enhancing a capacity to solve intellectually challenging problems, and through encouraging the generation of new and creative ideas (Dvir et al., 2002). Further, athletes high in global self-esteem view themselves as important, influential, effective, and worthwhile (Rosenberg, 1965). Coaches can nurture athlete self-esteem by setting and supporting athletes to achieve high expectations, expressing belief in their abilities, setting intellectually stimulating challenges, and by demonstrating how activities help support the group's collective goals and values (Shamir et al.,1993). Should one attempt to seize power back from supposedly empowered individuals (see Cruickshank, & Collins, 2015, 2016), this would undoubtedly undermine the process. Further, by seizing control from their athletes, coaches risk developing deference and ultimately dependency in the group. Both of which are thought to stifle any empowering effect that may have previously been experienced (Kark et al., 2003).

If not managed carefully, however, feelings of empowerment may develop into self-righteousness (i.e., holding the view that one is morally superior; Haidt, 2012). To temper this, those involved in sport should be encouraged to show humility and resist temptation (i.e., self-regulatory efficacy) to gloat about their perceived self-worth and capability. Self-regulatory efficacy is a facet of global self-efficacy and beyond tempering ego, performs an important function in governing transgressive behavior. For example, individuals high in self-regulatory efficacy have consistently been shown to resist personal and social pressures to engage in detrimental conduct (Bandura et al., 2001). Within sport, this has primarily been examined in terms of doping (Boardley et al., 2017), cheating (d'Arripe-Longueville et al., 2010), and aggression (Corrion et al., 2009). Although perceived self-efficacy serves a regulatory function in all developmental periods, adolescence is a key phase of enquiry (d'Arripe-Longueville et al., 2010). As a period often associated with exploratory engagement in high-risk activities (e.g., substance abuse, unprotected sex, and transgressive conduct in various domains, including sports), providing an appropriate and supportive example during this time may be of critical importance to athlete moral development.

Practical Advice for Coaches

Within the coach-athlete relationship, consistency between words and actions is key. From the perspective of moral excellence and to be viewed as possessing integrity, this consistency in words and actions should reflect trust in athletes, fairness, and empathetic concern. For those responsible for recruiting coaches within the junior sport and for the coaches occupying such roles, the aforementioned qualities should be placed above all else. Anecdotally it appears that recruiters are most concerned with understanding what a coach has won and what experiences they have from previous employment when hiring. Although the ability to develop technical and tactical competency is of course a key outcome of coaching. Focus on how they have developed their athletes beyond the track/field/water may provide more useful insight. However, identifying an individual's ability to nurture the development of moral functioning, that is, supporting athletes to interpret normatively appropriate standards of what is right and wrong, make moral judgements, prioritize moral motivations, and take responsibility for their actions, is arguably of equal if not greater importance than their ability to enhance technical and tactical skill. The coach has an important role to play in this process as their words and actions align with those of important others within an athlete's moral schema—potentially creating a heuristic for appropriate behavior within set contexts.

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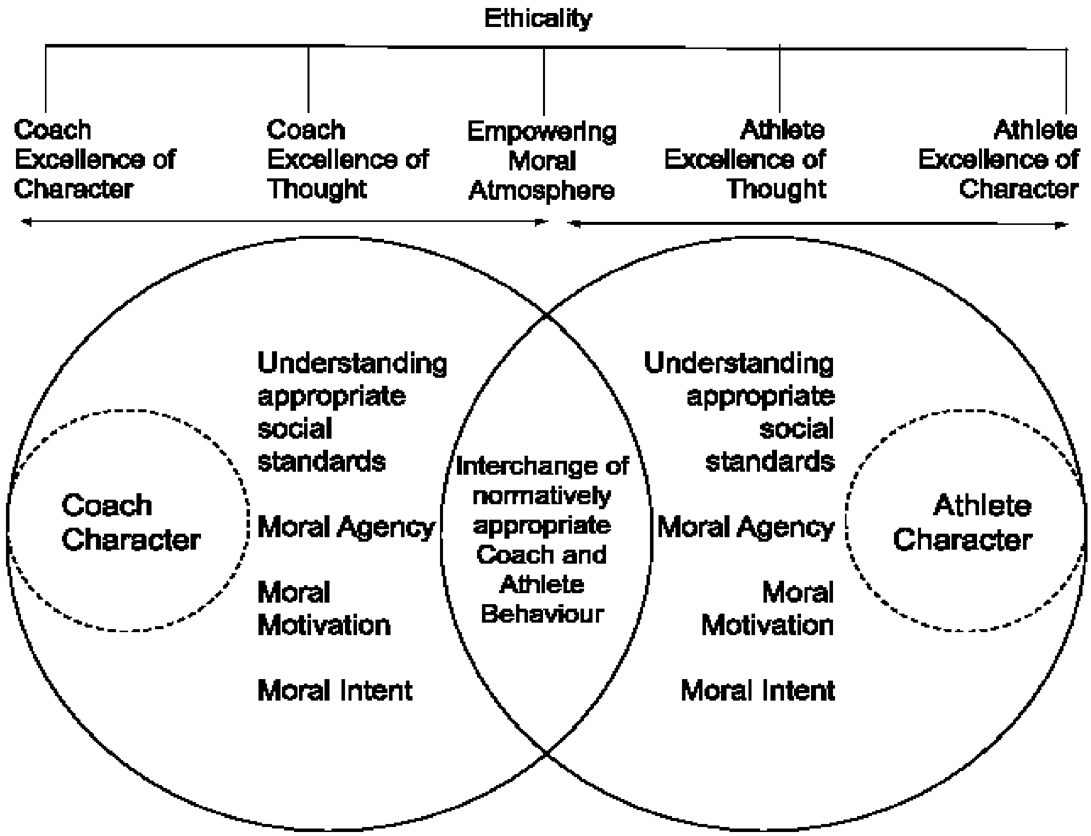
Developing the Three Es

In this section, consideration is given to how the moral atmosphere within sport may be co-constructed and habituated (see Figure 24.1). Although these processes are relevant to all in sport, in the following section a particular focus is paid to coaches and athletes, as they, to the general public at least, are the main actors and outward face of sport. Further, within the early years, coaches are thought to be particularly prominent in shaping the moral education of their players through sport (Weiss et al., 2008). During an athlete's formative years, the coach plays a key role in setting appropriate standards and establishing an ethical culture. Although the directionality of these processes may be more one-way (i.e., an apprenticeship model) in the early years, as athletes become more aware of themselves as moral agents, progressing towards co-construction of moral standards and a moral environment is key.

Figure 24.1
Interactive Processes Leading to Coach-Athlete Moral Development and Atmosphere



Supporting Individuals

As Steutel and Spiecker (2004) suggest, the habituation of moral agency and function is best understood by role modelling normatively appropriate behavior. Alas, this is not particularly a new or novel concept. Social Learning Theory is arguably one of the most well-known and influential theories in psychology (Bandura, 1986). Through consistent and regular practice and under the guidance of an ethical and empowering coach, normative standards can be produced and normalized within the moral atmosphere. Habits are then internalized leading to adaptations in the individual's character that occur and can be recalled spontaneously without reflective deliberation (Steutel & Spiecker, 2004). By practicing normatively appropriate standards, individuals acquire the skills associated with said standards. From a virtue ethics perspective, which is arguably the most intuitive of the ideologies for moral education (Haidt, 2012), this may be the development of characteristics such as fair play, integrity, and consciousness. Similarly, from a deontological position this may result in a greater understanding and respect for rules, expectations, and obligations. Lastly, those who align with a consequentialist position may learn to maximize good for all, the group (i.e., collective consequentialism) or the self (i.e., ethical egoism). Although these positions use different means and are presented independently here for the sake of clarity, they are not mutually exclusive and are often intertwined in application. It is also important to note that other factors such as: the individual's personality, background, the socio-economic environment they are exposed to, existing affiliations, and whether they derive value from achievement or social perception are also likely to influence the habit formation process. As such, understanding the uniqueness of individual athletes is important. The challenge of coaching is to identify commonalities between individuals within one's team and to tailor their environment accordingly. However, such a challenge is not specific to developing the Three Es and is arguably a cornerstone of effective leadership (Barling, 2014; Bass, 1999) and Coaching (Turnnidge & Côté, 2019) more broadly.

Within this complex set of social influences, the development of excellence and normatively appropriate standards of moral agency and function is a matter of perfecting interactive skills in perception, sensitivity, reasoning and judgment, focus, and action. To acquire a virtue is to fine-tune your perceptual abilities such that you detect the relevant signals, then feel the right emotions, understand their meaning, and then act in the right way (Haidt & Joseph, 2004). For example, to show kindness is to demonstrate sensitivity to the needs of others, to feel compassion when warranted, and to offer your full-hearted support. Likewise, to be courageous, is to be able to detect very different kinds of threats and opportunities, and to respond in a very different sort of way (Haidt, 2012).

As coaches and experts in skill acquisition more broadly are aware, the practice of a skill leads to increased automaticity of response (Bargh et al., 1988). Through practice and competition, athletes develop intuitive responses that facilitate automatic judgements and behavioral responses (Narvaez, 2010). Although in sport, this is primarily discussed in terms of technical skill development and tactical decision making, the process is the same for moral development. That is, through frequent activation, moral processing around ethical dilemmas may become incorporated within social cognitive schemas to the point of chronic automaticity (Lapsley & Hill, 2008). In other words, athletes develop automatic ways of responding to ethically challenging situations within sport through repeated exposure; much in the same way as they automatically perform a complex skill. Coaches, then, can support moral development through frequent and consistent use of positive reinforcement, modelling appropriate behaviors, and consistently enforcing normative ethical standards (Bargh et al., 1988; Smith et al., 1977).

Groups

The focus thus far has been on individuals, however, how one assimilates successfully into the group's culture is of equal importance. It is almost universally the case that the hiring process seeks a fit between the person and the organization, broadly defined as "the congruence of an individual's beliefs and values with the culture, norms, and values of an organization" (Koleva et al., 2017, p. 526). Research conducted within the leadership domain suggests that value congruence may have a mediating effect on the relationship between perceptions of the leader's values and follower outcomes (Brown & Treviño, 2006). More specifically, should the group perceptions of the leader's value match their desired values, positive follower outcomes are likely to be demonstrated. In contrast, should the perceived values of the leader deviate from those desired by the group, negative outcomes and a potentially toxic environment are likely to follow (Brown & Treviño, 2006; Jung & Avolio, 2000). Similarly, Bretz and Judge (1994) and Caldwell and O'Reilly (1990) have demonstrated a strong relationship between person-organization fit, and numerous measures of employee satisfaction and job performance. Where there is congruence between individual and group values, a moral atmosphere is likely to follow (Motyl et al., 2014).

In order to maximize the benefits of moral fit, athletes need to not only uphold shared values, but rather live them (Koleva et al., 2017). From an external perspective, it would appear that many sports governing bodies and clubs have attempted to distil the core values they wish to espouse (e.g., creating a philosophy document). However, this is often superficial and fails to be developed into a moral system that is implemented and embedded within their respective cultures. Without thoroughly seeking to understand the existing culture, such an approach merely attempts to transpose values onto others. Further, it does not create a system that embeds the development of such values within the community. At an organizational level, endorsing honesty, for example, is easy. However, fostering an environment where athletes feel safe to freely speak their minds without fear of retribution is less so – but it can be done. For example, facilitating a system to garner anonymous feedback is one mechanism. Encouraging a culture where all voices are heard and valued is harder, but again, processes can be put in place to create a more open environment (e.g., by soliciting feedback from subversive athletes, challenging domineering behavior, or encouraging small group projects). The first step for those involved in sport is, therefore, to reflect on personal standards both individually, as a group, and broader community. From there, individuals may work together to highlight desired moral virtues and co-construct cultural norms based upon moral foundations. Through this co-construction of normatively appropriate standards, those involved in sport can begin to find ways to incorporate moral skill development within their practice, and ultimately, within the self-concept. However, failing to achieve any one of these steps will likely result in a lack of moral internalization.

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Environment

Beyond individuals and groups, structural modifications can be made to the competitive environment to enhance moral development. Most commonly referred to as competitive engineering (Burton et al., 2011a), this approach advocates the modification of facilities, equipment, and rules to enhance participant motivation (Burton et al., 2011b; McCalpin et al., 2017). Examples include: (a) permitting participants to select their own level of competition (e.g., playing up or down age-grades), (b) modifying facilities (e.g., playing on smaller or larger fields, courts etc.), (c) adjusting equipment (e.g., using smaller or larger equipment, balls that run faster or slower, or bounce higher or lower), and (d) altering the rules (e.g., every player plays at least half a game; Jones et al., 2021). Whilst competitive engineering has primarily been examined from a motivational perspective, there is no reason why similar structural changes cannot be used to enhance moral development. For example, ending a game and allowing participants to mix teams should one team establish an insurmountable lead (as many of us did on the playground as children), offering bonus points for pro-social action (e.g., helping up an opponent should they fall, being honest and showing respect to everyone involved in the competition, showing good manners), or removing officials entirely and encouraging the participants to self-police their competition.

Whilst a relatively young area of academic enquiry, Competitive Engineering has demonstrated promise in enhancing the types of positive outcomes that can be obtained through sport. Specifically, within engineered sporting environments, participants have reported increased engagement (Harwood et al., 2018), technical skill acquisition (Morley, 2016), enjoyment, and time on ball (Thomas & Wilson, 2016). However, competitive engineering goes beyond motivational and skill acquisition outcomes. Similar outcomes can be initiated within the domain of moral development. Sports administrators should consider whether the approach they currently adopt is providing younger sports participants with a structure that enhances moral development and encourages healthy competitive opportunities over winning (Côté & Hancock, 2016). At the performance level, how success is defined needs to go beyond the medal table (Bishop, 2020) with attention spent on developing the athletes beyond their sport so, at the very least, they are able to assimilate into society in a post-athlete career with minimal issues (Wylleman et al., 2004).

Conclusion

Coaching is a privilege that carries great responsibility; none more so than supporting the moral development of the people we work with. The greatest lesson a coach can teach is what it means to strive for moral excellence in an ethically appropriate and empowering manner. The aim of this chapter was, therefore, to introduce moral philosophy within sport and to outline an approach to coaching that places the development of the Three Es at the forefront of coaching practice and research. More than that, it is a plea for those involved in sport to reflect upon what they believe are the most important elements of their role. Historically, for example, coaches have spent the majority of their time seeking ways to develop technical skills. Although important, such skills mean little without appropriate moral development and socialization. Further, at youth levels, developing moral agents who understand normatively appropriate social standards and are motivated to behave in a moral manner should be of equal, if not greater, importance to technical and tactical skill acquisition. That said, it is not a competition and just like personal, inter-personal, and intra-personal skills, one process can be mastered alongside the other (Evans et al., 2015; Lefebvre et al., 2016)

Despite frequent admission of the importance of using sport as a vehicle for moral education, to date, these endeavors have lacked clear conceptualization and direction. Through presenting both an argument for the importance of developing normatively appropriate ethical standards in sport and an explanation as to how such standards are cognitively incorporated within the self-concept, it is hoped that this chapter goes some way in addressing these concerns. To further aid in this process a series of considerations are presented below. Most importantly, a framework outlining the development of normatively appropriate ethical standards is also discussed with a clear progression towards a system of co-construction to meet the changing needs and capabilities of the athlete.

Within this approach, the moral agency of the reader is considered. Although normative approaches to ethics are highlighted and character development advocated, specific standards are not prescribed. Instead, it is left up to the reader to reflect upon their own beliefs and consider how they may incorporate the concepts discussed here within their own practice. Presented are a series of tips below to aid this process:

- Consider your ethical position. Reflect upon decisions you have made and the motives for doing so. Openly discuss your ethical position and expectations for others. Work with your athletes to co-construct normative moral standards. Identify shared values, consider the group's habits, and where appropriate, adjust.

- Continually strive for excellence. Contemplate whether you are of integrity (i.e., consistent in your words and actions), have moral desires, and are able to resist the temptation to win by lowering your personal standards. Consider your lower order virtues and speak to others to gauge how the social information you present is being perceived. Reflect upon whether there is a discrepancy between how you think and act when stressed, tired, and/or under pressure compared to when you are not. If you make poor choices or behave in a way that you do not like under such conditions, try to limit their influence. Examine ways to develop your contextual understanding and explore opportunities to embed different forms of learning opportunities within your practice.
- Empower your athletes. Share power and responsibility with your athlete[s], set intellectually challenging problems to solve, and show support and encouragement for new and creative ideas. Nurture athlete self- and collective esteem by setting and supporting athletes to achieve high expectations, expressing belief in their abilities, and by demonstrating how activities help support the group's collective goals and values. Consider the level of value congruence within your club or organization. Implement mechanisms that support the development of a moral and empowering culture (e.g., challenging behavior that does not fit within the organization's aims).

Learning Exercises

1. What ethical position do you take within your coaching practice?
2. How do you embed moral development in your practice?
3. How do you develop the moral climate within your group or team?
4. What impact do the athletes you coach have on your morals?
5. How do you evaluate whether you are meeting the moral standards you set for yourself as a coach?
6. How are you able to modify your equipment in your environment to support moral development of the athletes?

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Chapter 25
Leadership Development in Sports Teams

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Chapter Overview

In team environments the need for, and provision of leadership is a crucial factor impacting upon multiple outcomes for both teams and individuals. However, historically leadership in team sports has often developed in an ad-hoc and unstructured way. This chapter will explore the concept of leadership, particularly within the context of sports teams. Specifically exploring coach leadership, athlete leadership, and leadership development of both coaches and athletes.

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Introduction

Leadership is a core part of sport, particularly as it relates to the effectiveness of teams within sport environments (Cotterill & Fransen, 2016). The notion of leadership has been explored in detail across a wide range of environments, both within and outside of sport, which in turn has led to the development of numerous conceptualizations of leadership. Leadership has been defined and described in a variety of ways depending on the context in which it was conceptualized. For example, in considering the context of management, Barrow (1977) defined leadership as "the behavioral process of influencing individuals and groups toward set goals" (p. 232). An alternative view was adopted by Gray (2004) who described leadership as "knowing what should be done, and influencing others to cooperate in doing it" (p. 76). In addition to these two definitions, leadership has also been described by Yukl and Van Fleet (1992) to be:

> A process that includes influencing the task objectives and strategies of a group or organization, influencing the people in the organization to implement the strategies, and achieve the objectives, influencing group maintenance and identification, and influencing the culture of the organization (p. 149)

In recent years the leadership that exists as part of sport teams has emerged as an important area of focus (Day, 2012). Increasingly, team leadership has been highlighted to be a distinct form of organizational leadership (Kozlowski et al., 2016).

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Coach Leadership

Coaches in sport have traditionally been seen as either *occupying* a leadership role or *fulfilling* a leadership role. In considering coaches as leaders, Chelladurai and Riemer (1998) defined coach leadership to be “a behavioral process that is used to increase athlete performance and satisfaction” (p. 228). Building upon this initial conceptualization, Vella et al. (2010) further suggested that coach leadership is “a process of influence that is dependent upon and constituted by the interpersonal relationship between coach and athlete” (p. 431). Vella et al. (2010) also suggested the following key aspects to coach leadership: (a) The coach–athlete relationship does not directly affect athlete outcomes, but rather acts as a mediating variable between coach behavior and athlete outcomes, (b) coach leadership behaviors are used to bring about the athlete outcomes of competence, confidence, connection, and character, (c) coach leadership behaviors are determined by the coaching context, the coach’s personal characteristics, and athlete characteristics.

Models of Coach Leadership

In an attempt to understand the mechanisms underpinning coach leadership, a number of models and theories have either been applied from other domains or developed specifically within a sporting context. These include: (a) trait and behavioral approaches, (b) the mediational model of leadership, (c) the multidimensional model of leadership, (d) coach–athlete relationships, (e) authentic leadership, and (f) transformational leadership approaches.

Trait and Behavioral Approaches

Simply put, trait and behavioral approaches suggest that the traits and characteristics individuals have predispose them to be effective or ineffective leaders in specific contexts. Four main trait and behavioral approaches to the study of leadership were highlighted by Carron et al. (2005) in a sporting context:

1. Universal-traits approach
2. Situational-traits approach
3. Universal-behavior approach
4. Situational-behavior approach

In the universal-traits approach the most successful leaders are scrutinized to understand the personality traits they possess that make them effective and successful leaders (for more discussion on personality and physical activity, see Chapter 6; Wilson & Rhodes, 2021). Under this line of thinking, if you identify the desired personality traits you could then be able to select the individuals with the right traits for future leadership positions. This approach, though, has been largely dismissed as being too simplistic since a single set of key personality traits could not be found and because it fails to account for the broad range of people who are successful in leadership roles (Cotterill, 2012). Building upon some of these initial limitations, the situational-traits approach seeks to understand the traits possessed and also the characteristics of the specific situation or context. This approach works on the assumption that some personality types will be more effective in some situations than others, as proposed in Fiedler’s (1967) contingency theory of leadership. Examples of the sorts of traits that have been historically linked to successful leadership include confidence, decision making, delegation, creativity, and authority (Cotterill, 2012). This view that leaders are born to be effective in certain situations also suggests that the same leaders might be less effective in other contexts.

In contrast to the trait approaches, the behavioral approach suggests that individuals are not born as leaders or followers, but that leadership can be developed like other skills. The universal-behavior approach seeks to understand how leaders behave and how this makes them successful or effective as leaders. Four main styles have emerged from this approach (Cotterill, 2012):

1. Concern for task: focusing on achieving specific objectives
2. Concern for people: seeking to understand the people they lead
3. Directive leadership: making decisions for others
4. Participative leadership: sharing decisions with others

In the situational-behavior approach, the focus is on understanding what leadership behaviors and approaches are successful in specific situations. Examples of positive leadership behaviors include leading by example, communicating effectively, asking for feedback, treating everyone fairly, listening, and acting consistently (Cotterill, 2012). Although these behavioral approaches have merit, they do fail to consider the need for authentic leadership (i.e., the idea that leaders should embody their true selves in their leadership role) instead of adopting a set of general leadership behaviors that have been suggested to be effective.

The Mediational Model of Leadership

A number of leadership theories have sought to build upon these earlier trait and behavioral approaches, embedding a range of important factors, including both leadership behaviors and athlete/player perceptions. One example of this is the mediational model of leadership suggested by Smith et al. (1977). The core components of this model are coach behaviors, both athletes' perceptions of and recall of these behaviors, and athletes' evaluative reactions to the coach. One of the core principles of this model is that both perceptions and memories (the mediators) are just as important as the actual demonstrated coach behaviors in determining athletes' evaluative reactions to the coach. In this model, coach behaviors are believed to be influenced by the uniqueness of the coach (individual differences), including factors such as coaching goals, intentions, perception of coaching norms, role conception, perception of athlete motives, and gender (Smoll & Smith, 1989). Athlete perceptions and recall, on the other hand, are influenced by athletes' individual differences, such as age, gender, perception of coaching norms, sport-specific achievement motives, competitive trait anxiety, general self-esteem, and athletic self-esteem (Smoll & Smith, 1989). Finally, all core components of the model—coach behaviors, athletes' perceptions and recall, and athletes' reactions—are influenced by situational factors, such as the nature of the sport, level of competition, setting (practice or game), previous successes and failures, current outcomes, and intrateam attraction (Smith et al., 1977). The mediational model offers insight into how mental performance consultants might improve leadership outcomes by either modifying coach behaviors or shaping athletes' perceptions or recall abilities (Cotterill, 2012). If one is looking to modify coach behaviors, an effective approach would be to work on optimizing the coaches' goals and motives and associated behavioral intentions. If the focus is on changing athlete perceptions, then one would focus on understanding athletes' perceptions of coaching behaviors, and more specifically, expected coaching goals, intentions, norms, and roles within the team and broader sport.

The Multidimensional Model of Leadership

The multidimensional model developed by Chelladurai (1978) seeks to build upon all of the previously mentioned theories, integrates the core aspects of the trait, behavioral, and mediational approaches into a comprehensive model that seeks to outline a comprehensive range of factors that influence coach leadership behavior. A central tenet of the model is the congruence between three categories of leadership behaviors: required, actual, and preferred behaviors. According to Chelladurai, whether the leadership approach is adopted (and how well it is received) in a given situation is determined by a range of specific situational factors, the preferred behaviors of the group, and the preferences of the leader. The actual leadership behavior is a function of the characteristics of the leader, the behaviors required by the situation or composition of the team, and the behavior preferences of the athletes, To illustrate the impact of preferred behaviors, previous studies on leadership suggested that when coaches' leadership style is not aligned with athletes' preferred style, the *performance* of athletes may develop, but their level of *satisfaction* may decrease (Cotterill, 2012).

In 2007, Chelladurai further adapted the model to include the concept of transformational leadership. This concept was included as Chelladurai felt that coaches served to transform relatively unaccomplished novices into expert performers. As such, it could be argued that successful coaches exhibited transformational leadership (covered later in this chapter).

Authentic Leadership

In recent years the concept of authentic leadership has gained increased traction within leadership-focused literature. This approach to leadership was originally developed building upon reflections about the unethical ways that transformational leaders can manipulate their followers (Gardner et al., 2011). Authentic leadership has been defined in the literature to be:

> A pattern of leader behavior that draws upon and promotes both positive psychological capacities and a positive ethical climate, to foster greater self-awareness, internalized moral perspective, balanced processing of information, and relational transparency on the part of leaders working with followers, fostering positive self-development (Walumbwa et al., 2008, p. 90).

It has been argued that while transformational approaches outline what to do in order to facilitate change, they do not really focus on personal growth for either the leader or the follower. Furthermore, while transformational leadership requires authenticity as part of the characteristics of being visionary and of high moral character, the distinction between the two lies in the authentic leaders' faith in their own deep sense of self-values and beliefs (Sağnak & Kuruőz, 2016). In contrast, an authentic leader leads with purpose, gives more consideration to contextual and organizational factors that influence the effectiveness of leadership, and ensures the psychological well-being of followers (Penger & Cerne, 2014).

In addition, authentic leadership is not only limited to the authenticity of the leader, but also includes the quality of the leader-follower relationships. Central to the development of these relationships are the concepts of integrity, respectability and trustworthiness (Emuwa, 2013). Recent published research has highlighted that coaches who are viewed to be authentic create transparent two-way relationships with their athletes (Bandura & Kavussanu, 2018). These positive relationships serve to then raise levels of follower commitment, motivation, and positive emotion, and they can also facilitate positive follower behaviors such as active engagement and independent critical thinking (Sağnak & Kuruőz, 2016). In a recent study, Bandura and Kavussanu (2018) also highlighted that coaches who are viewed to be authentic are perceived as being trustworthy and fostering autonomy in athletes who, as a result, reported greater enjoyment and higher commitment.

Transformational Leadership

A revised version of the multidimensional model (Chelladurai, 2007) incorporated the concept of transformational leadership, in which the leader transforms the aspirations and attitudes of group members and subordinate leaders (e.g., assistant coaches, team captains) by creating and articulating a new mission for the group. This extension to the model suggests that leadership can help to change the expectations of the group regarding the leadership requirements of a specific situation.

The transformational model of leadership has been applied to the sports coaching context with positive results (Vella et al., 2010) and has seen increased application to sporting environments in recent years (Arthur et al., 2017). Transformational leadership has been described as "the process of influencing major changes in the attitudes and assumptions of organization members (organization culture) and building commitment for major changes in the organization's objectives and strategies" (Yukl, 1989, p. 174). More simply, it is a course of action in which both leaders and participants engage in a mutual ongoing process of raising one another to higher levels of motivation, moral reasoning, and self-consciousness (Charbonneau et al., 2001). Research exploring the leadership approaches of 132 business managers suggested that individuals scoring in the highest group of moral-reasoning on the Multi Factor Leadership Questionnaire (MLQ) exhibited more transformational leadership behaviors than leaders scoring in the lowest group (Turner et al., 2002).

Four specific leader behaviors have been associated with transformational leadership (Hoption et al., 2007): (a) Idealized influence, (b) inspirational motivation, (c) intellectual stimulation, and (d) individualized consideration. A number of studies have reported links between these four behaviors and key group factors including team members' values, team needs, team awareness, and ultimately team performance (Bass & Riggio, 2006).

Idealized influence is a behavior through which leaders seek to instill pride in the group members, set a good example, and earn the respect of the group. Inspirational motivation refers to a behavior that leaders adopt to motivate and inspire those around them by developing a collective purpose and shared vision. Enthusiasm and optimism are displayed as athletes are engaged in helping leaders create an exciting and attractive future. Intellectual stimulation occurs when leaders are creative and innovative with group members through questioning assumptions, reframing problems, and encouraging creativity in one another. One outcome of this process is the enhancement of each person's knowledge and abilities. Finally, individualized consideration guides the behavior of leaders in growing future leaders by paying attention to each individual's needs for achievement and growth. Leaders serve as supporters, mentors, and coaches for participants, thereby increasing these individuals' potential for development and increased competence. In sport, one example of the application of transformational leadership is captured in Newland et al.'s (2015) phenomenological study of 11 female team sport athletes. The athletes highlighted transformational approaches adopted by coaches, including caring, motivating, teaching life lessons, and trusting. This example suggests that coaches who wish to adopt a transformational approach should seek to focus on interpersonal skills, including how to both motivate and care for their athletes, with a focus on them as people and not just sporting outcomes.

Coach–Athlete Relationships

Coach leadership requires engagement with athletes and as a result, the quality of the relationships that exist between the coach and their athletes is crucial in underpinning how effective the coach can be as a leader. Crucial to this is the development of intrapersonal and interpersonal knowledge. Intrapersonal knowledge includes self-awareness and reflection, both of which have been shown to influence the development of coaching and leadership (Vella et al., 2010). In contrast, interpersonal knowledge is the awareness of others in relation to oneself. The importance of these forms of knowledge and associated interpersonal skills cannot be overstated, and, as such, should form a core component of understanding and assessing effective leadership.

Coach–athlete relationship frameworks are built upon the view that both leadership and coaching are social processes that are constituted and maintained by reciprocal, interpersonal relationships. The coach–athlete relationship has been conceptualized by Jowett (2006) in relation to four interpersonal constructs: closeness, commitment, complementarity, and co-orientation. Closeness is reflected in mutual feelings of trust and respect that result from appraisals of coaches' and athletes' relationship experiences. Commitment is represented in coaches' and athletes' long-term orientation toward the relationship. This orientation includes thoughts of attachment and the intention to maintain the athletic relationship. Complementarity is reflected in coaches' and athletes' actions of cooperation. Co-orientation includes reciprocal behavior whereby, for example, the coach instructs while the athlete follows instructions. The corresponding behavior would then be when the coach and the athlete manifest a friendly attitude toward one another and communicate effectively during training sessions (Jowett, 2007).

Mageau and Vallerand (2003) presented a motivational framework that outlined core aspects of the coach that can affect both the quality of and perception of the relationship. These factors include the coach's personal orientation, the coaching context, and the coach's perceptions of the athlete's behavior and motivation, all of which influence the coach's autonomy-supportive behavior (the degree to which the coach empowers the athlete to be autonomous). The core importance of supporting athlete autonomy in this model relates to the premise that autonomy-supportive behaviors have a beneficial impact on athletes' intrinsic and self-determined extrinsic motivation, which are important determinants of performance and persistence (for more on autonomy, intrinsic motivation, and extrinsic motivation, see Chapter 3; Quested et al., 2021).

Assessing and Quantifying Coach Leadership in Sport

In seeking to assess, compare, and contrast coach leadership, a number of specific measures have been developed including the Leadership Scale for Sports (Chelladurai & Saleh, 1980) and the Multifactor Leadership Questionnaire (Bass & Avolio, 1995).

Leadership Scale for Sports

The Leadership Scale for Sports (LSS), developed by Chelladurai and Saleh (1980), is based upon the multidimensional model of leadership (Chelladurai, 1978). The scale is composed of 40 items, representing five dimensions of leader behavior (Chelladurai, 2012): (a) training and instruction, (b) democratic behavior, (c) autocratic behavior, (d) social support, and (e) positive feedback and rewarding behavior. Training and instruction refer to the development of athletic performance through the use of technical skill, tactical, and team culture development. Democratic behavior reflects the degree to which the individual involves athletes in the team decision-making process. Autocratic behavior scores reflect the degree to which the coach acts as an independent decision-maker and acts in an autocratic manner. The social support dimension reflects the degree to which the coach demonstrates care, concern, and the provision of support to athletes. Positive feedback and rewarding behavior refer to the extent to which the coach rewards positive or desirable athlete behavior.

The scale is assessed using a five-point Likert scale (always, often, occasionally, seldom, never). One interesting feature of the measure is that it can be used to better understand the leadership preferences of both athletes and coaches and can identify the existence of differences between the two.

One study to utilize the LSS was conducted by Loughead and Hardy (2005), who used the LSS to compare the leadership behaviors both of coaches and athlete leaders. Their results suggested some differences between coaches and athlete leaders. First, that the coaches were more likely to score higher on the training and instruction, and autocratic behavior dimensions. In addition, the athlete leaders recorded higher scores on the social support, positive feedback, and democratic behavior dimensions when compared to the coaches. These findings highlight that not all of the leadership needs of a team are met by coaches. As a result, mental performance consultants should look to develop a holistic view of the leadership needs of a team and how these needs can be met (see Chapter 20 for more discussion on mental skills training or psychological skills training; Rymal et al., 2021).

Multifactor Leadership Questionnaire (MLQ)

The second tool developed to assess leadership behavior is the Multifactor Leadership Questionnaire (MLQ; Bass & Avolio, 1995). Similar to the LSS, the MLQ assesses leadership styles including passive leadership, transactional leadership, and transformational leadership.

A number of studies have been conducted using the MLQ in a sporting setting, For example, Paradis and Loughead (2010), in their study of leadership in youth sport athletes, reported that the individualized consideration (e.g., "the leader differentiates among us") and inspirational motivation (e.g., "the leader expresses confidence") dimensions of the transformational leadership scale were most decisive in determining the effectiveness of youth sports leaders. In a study of female adolescent soccer players, Price and Weiss (2013) asked participants to fill out the MLQ for both the coach and the athlete leader in the team. The results suggested that the transformational leadership behaviors of both coaches and athlete leaders were positively related to perceived competence, intrinsic motivation, enjoyment, team cohesion, and confidence. Interestingly, it was also reported that athlete leadership behaviors were overshadowed by the coach for individual outcomes (such as enjoyment) but were equal for team outcomes (such as collective efficacy).

Athlete Leadership

Although there has been significant focus on coach leadership in the last 40 years, it has only been recently that the concept of leadership within teams and groups of athletes, termed *athlete leadership*, has started to receive significant attention. An athlete leader has been defined as "an athlete, occupying a formal or informal role within a team, who influences a group of team members to achieve a common goal" (Loughead et al., 2006, p. 144).

Building upon previous research, Fransen, Vanbeselaere, et al., (2014) developed a four-factor athlete leadership categorization system. This system includes two leadership roles on the field: the task leader, who provides tactical instructions to their teammates, and the motivational leader, who motivates their teammates on the field. The categorization system also includes two leadership roles off the field: the social leader, who fosters a good team atmosphere off the field, and the external leader, who handles the communication with club management, media, and sponsors. Fransen and colleagues (2014) emphasized the relevance of this leadership classification by demonstrating that effective fulfillment of the four leadership roles within a team resulted in higher team confidence, stronger team identification, and better team performance outcomes (e.g., ranking).

There has also been an increased focus on different types of athlete leaders as characterized by how formal their leadership position is. Some leadership is provided by formally appointed leaders such as captains, while at the same time, unappointed teammates can also provide peer leadership for their teams (Loughead & Hardy, 2005). As a result, a second approach to categorizing athlete leadership has been to explore the formal versus informal nature of leadership (Carron & Eys, 2012). Formal leadership roles are those that are prescribed or awarded (e.g., captains and vice captains). Informal leadership roles are those that emerge within the team as a result of interactions between teammates and the demands of the task (Cotterill, 2012). These informal leaders often act as the cultural architects for the team. Cultural architects are leaders who possess the ability to change the mindset of others (Railo, 1986). In sports teams, cultural architects are often more senior and vocal individuals who are respected by the rest of the team and thus play a prominent role in the development and maintenance of dominant team culture.

Informal leaders can both help and hinder the work of formal leaders (Cotterill & Cheetham, 2017). When informal leaders' views complement the views of the formal leaders, they reinforce core messages, further enhancing the focused nature of the team environment. However, when informal leaders' views conflict with those of the formal leaders, this can result in a lack of clarity within the team, resistance to the proposed approach, and broader conflict within the team. The same can be true for formal leaders. For example, when behaving in a negative way (e.g., competence-thwarting behavior), formal leaders can also have a negative impact on the team motivation and performance (Fransen, Van Puyenbroeck et al., 2015; Fransen, Vansteenkiste, et al., 2018). Competence-thwarting behaviors include providing negative feedback and displaying a lack of confidence in the ability of individuals and the team.

Fransen and colleagues (2014) emphasized the importance of informal leaders, reporting that in a study of 4,451 participants across nine team sports, the team captain in almost half (i.e., 44%) of the teams was not perceived as best leader in relation to any of the four leadership roles. In addition, a study using a network approach to leadership tempered these findings by demonstrating that leadership is shared within sport teams. In half of the teams observed, the team captain was perceived as the best leader in general. In the other half of these teams, the informal leaders, rather than the team captain, were perceived as the real leaders (Fransen, Van Puyenbroeck, et al., 2015). With regard to the specific leadership roles, findings demonstrated that in the majority of the teams, the captains were perceived as best task and external leaders. However, in the motivational and the social leadership role domains, informal leaders were largely perceived as the best leaders. Ultimately, leadership is shared within teams. The coach, team captain, and informal athlete leaders all pursue different leadership roles. Finally, it is important to note that the specific formal role of, and the importance assigned to, the captain can vary significantly from sport to sport, and across levels of performance (Cotterill, 2015).

Characteristics of Athlete Leaders

Initial research focused on athlete leaders characteristics explored a number of descriptive and observable aspects of leader behavior that athlete leaders are more highly skilled than their teammates (Glenn & Horn, 1993; Moran & Weiss, 2006; Price & Weiss, 2011; Yukelson et al., 1983); are more likely to be starters (Gill & Perry, 1979; Loughead et al., 2006); have more experience (Gill & Perry, 1979; Yukelson et al., 1983); and have more playing time (Fransen, Van Puyenbroeck, et al., 2015)

A number of research studies have sought to understand the behaviors, traits and skills of effective athlete leaders. For example, Klonsky (1991) reported that athlete leaders demonstrated higher levels of dominance, ambition, competitiveness, and responsibility compared to players who were not perceived as leaders. In a more recent study, Moran and Weiss (2006) suggested that athlete leaders could be viewed in terms of both instrumental traits (including being independent, energetic, self-confident) and expressiveness traits (including being emotional, gentle, kind, warm in interactions with others). It has also been reported that effective athlete leaders need good interpersonal skills (Holmes et al., 2010), have the ability to develop effective relationships with other team members (Fransen, Van Puyenbroeck, et al., 2015), and crucially need to be trusted and respected their teammates (Bucci et al., 2012; Dupuis et al., 2006).

Furthermore, Callow et al. (2009) identified transformational leadership behaviors that are important for athlete leaders, such as: individual consideration (showing respect for followers and concern for their personal feelings and needs), inspirational motivation (developing, articulating, and inspiring others with their vision for the future), and intellectual stimulation (challenging followers to reexamine their assumptions about their work and reconsider how it can be performed). These leaders also foster acceptance of group goals, have high performance expectations, use appropriate role modelling of behaviors that are consistent with values that the leaders espouse, and provide positive reinforcement in return for appropriate follower behavior and performance.

A more modern approach to peer leadership in sport is the social identity approach (Haslam et al., 2011). This perspective asserts that in order to mobilize athletes' efforts and to be successful as a peer leader, leaders need to be "seen as one of us" (be identity prototypes), "craft a sense of us" (be identity entrepreneurs), "do it for us" (be identity champions), and "embed a sense of us" (be identity impresarios; Steffens et al., 2014). Research has highlighted that when coaches and athlete leaders succeed in building a united feeling of "we" and "us," this joint team identity will, in turn, foster athletes' motivation and performance-related outcomes (Fransen, Haslam et al., 2015; Fransen et al., 2016; Rees et al., 2015; Slater et al., 2015; Slater et al., 2018).

Assessing Athlete Leadership

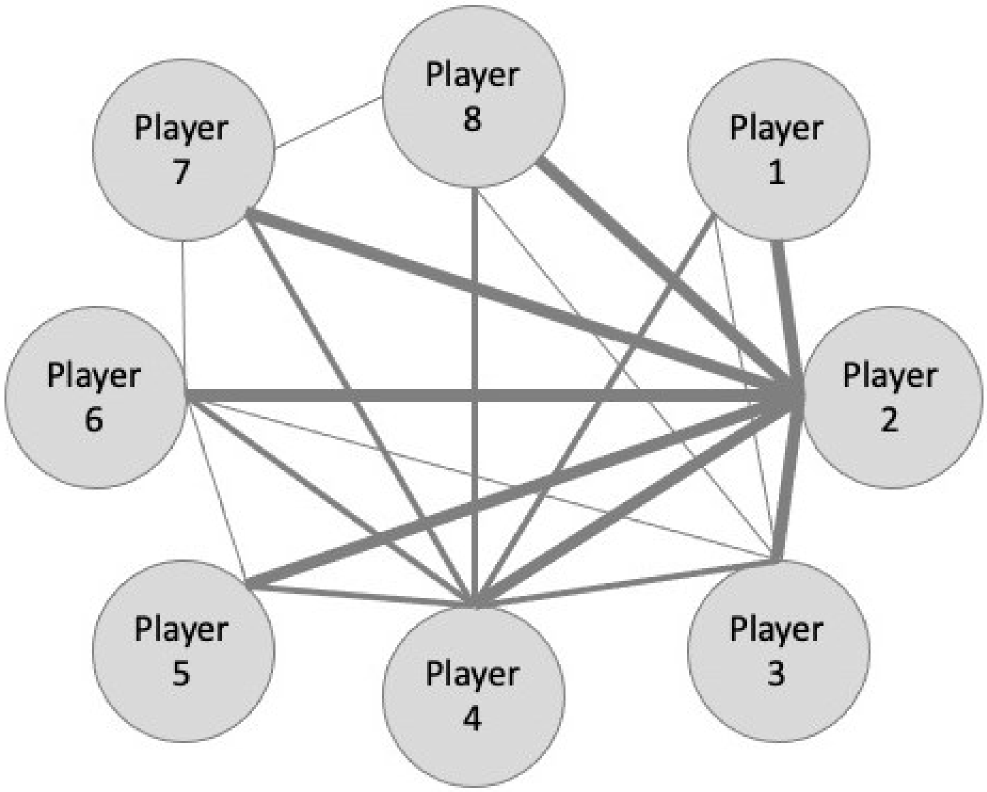
A number of assessment tools and been developed that have been used to assess athlete leadership quality including the Player Leadership Scale (Kozub, 1993), the Identity Leadership Inventory (Steffens et al., 2014), and Social Network Analysis (Wasserman & Faust, 1994).

The Player Leadership Scale distinguished between instrumental and task leadership behaviors (e.g., "helps to set goals for the team"), as well as expressive and social leadership behaviors (e.g., "helps to settle conflicts among team members"). Research with interscholastic student-athletes demonstrated that male student-athletes generally perceived task leadership behaviors as significantly more important for athlete leaders than did female student-athletes, who showed no favoritism between task and social leadership behaviors (Todd & Kent, 2004).

The Identity Leadership Inventory (ILI; Steffens et al., 2014; van Dick et al., 2018) explores the extent to which leadership behaviors foster a shared team identity. The scale is composed of four dimensions of effective identity-based leadership. First, effective leaders must be in-group prototypes (i.e., represent the unique qualities that define the group and what it means to be a member of the group). Second, they must be in-group champions (i.e., advance and promote the core interests of the group). Third, they must be entrepreneurs of identity (i.e., bring people together by creating a shared sense of "we" and "us" within the group). Fourth and finally, effective leaders must be embedders of identity (i.e., develop structures that facilitate and embed shared understanding, coordination, and success). The initial study by Steffens and colleagues' (2014) explored the identity-based leadership behaviors of team captains in a number of teams across four different team sports. The results suggested that the dimensions most related to the perceived leadership quality of the team captain were identity prototypicality and identity entrepreneurship. In addition, team confidence and task cohesion were also reported to be positively correlated with the captains' leadership behavior.

An alternative approach that has been used to assess leadership structures and provision within teams is Social Network Analysis (SNA). SNA conceptualizes groups in terms of networks, consisting of nodes (representing the individual actors) and ties (representing the relationships between the actors; [Wasserman & Faust, 1994]; See Figure 25.1). This approach allows the researcher to move beyond team member self-perceptions and instead explore perceptions within the team at a global level. Over the past decade, SNA has yielded explanations for social phenomena in a wide variety of domains, including athlete leadership (Fransen, Van Puyenbroeck et al., 2015). The SNA approach has the potential to provide insights into the leadership structure within a team and more clarity on the importance of formal versus informal leaders. Furthermore, this approach is ideally suited to enhance our knowledge of specific leadership attributes (Fransen, Van Puyenbroeck, et al., 2015). The approach also allows for further examination of the antecedents and consequences of high-quality athlete leadership (e.g., Loughead et al., 2016).

Figure 25.1
Social Network Analysis: An Example of SNA Nodes and Ties



Leadership Development

While understanding and describing leadership behavior is important, applying this knowledge and understanding to enhance leadership for both individuals and teams is crucial to enhance both individual and team performance. As such leadership development has emerged as a scholarly discipline in its own right. Key factors in leadership development include leader identity (Lord & Hall, 2005), cognitive and metacognitive skills (Marshall-Mies et al., 2000), affect, and behavioral skills (DeRue & Myers, 2014). A distinction can also be drawn between developing individuals as leaders (leader development), and meeting the leadership needs of a specific context (leadership development). Historically, more emphasis has been placed on leader rather than leadership development. In trying to resolve this distinction, Day (2001) suggested that the “preferred approach is to link leader development with leadership development such that the development of leadership transcends but does not replace the development of individual leaders” (p. 605). In a sporting context, this distinction is important because there has been a tendency to focus on trying to develop the individual rather than to meet the context-specific leadership needs. Following this line of thought, coaches should seek to develop the leadership abilities of all members of a team to maximize the leadership provision within the team rather than focus on just developing certain individuals as leaders (e.g., captains).

Coach Leadership

A useful starting point when considering how to further develop coaches as leaders is to reconsider the factors influencing the coach's leadership approach, a summary which is presented in Table 25.1.

Over the last 20 years a number of specific approaches to coach leadership development have also been suggested in the coaching literature that encompass both formal and informal development approaches that focus on the coach's ability as a leader (Mallett et al., 2009). There has also been increasing recognition of the experiential learning that takes place within the coaching context as coaches reflect upon their own coaching practice and those of others (Cushion et al., 2003). One example of a coach development program was developed by Smith and Smoll (2007). They developed a coach effectiveness training (CET) intervention designed to enhance coach practice. The training program emphasizes five core coaching principles that can enhance coaches' leadership:

1. Having a coaching philosophy that prioritizes learning and development (with a focus on athlete effort and enjoyment)
2. The coach possesses a positive approach to coaching (demonstrating positive reinforcement and encouragement)
3. Embedding norms that emphasize athletes' obligations to help and support one another
4. Engage in decision making that involves athletes (to achieve greater compliance with team roles and responsibilities)
5. Demonstrate increased self-awareness of one's own behavior and its consequences (through observing and recording one's coaching behaviors)

A coach self-monitoring form was also developed by Smoll and Smith (2005) designed to be completed straight after training and competition as a tool for individual coaches to reflect upon their leadership behaviors and associated individual and team outcomes. Research exploring the CET approach suggests that it can be effective in reducing dropout (Barnett et al., 1992) and increasing self-esteem in coaches (Smith et al., 1995).

An alternative approach to coach leadership development was suggested by Ferrar et al. (2019), who explored the effectiveness of the coach-athlete relationship aspect of the United States Olympic Committee's National Team Coach Leadership Education Program (NTCLEP). This component of the NTCLEP focused on developing coaches' self-awareness, people acuity (i.e., the ability to discern and maximize others' strengths), interpersonal agility (i.e., adaptability in interpersonal interactions), and self-management. Based upon feedback from the program attendees, researchers concluded that: (a) interpersonal and intrapersonal skills were crucial for coaches to be effective leaders of teams, and (b) coaches had an important role to play in determining and influencing team culture. The authors emphasized that the coach wears many hats (including instructor, manager, and leader), and a key role of the leader is to create a climate and personal interactions that allow individual athletes and the team as a whole to thrive and succeed.

Athlete Leadership

There has been a growing interest in athlete leadership, and athlete leadership development in the sport psychology literature over the last decade. Initially there was a focus on the development of personal leadership skills in youth athletes through sport (e.g., Gould & Voelker, 2012; Gould et al., 2010; Martinek & Hellison, 2009), with limited research exploring approaches to developing leadership approaches, knowledge, and behaviors in adult and/or elite sport (Cotterill & Fransen, 2016; Voight, 2012). However, in recent years there has been a significant expansion of studies exploring adult and elite sport athlete leadership development.

Table 25.1
The Main Factors Influencing Coaches' Leadership Approaches

Factor	Description
Coaching context	The coaching context is defined by key environmental factors such as the sport, the level of competition, the age and gender of the athletes, cultural and ethnic identity, and socioeconomic background. The most effective coaches will develop a good understanding of these contextual factors and implications for the way that they conduct themselves. For example, youth and collegiate athletes differ in the coaching style they prefer, so coaches should adjust their approach accordingly.
Coaches' personal characteristics	This factor includes coaches' interpersonal and intrapersonal knowledge, values, beliefs, personality, and goals. Self-awareness is important for developing leadership ability. By understanding what they do, how they do it, and why, coaches can operate in ways that are better aligned with their own beliefs and values while also considering the needs of the group they lead.
Athlete outcomes	The competence, confidence, connection, and character of athletes are outcomes that are also the focus of successful leadership. Effective coaches are able to develop each of these key characteristics and, in particular, help to enhance confidence at both an individual level (self-efficacy) and a team or group level (collective efficacy). Which in turn may be reflected in athlete performance outcomes.
Athlete characteristics	The perceived effectiveness of coaches in the eyes of athletes is also influenced by the athletes' perceptions, beliefs, and attitudes. Even if coaches are doing a good job (objectively), individuals might view this differently. As a result, there is sometimes a need for coaches to manage perceptions and to challenge existing beliefs and attitudes.
Coaching behaviors	How coaches actually act or behave is a major factor influencing how they lead and how they are perceived by others. Having a coaching mentor can be a very effective way to help coaches to reflect on how they behave and why. This increased self-awareness can further help coaches to maximize their effectiveness in a given situation.

Youth Athlete Leadership

A number of published studies have reported the effectiveness of leadership programs with youth athletes. One example of this is the work of Gould and Voelker (2010). They developed a workshop-based development program for high school captains that included a clinic (development group) and a self-study team captain's guide. Examples of workshop topics included "What you need to know as a leader" and "Handling common team problems." The guidebook, titled, *Becoming an Effective Team Captain: Student-Athlete Guide*, focused on topics such as the role of a team captain, effective communication, team motivation, team building and cohesion, handling tough team situations, and recommendations from captains and coaches. One particular concern regarding the development of youth sport athlete leaders is the support and guidance provided to them by their coaches (Collins et al., 2009; Voelker et al., 2011). Part of the problem is that often the coaches are not sufficiently equipped or educated (in relation to leadership development) to develop the leadership skills and abilities of their athletes (Gould et al., 2013).

A relatively recent development in the leadership development literature relating to sport is the application of mentorship (Mead & Gilson, 2017). In this approach, the more experienced leader (the coach) trains a protégé by consistently interacting and sharing ideas (Day, 2001). The effectiveness of this approach relies heavily on how positive the relationship is between the mentor and the protégé (Riggio, 2013). In a study of American high school basketball, Mead and Gilson (2017) explored the impact of coach mentoring on athlete leadership development. The study itself provided a rich and detailed description of the coach's approach to mentoring, and their successes and failures. Specifically, the coach sought to allow captains to use their personal voice, distribute and delegate leadership tasks to the captains, offer reminders of important leadership concepts, and set an effective example as the coach. The captains in this study were also encouraged to reflect on their own leadership development—an approach that has been suggested to be an important part of the leader development process (Grandzol et al., 2010).

Adult Athlete Leadership

There is an increasing focus on adult athlete leadership development within sport. According to Grandzol and colleagues (2010), occupying the position of captain within NCAA Division III intercollegiate athletics teams appears to lead to the development of the leadership skills of the individuals involved, suggesting that effective programs of leadership development should include the opportunity for future leaders to practice leading and applying leadership skills. However, historically, the focus on the development of athlete leaders in sport has not been great. In reviewing current practices at the collegiate level, Voight (2012) reported that much of the leadership training that team captains received consisted of either receiving a list of books or articles about leadership or being given a list of responsibilities without guidance or instruction.

Building upon these initial gaps in the approach to leadership development for athletes, a number of studies have sought to systematically apply and report the implementation of structured leadership development programs. For example, Voight (2012) implemented a 15-stage leadership development program with two regional U.S. volleyball teams. Although the program proved to be effective at this level, it was recommended that future research explore the delivery of similar intervention programs at different levels (e.g., youth, recreational, and professional levels). In addition, Cotterill (2016) developed a leadership development program for elite (international) U.K. professional cricketers. The program sought to develop athlete leadership at three specific levels: (a) captaincy development, (b) leadership skill development (e.g., teamwork, honesty, respect, excellence, enjoyment, resilience), and (c) personal growth and leadership development. These three levels have been identified as crucial in helping to cultivate leaders at an international level of performance. Captaincy development was delivered through a leadership development group, which focused on awareness of the self and others using the Myers-Briggs Type Indicator (MBTI) tool. This structured program used a range of relevant guest speakers and offered the opportunity to get practical experience as a captain and to receive leadership performance debriefs from a sport psychologist and coaches. Reflections on the program by the participants suggest that a formal development program can be beneficial in enhancing the leadership capabilities of elite players.

Recently, an alternative approach has focused on seeking to develop individuals' social identity (i.e., leadership identity). This approach has been implemented with both athlete leaders (Fransen, Vanbeselaere, et al., 2018) and athletes and coaches (Slater & Barker, 2017). In the Slater and Barker study, the intervention was informed by the five Rs program created by Haslam et al., (2017): reflecting, representing, realizing, readying, and reporting. Slater and Barker focused on the three Rs that related to identify leadership—reflecting, representing, and realizing—and included a number of new activities delivered with the senior leadership team (SLT). An outline of the specific components of the program is presented in Table 25.2.

In a similar vein, Fransen and colleagues (2018) reported the implementation of a leadership development program that focused on teaching the athlete leaders how to create a sense of "we" and "us", as a way to create a shared identity for the team. This program adopted a team-centered approach where workshops were delivered with the entire team and the appointed athlete leaders were given additional responsibilities to further enhance the process.

Table 25.2

Overview of the Stages of the 3R Model as Implemented in the Slater & Barker (2017) Study

Stage	Overview
1. Reflecting	Purpose: increase participant understanding and application of reflection. In the first workshop the concept of #whatstrending was used to allow athletes to raise awareness of current issues in a non-judgmental way. Identity mapping was also undertaken in the second workshop.
2. Representing	The focus in this stage was to explore values and barriers that would interfere with the team living those values. Then, in developing an action plan relating to behaviors that align to the agreed values.
3. Realizing	In this stage the senior leadership team reviewed the operationalization of the values and behaviors agreed in the representing stage, then focused on creating a team vision.

Conclusion

Understanding of leadership within sport has developed significantly over the last 20 years, moving from the application of global leadership models and theories to the development and implementation of sport-specific models and approaches. However, while the description of leadership as a concept in sport has progressed, the evidence base underpinning leadership development has lagged behind. Future research needs to explore the implementation of leadership development programs in different contexts, with different sports, and at different levels. The studies that have been conducted have been quite disparate and focused on different leadership development environments (e.g., professional teams, collegiate athletes, high school athletes) and have adopted varying approaches to leadership development (education programs, personal development self-awareness). As a result, far more research exploring applied intervention programs is required. A good starting point might be the development of a conceptual framework to underpin leadership development projects. There is also a need to better share and disseminate the leadership development approaches for both coaches and athletes being applied out in the applied sporting world.

Learning Exercises

1. How would you describe the concept of leadership?
2. What are the strengths and weaknesses of using theories and models of leadership from other domains to explain and describe leadership in sporting contexts?
3. Why is the position of the coach seen as a leadership role?
4. Why are trait and behavioral approaches to explaining leadership seen as too simplistic?
5. How do the mediational and multi-dimensional models of leadership build upon the trait and behavioral approaches?
6. What is authentic leadership, and how can it be applied in sports teams by coaches?
7. What are the strengths and weaknesses of the transformational leadership approach?
8. What factors influence the quality of coach-athlete relationships?
9. What is athlete leadership?
10. What are the key characteristics of successful athlete leaders?
11. What lessons can be learnt from the Coach Effectiveness Training (CET) program to enhance coach leadership development?
12. What approaches have been adopted to develop leadership skills in youth athletes? How can youth leadership development be enhanced?
13. What further work is required to better understand how to effectively develop adult athlete leaders?
14. Reflecting on the chapter, where do you feel the current gaps in knowledge and understanding are?

Further Reading

Carron, A. V., & Eys, M. A. (2012). *Group dynamics in sport* (4th ed.). Fitness Information Technology.

- A great starting point for seeking to understand group functioning and group-related processes. Will serve as a good foundation upon which to explore key concepts in greater detail.

Cotterill, S. T., & Fransen, K. (2016). Leadership in team sports: Current understanding and future directions. *International Review of Sport and Exercise Psychology, 9*, 116–133. https://doi.org/10.1080/1750984X.2015.1124443

- This article presents a comprehensive overview of the concept of athlete leadership, its measurement and approaches to further enhancing athlete leadership within teams.

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- A good overview of transformational leadership within a sporting context, and crucially how to look to apply the theory in practice.

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Chapter 26
Group Dynamics in Sport

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Chapter Overview

Small groups like teams, training groups, and physical education classes are nearly inseparable from sport, so they have the potential to determine how young people and adults experience sport. This chapter will introduce you to some of the fundamental concepts related to group dynamics in sport. The chapter will first discuss definitional characteristics of groups and the universality of groups, and then will explore how individual members can influence their groups, as well as how individuals are impacted by group-related factors (e.g., group cohesion, role structures). The chapter will also describe team development intervention strategies that can promote group success and enhance members' experiences. In each section, we will discuss selected research findings involving groups in sport as well as in other settings while also addressing how these findings might inform the efforts of coaches, programs, and athletes in terms of enhancing their groups. Through this chapter, you will develop an appreciation of the complexity of groups and learn about the various factors that can positively and negatively influence how groups function.

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Group Dynamics in Sport

Groups are widespread throughout life and group memberships strongly influence individuals (Forsyth, 2018). Humans are innately social beings and seek out group memberships for various reasons, including fulfilling an embedded human need to belong, accessing social networks, or even enjoying activities like sport (Baumeister & Leary, 1995). Groups are so important that we experience psychological benefits when we belong to groups. Simply the act of identifying with a group (i.e., belonging to one or more social groups that are important for one's sense of self) delivers a sense of meaning and purpose to people (Haslam et al., 2009).

The pervasiveness and importance of groups translate to sport settings, to the extent that groups often characterize the experience of sport. Next time you attend or watch a sport event, observe the many types of groups that are evident. At a competitive youth soccer (football) game, for instance, athletes form separate teams that compete against one another, parents cluster together to the side of the pitch, and officials work collectively as a small group. We reinforce these groups by creating barriers to become a member (e.g., fee to be involved, tryouts), and then we bind members through special colors and team names, as well as by constructing norms that lay out what is expected from members. In many of these cases, individuals with different personalities and characteristics come together to form a group, develop a collective identity, and collate their efforts to achieve shared goals.

Sport is an especially rich environment to study group dynamics because teams and clubs possess many of the characteristics required for defining a collective as a group. Forsyth (2018) defined groups as collections of "two or more individuals who are connected by and within social relationships" (p. 3) and discussed several characteristics that underlie groups. According to Forsyth, group members:

1. Share instrumental goals (e.g., winning a competition).
2. Constantly interact with one another. In sport, athletes often stay together as a team and interact with one another throughout a season or across years.
3. Depend on one another for task achievements. In sport, members often rely on one another to perform.
4. Are embedded within a social structure that consists of norms and roles.
5. Collectively identify as a distinct entity from other groups.

Because these characteristics are apparent in many of the groups that emerge in sport, it is evident that: (a) considering group-related aspects is important for understanding and enhancing individuals' sport experiences, and (b) sport can be a powerful setting to learn about groups in ways that translate to other settings like workplace, classrooms, and health promotion interventions. The following sections explore some fundamental concepts and how they have helped advance our understanding of sport groups. Then, some of the key considerations pertaining to developing effective groups will be provided, including practical suggestions that can help enhance groups.

Inputs and Interactions that Comprise Group Dynamics

Various group components interact with one another to influence the success and maintenance of groups. Broadly, these components can be divided into group *inputs* and member *interaction*s (Carron & Eys, 2012). Inputs include members' attributes and groups' structural designs that collectively "make up" and organize groups. These inputs then shape within-group processes and members' feelings and thoughts about their groups that emerge over time. It is anticipated that these processes and emergent states represent how members interact and ultimately determine what groups achieve and what the members gain from their membership. It is important to note that these components influence one another. For example, while it is natural to think about how inputs shape member interactions, the interactions can also induce changes in group member compositions or structures. In this section, some of the key concepts related to each group component will be discussed in detail.

Group Member Attributes

If you recall the sport teams you may have belonged to, you will quickly recognize that every team is composed of members with diverse individual characteristics. Such characteristics can include things like members' age, gender, ethnicity, personality, and attitudes, and can be broadly referred to as their *attributes,* which represent a type of a group input*.* Effectively integrating the collection of individuals who possess diverse attributes is the essence of group success. When researchers or consultants try to measure the composition of members' attributes in a group, they can use many different methods. The simplest is to identify the overall group mean as a way to reveal whether the group members are "high" or "low" on given attributes as a whole. However, alternative approaches exist, including efforts to identify the dispersion of attributes (i.e., how different or similar are members on given attributes?) or the minimum/maximum score (i.e., what is the lowest or highest score on given attributes?).

Whereas sport researchers have conducted few studies that focused on group composition and member attributes, much of our understanding comes from researchers studying student project groups and workplace groups (Hardy et al., 2020). In these settings, one of the most researched member attributes is member personality. This body of research used the five-factor model proposed by McCrae and Costa (1987) as the conceptual basis, which asserts that there are five global personality dimensions. These dimensions include *openness to experience* (i.e., how much one prefers or seeks new experiences/perspectives), *conscientiousness* (i.e., how diligent and reliable one is), *extraversion* (i.e., how outgoing and sociable one is), *agreeableness* (i.e., how sympathetic and cooperative one is), and *neuroticism* (i.e., how emotionally unstable one is; often used interchangeably with *emotional instability*). Several interesting findings can be drawn from the studies examining member personality composition. In more successful groups, members tend to be more agreeable and conscientious on average (i.e., higher group mean), and most members share these traits (i.e., lower dispersion; Peeters et al., 2006; Prewett et al., 2009). There is also some evidence that groups may benefit from having members who are more extraverted and emotionally stable on average (Prewett et al., 2009). The findings regarding extraversion were nevertheless more mixed in contrast to the other traits, but some researchers found that greater variability in extraversion could be beneficial within teams (Prewett et al., 2018). This suggests that a balanced mix of extraverts and introverts may be beneficial for teams, perhaps because these traits are complementary. It is intuitive that teams might face drawbacks when members are highly introverted or extraverted. For example, teams with predominantly extraverted members may experience conflicts because every member wishes to speak up and take on leadership roles, whereas more introverted teams may suffer because members engage in less communication and interactions that are pillars of effective teamwork.

As an additional finding regarding personality from other group settings, minimum scores on traits such as agreeableness and conscientiousness can relate to team success (Prewett et al., 2009). In other words, having even a single member with noticeably low agreeableness and/or conscientiousness scores may negatively impact the team. This is comparable to the idea of "one bad apple spoiling the whole bunch". Though there is currently limited research examining personality composition of sport teams, these studies hint at the possibility that athlete personality traits can significantly impact the team.

In addition to personality, members' cultural backgrounds are an important consideration. In today's societies, culturally diverse sport teams are very common. As one illustrative example, Tottenham Hotspur Football Club's Men's First Team squad in the English Premier League during the 2019-2020 season included various players whose skin colors were visibly different. The complexity of the cultural diversity within this team can be further appreciated considering that the players' nationalities included France, Belgium, Colombia, South Korea, England, Argentina, Netherlands, Ivory Coast, Brazil, Wales, and Portugal (ESPN, n.d.).

Photo by Pixabay from Pexels

There are two major schools of thought on how cultural diversity may impact group functioning. On the one hand, *social identity theory* posits that individuals are naturally attracted towards others who are perceived to be similar (Tajfel, 1982). This identification school of thought suggests that culturally diverse groups may be more prone to conflicts and social division within the group and thus perform less effectively than culturally homogenous groups. On the other hand, researchers adopting an *information processing perspective* believe that more culturally diverse groups have more variety of resources and information available, and thus perform better than culturally homogenous groups (Mannix & Neale, 2005).

Advancing from these theoretical foundations, researchers provided evidence of both negative (e.g., Haas & Nüesch, 2012) and positive (e.g., Kearney & Gebert, 2009) effects of cultural diversity. Offering some explanation for such mixed findings, Stahl et al. (2010) demonstrated that the impact of cultural diversity on group outcomes depended on various contextual factors such as task complexity, group size, and team tenure (i.e., amount of time spent together as a team). For instance, it is possible that diverse cultural backgrounds will have unique effects on how members interact when a group is first assembled, compared to the effects of diversity on how groups emerge across months or years.

Given the salience of diverse cultures, there is some emerging research that has examined related topics in sport. For example, Schinke et al. (2013) suggested that social support from teammates and coaches is critical for helping immigrant athletes during their transition into a new community. However, sport researchers have yet to examine how cultural diversity can specifically influence sport teams. Godfrey and colleagues (2020) asserted that cultural diversity within sport teams can influence factors such as team cohesion, athlete satisfaction, member conflicts, as well as the overall team performance in a variety of positive or negative ways. For example, Godfrey and colleagues suggested that leaders of culturally diverse groups could promote more unity among members if they can find ways to recognize members' unique characteristics and celebrate diversity as something that defines the group. Though the specific mechanisms by which cultural diversity influences sport teams are still unknown, it is clearly an important factor to consider in sport team contexts.

Group Structure

Once a group has been formed, it is necessary to create and maintain a group structure that can maximize members' abilities and strengths. In particular, successful team performance requires *chunking* the group's mission into individual tasks and assigning these tasks to each member according to their strengths and interests. A concept that helps with this process is *roles,* which can be referred to as the sets of behavioral expectations held for each member (Biddle & Thomas, 1966). Benson and colleagues (2014) classified four major types of roles that emerge within sport teams, including roles related to *specialized task* (i.e., actions directly related to team performance such as scoring goals), *auxiliary task* (i.e., supplemental actions indirectly related to team success such as supporting teammates), *social* (i.e., actions for promoting harmony and relationships among teammates), and *leadership* (i.e., actions for guiding teammates in terms of both task and social aspects) functions.

Considering that roles reflect the individual tasks that must be combined to create a successful and harmonious group, sport researchers have focused on studying how athletes perceive their roles and their feelings relating to their roles. These concepts include role *clarity* (i.e., do members understand their roles?), *efficacy* (i.e., are members confident that they possess the capabilities to execute their roles?), *satisfaction* (i.e., do members feel pleased with their roles?), and *acceptance/commitment* (i.e., are members willing to execute their roles?; Eys et al., 2014). Generally, more positive individual and team outcomes result from members who report higher scores on these role perceptions.

Among the aforementioned role perceptions, researchers have demonstrated substantial interest in role clarity, along with role ambiguity (the opposite of clarity). There is evidence that athletes who have a vague understanding of their roles tend to report lower self-efficacy and satisfaction in their group, along with weaker perceptions of team cohesion (Eys et al., 2014). Eys and colleagues (2005) surveyed competitive team sport athletes to understand the various sources of role ambiguity and found that athletes experienced greater role ambiguity if they did not: (a) understand their sport well enough to recognize how their roles affected the game, (b) ask questions to clarify potential misunderstandings, or (c) practice hard enough to learn their roles. Meanwhile, coaches produced ambiguity if they provided little communication or if they did not fully explain members' role responsibilities. Conflicting communication was also highlighted as an important factor, where two or more coaches communicate inconsistent expectations to the athletes. As for situational factors, athletes were less likely to understand their roles if they did not have role models, opportunities to practice performing their roles in competitions, or if their roles were very complex (Eys et al., 2005).

Although athletes may understand their roles, acceptance and commitment can present additional challenges. Eys and colleagues (2020) made several conceptual advances on the topic of role acceptance and commitment in sport contexts based on the literature within the organizational psychology discipline (i.e., study of industry groups/organizations; e.g., Klein et al., 2012). They defined role commitment as the "dynamic and volitional psychological bond reflected in the dedication to and responsibility for one's role" (p. 91) and identified three antecedent bases of role commitment: *affective, normative,* and *continuance* perceptions (Eys et al., 2020). These bases can roughly be reflected as the "I want to…", "I ought to…", and "I have to…" types of perceptions, respectively. For example, athletes are likely to commit to their roles if they are assigned glamorous roles such as the team's main scorer, because they simply like the roles (i.e., affective base). However, those who are assigned less desirable roles (e.g., substitute or practice players) may still commit to them because there is a strong team norm to be a team player (i.e., normative base) or because they would like to remain as a member of their team (i.e., continuance base).

Box 26.1
Informal Roles

We often focus on *formal* roles that are essentially assigned by coaches, such as strikers in soccer, guards in basketball, bowlers in cricket, or team captains (i.e., formal athlete leaders). However, many sport teams also have *informal* roles, which develop more naturally without coaches' formal delegation of responsibilities. Cope and colleagues (2011) read and analyzed articles from the *Sports Illustrated* magazines and identified 12 informal roles that may be relevant in sport teams:

- *Comedian:* Someone who consistently uses humor to amuse others.
- *Spark plug:* Someone who fires up teammates through inspirational actions/words.
- *Enforcer:* Someone who is trusted to protect teammates by fighting back when the opponent team uses aggressive tactics.
- *Mentor:* Someone who guides other members with their knowledge and experiences.
- *Informal leader-nonverbal:* Someone who leads other members through actions without verbal commands.
- *Informal leader-verbal:* Someone who leads other members by being outspoken and by giving verbal directions.
- *Team player:* Someone who makes sacrifices for the team and places their team's and teammates' needs before their own.
- *Star player:* Someone who stands out with exceptional personality or performance.
- *Social convener:* Someone who organizes gatherings for members to socialize.
- *Cancer/bad apple*: Someone who spreads negativity throughout the team.
- *Distracter:* Someone who disturbs teammates' focus during important tasks (e.g., training, competition).
- *Malingerer:* Someone who constantly feigns and/or exaggerates injuries for benefits such as drawing sympathy or gaining access to therapies.

Increasing amount of research has documented how these roles emerge and impact the team. For example, informal leaders are known to serve important task, social, motivational, and external functions in sport teams (Cotterill & Fransen, 2016; also see Chapter 25; Cotterill & Fransen, 2021). Other roles such as team comedians, enforcers, cancers/bad apples, and distracters have been suggested to influence the team's cohesion and overall integration (Cope et al., 2011; Kim, Godfrey, & Eys, 2020; Leggat et al., 2020). In terms of how they emerge, athletes who are more extraverted may be more likely to emerge as the team comedians and athletes who are less conscientious may emerge as the team distracters (Kim, Godfrey, & Eys, 2020). In addition to personality, external factors like the team environment can lead to the emergence of certain informal roles (Kim, Coleman, et al., 2020). Because these roles can emerge rapidly and have a big impact, it may be beneficial to encourage individuals to fulfill positive informal role functions and/or to recognize someone who does (e.g., acting as a spark plug or informal leader).

What types of informal roles do (did) you see on your team? How do you think they emerge(d) and influence(d) the team?

When people think of sport teams, it is common for them to focus on team sports where successful team performance depends heavily on the coordination of all members' efforts. However, individual sports also tend to happen in groups. For example, athletes participating in sports such as track and field, swimming, wrestling, and badminton commonly belong to a school team or a sport club where they train with other members and often compete for team-level goals (i.e., conference championships). Individual sports also often include events where members have to work together in ways that resemble team sport, such as relays or doubles tennis. Evans and colleagues (2012) identified six types of sport teams, based on the varying degrees of structural interdependence. Two of the six types can be observed in team sports. In *integrated* teams, all members must coordinate their efforts simultaneously (e.g., basketball, rowing). In *segregated* teams, members compete together but their actions may not always occur at the same time (e.g., baseball). In both types, members must interact with one another (Evans et al., 2012).

The remaining four types of teams can be observed in prototypical individual sports, where there is no clear group task requiring all members to work together interdependently (Evans et al., 2012). A *collective* team involves members competing against one another but also for a team outcome (e.g., members of a golf team compete in a tournament that has both individual and team standings). A *cooperative* team involves members competing separately from teammates but contributing to an overall team goal (e.g., members of a wrestling team compete in different weight groups and contribute to an overall team score). A *contrient* team involves members competing against one another without a team goal (e.g., members of a tennis team may train together but compete in an individual tournament that does not consider team standings). Finally, in an *independent* team, members do not compete against one another and there is no team goal, though they may identify as a group (e.g., a team of speed skaters compete in different events; Evans et al., 2012). Considering this spectrum of team types, it is evident that individual sport team members can still experience connection. Furthermore, when members do experience interdependence with one another, their group becomes more salient and teammates can influence one another in meaningful ways (Evans et al., 2013).

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As we have discussed, groups are salient across various types of sport environments, even in those sports that are often considered individual. The salience of groups can be further appreciated when one considers that there are "groups within groups", often referred to as *subgroups.* The term *cliques* is also used to refer to subgroups that are thought to be detrimental to the group. Subgroups have three defining features: The collection of individuals (1) belongs to a bigger total group, (2) has formed reciprocating relationships among them, and (3) can be distinguished from the rest of the group (Martin, 2020). Researchers have discussed several mechanisms by which subgroups may form. Among them, *faultline theory* suggests that there are unobservable dividing lines in a group due to the various member attributes (Lau & Murnighan, 1998), and uses the analogy of geologic faultlines that are difficult to observe but that divide up the earth's surface. For example, group members may interact more frequently with members who share similarity in age or cultural backgrounds.

Though research focusing on subgroups/cliques in sport is still in its infancy, studies have gathered important insights from interviews with coaches and athletes (Martin et al., 2015, 2016; Wagstaff et al., 2017). Supporting the faultline theory, coaches and athletes across the studies indicated that certain members naturally gravitated towards one another because they lived together or because they were in the same cohort (e.g., first-year athletes), or due to the similarity in age, personalities, interests, and skill levels. Coaches and athletes also asserted that subgroups are inevitable, and that they are not inherently detrimental to the team because they have consequences that are both positive (e.g., sense of inclusion) and negative (e.g., conflicts). Thus, effective management of subgroups first requires the coaches to engage in ongoing communications with various team members (e.g., athletes, other coaches, trainers) to closely observe member relationships, which can help differentiate positive (or neutral) subgroups from detrimental cliques. Coaches may also benefit from: (a) establishing norms and values that promote unity regardless of subgroup membership, (b) enhancing the members' understanding of other members' personality traits and values, and (c) organizing authentic, inclusive team gatherings as opposed to relying on casual team outings that may exclude certain members.

Group Processes

We have so far discussed concepts related to the group member attributes and structures, which pertain to the inputs that provide the foundation of group development and functioning. However, even though the leader has organized these inputs effectively, it cannot be assumed that the group will operate smoothly on an "auto-pilot" mode. Rather, leaders and members must continuously ensure that they engage in effective interactions and group processes that will ultimately determine the team's success.

To gather a sense of the intricacy within group processes, consider that a group of only 15 members represents over a hundred pairings between teammates, which is a pile of individual relationships! It is perhaps unsurprising that researchers have identified numerous constructs for measuring how members work together. As one key example of this, researchers have attempted to comprehensively unpack the concept of *teamwork* by trying to document the components required to efficiently work together as a group. McEwan and colleagues (McEwan & Beauchamp, 2014; McEwan et al., 2018) specifically described four phases of effective team performance regulation, each of which includes several components. During the *preparation* phase, members identify the team's overall mission, specific goals, and plans to achieve such goals. Then, during the *execution* phase, members enact their plans by coordinating their efforts as well as by cooperating and communicating with one another. During the *evaluation* phase, members monitor themselves to ensure that they are following through on their plans and identify areas for improvement. Finally, during the *adjustments* phase, members modify their plans as necessary, which can involve brainstorming innovative solutions, as well as providing feedback and social support to one another. Through iterative processes involving preparation, execution, evaluation, and adjustment, teams can maximize their chance of overall success and positive individual member experiences.

Early research on the topic of group processes focused on understanding why groups often perform below their full potential. In his conceptual model, Ivan Steiner (1972) asserted that a group's actual productivity can be represented as the difference between the group's *potential productivity* and *process losses* due to various errors. A group's potential productivity represents the best possible scenario, where highly skilled and talented members exert maximum efforts and are able to integrate their efforts flawlessly as a group. However, the group's actual productivity is often less than the group's potential productivity due to various process errors.

One of the earliest illustrating examples of this reduced group productivity was demonstrated by Ringelmann, whose work originally focused on performance efficiency in agricultural contexts (Kravitz & Martin, 1986). Ringelmann noted that workers' individual performance on a rope-pulling task decreased as the group size increased. Specifically, if individual performance is expressed as 1 when a worker is pulling the rope alone, the overall group output should theoretically increase by 1 unit each time a new worker is added. However, the workers' collective performance was recorded at 1.86 for two members, 2.55 for three members, and down to 3.92 for eight members. This means that each member was only contributing 49% of their potential productivity in the largest group, which included eight members! This interesting phenomenon has come to be known as the *Ringelmann effect* (Kravitz & Martin, 1986). Contemporary scholars assert that this effect is comprised of coordination losses (i.e., members of larger groups experiencing greater difficulties to cooperate compared to smaller groups) and motivation losses (i.e., members reducing their effort when they know there are others contributing to pulling).

This example provides a simple illustration of process losses that can reduce overall group productivity. However, most sport situations are much more complex than rope-pulling, and thus theorists have created their own conceptual models to consider process losses in sport contexts specifically. In terms of coordination, Eccles (2010) explained that athletes must align three elements to achieve optimal teamwork: *action type*, *timing,* and *location*. For example, in basketball, if a point guard with the ball dribble-penetrates through the opponent team's defense and moves closer to the basket, this may attract multiple defenders to the basket, creating an open space outside the three-point line. The team's shooting guard then could recognize this and position themselves into this open space, which can allow the point guard to pass the ball to the shooting guard who then can take a three-point attempt without the presence of the opponent team's defenders. In this example, it is apparent that all three components of coordination are present: The point guard dribble-penetrates and subsequently passes the ball to the shooting guard (*action type*), who must move (*action type*) into the open space (*location*) as soon as the point guard attracts the opponent defenders (*timing*).

Considering the importance and the complexity of coordination in sport teams, a logical question that follows is, "how does a team achieve coordination?". A relevant psychological concept is *shared knowledge*, meaning that team members must have a common understanding of the task at hand to be able to coordinate their actions (Cannon-Bowers et al., 1993; Eccles, 2010). Eccles (2010) asserted that team members can develop shared knowledge naturally through experience (*incidentally shared knowledge*) and/or through communication (*intentionally shared knowledge*). As an example of incidentally shared knowledge, defenders in soccer may learn over the years that effective defense entails avoiding large gaps where opponent team players can break through. Athletes may also incidentally learn the tendencies of their teammates over time—allowing them to anticipate one another's movements during a game. Intentionally shared knowledge develops via verbal communication and is evident when coaches verbally explain strategies to athletes or when teammates constantly exchange task-relevant information during competitions (e.g., softball outfielder yelling, "my ball!").

Teams may still fail to achieve their potential even when all members have the capacity to coordinate effectively. Specifically, motivation losses also harm group productivity because members elect not to exert their full effort. A popular concept in social psychology that exemplifies motivation losses is *social loafing*, which refers to a phenomenon where individuals reduce their effort when they are in a group context. Karau and Williams (1993) made several suggestions for reducing social loafing, which included making individual performance identifiable, providing feedback on group performance, assigning meaningful tasks, and promoting cohesiveness in the group.

Box 26.2
Köhler Effect

Though individuals may decrease their efforts in a group setting because of social loafing, an opposite effect can also occur. Otto Köhler, a psychologist from Germany, first discovered that there are circumstances where participants persisted longer on a task when they were performing in a group setting than performing individually.

Köhler effects occur commonly on tasks where group performance is complete only after the weakest member finishes the task. For instance, sport researchers have studied relay events like 4X100m track races and swimming relays, where the slowest member can have a substantial effect on the race result. Even though runners and swimmers occasionally race faster during relays than during individual races, researchers revealed that more inferior members of a given relay team raced their fastest during relays (e.g., Osborn et al., 2012). This improved performance for the weakest links in a relay team may occur because those members feel pressure to match the performance of more superior teammates, such that they do not compromise the team's overall performance. These findings suggest some practical strategies that coaches may consider for maximizing athletes' efforts. For instance, athletes may be grouped together with teammates who are moderately more skilled, and group drills can be organized such that individual performances are identifiable.

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Group States

As group members spend time together, they develop various affective and cognitive perceptions regarding the group and fellow teammates over time. Such perceptions can be referred to as *emergent states*. Group dynamics researchers have dedicated substantial attention toward studying emergent states, perhaps because (a) emergent states that are self-reported from team members tend to be easier to measure compared to behavioral processes, (b) they are more changeable compared to member attributes, and (c) optimizing emergent states can positively contribute to groups and their members. Though numerous important emergent states have been examined in the field of sport group dynamics, we will primarily focus on the concept of *group cohesion* because it was one of the first group-related constructs studied by sport researchers, and because it is the most predominant group-related perception in sport research.

Carron and colleagues (1998) defined group cohesion as an emergent state “that is reflected in the tendency for a group to stick together and remain united in the pursuit of its instrumental objectives and/or for the satisfaction of member affective needs” (p. 213). Carron and colleagues’ work (e.g., Carron et al., 1998, 1985) has provided the foundation for research on this topic in sport contexts. They demonstrated that athletes’ perceptions of their team’s cohesion can be subdivided based on two factors: (a) whether the perceptions pertain to task-related aspects vs. social relationships in the group, as well as (b) whether the perceptions pertain to members’ personal attractions to the group vs. the group’s integration as a whole. Carron and colleagues (1998, 1985) combined these factors to create four dimensions of perceptions of cohesion, representing the degree to which an athlete (1) feels personally satisfied with their roles and contributions to the group success (*attractions to the group-task*), (2) feels connected to their teammates (*attractions to the group-social*), (3) perceives that the group is on the same page in terms of its performance goals (*group integration-task*), and (4) believes that teammate relationships are positive and strong (*group integration-social*).

Group cohesion can be viewed as a key emergent state that is associated with numerous important antecedents and outcomes, many of which have already been mentioned in this chapter. For example, research findings have demonstrated that team mean levels of extraversion and emotional stability related to social cohesion (Barrick et al., 1998) and team minimum levels of conscientiousness and agreeableness related to task cohesion (van Vianen & De Dreu, 2001). In addition to member attributes, studies have found that greater cohesion can be observed when coaches engage in democratic and supportive leadership behaviors (Shields et al., 1997), when athletes clearly understand their roles (Leo et al., 2020), and with smaller group sizes (Widmeyer et al., 1990).

Researchers have also focused on understanding the key outcomes of group cohesion. Not surprisingly, studies have linked higher group cohesion to more beneficial outcomes. As examples, athletes who perceive greater cohesion in their group are more motivated to return to their team in the future (Spink et al., 2018), develop better social skills (Bruner et al., 2014), report stronger capacity to cope with stress (Wolf et al., 2015), and are more satisfied with their sport involvement (Paradis & Loughead, 2012). Meta-analyses also reveal that both task and social cohesion are positively related to team performance (Carron et al., 2002). Researchers have also found that the link between cohesion and performance was stronger for some teams than others. As one example, the relationship between cohesion and team performance was stronger in female teams than male teams (Carron et al., 2002).

Though it seems self-evident that cohesion is related to team performance, a more complicated question pertains to the direction of this relationship. Is it the case that more cohesive teams perform better, or is it that teams that perform better develop stronger cohesion? Both of these scenarios appear logically possible. This “chicken or the egg” question was tackled by Benson and colleagues (2016) who studied European elite youth soccer and handball teams. Benson and colleagues found the strongest evidence for the performance-to-cohesion direction. Specifically, mid-season team performance predicted cohesion perceptions later in the season, but mid-season cohesion perceptions did not predict team performance later in the season. Although this study emphasizes the importance of focusing on previous performance as a predictor of cohesion, this does not mean that we should stop working to enhance cohesion. This is because cohesion still impacts team performance indirectly. For example, cohesion may promote teamwork behaviors such as communication or coordination. It is also important to remember that cohesion is related to other meaningful factors pertaining to the group's functioning (e.g., reduced social loafing) and individual members' experiences (e.g., greater satisfaction).

As described in the lead-in to this section, cohesion is the most commonly-studied emergent state from sport group dynamics researchers. Researchers are nevertheless increasingly recognizing the spectrum of perceptions or evaluations that athletes make about their group that are also important considerations. As such, we will conclude this section with Table 26.1, which lists several other emergent states and their implications for members and teams.

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Table 26.1
Example Emergent States Beyond Group Cohesion

Concept	Definition	Example measure in sport	Underpinning theory and relevance	Example finding
Collective efficacy	Perceptions of our group's ability to successfully complete a task	Collective Efficacy in Sport Questionnaire (Myers et al., 2004)	Self-efficacy theory (Bandura, 1977) Peak performance entails believing that we can do it.	With professional soccer players, Leo et al. (2015) found that teams' changes in collective efficacy during a season were predicted by team conflict and cohesion.
Perceived interdependence	Beliefs about the degree to which members of our group depend on one another for tasks, outcomes, and resources	Perceived Task and Outcome Interdependence Survey (Evans & Eys, 2015)	Social interdependence theory (Deutsch, 1949) We will cooperate when we think we are "in it" together.	University athletes from individual sports reported higher interdependence perceptions with teammates when they participated in cooperative events (e.g., relays), or when they had a team score at competitions (Evans & Eys, 2015).
Social identity strength	The degree to which athletes feel that their sport team contributes to their identity	Social Identity Questionnaire for Sport (Bruner & Benson, 2018)	Social identity theory (Tajfel & Turner, 1979) Social identities benefit wellbeing, and we try to align our behaviors to match our identities.	Young athletes reported stronger identity with their team on days they experienced more prosocial behaviors from teammates (e.g., teammates gave them positive feedback; Benson & Bruner, 2018).
Groupness	Evaluations of the extent to which a collection of individuals represents a group	Spink et al.'s (2010) measure focusing on common fate, mutual benefit, social structure, group processes, and self-categorization	Group entitativity (Campbell, 1958) True groups are likely more potent than collectives that lack features of small groups.	When groupness was higher in youth sport teams, task cohesion was a stronger predictor of intentions to return to the team the next season (Spink et al., 2018).

Table 26.1 (continued)

Motivational climate	The psychological environment aimed at motivating athletes in training/competition (mastery- vs. performance-oriented)	The Perceived Motivational Climate Questionnaire (Walling et al., 1993)	Goal perspective theory (Nicholls, 1984) Two major goal states are dominant in achievement contexts: task vs. ego.	Adolescent male soccer players who perceived a mastery climate in their team reported more "sportspersonlike" behaviors with teammates and competitors (Ommundsen et al., 2003).

Team Development

Just as sport psychologists use psychological approaches to improve experiences within sport, application seems particularly woven into the fabric of group dynamics research that often focuses on enhancing productivity in other settings like military units and surgical teams (Paradis & Martin, 2012). As such, those who study groups often develop knowledge that has direct use for coaches and athletes. Many of you may recognize strategies that athletes or coaches intuitively use to enhance groups. Perhaps you remember gatherings such as potlucks that bring teammates together or participated in team discussions about group norms. Although it is great to see team leaders implementing activities to enhance their group, researchers have produced key insights that help team leaders to more consistently produce positive team environments. For instance, Box 26.3 lists several insights about developing optimal groups drawn from the available literature. These are only a sample of take-home messages that can be integrated into a group leader's everyday actions. Sport researchers have also developed formal interventions that can be adopted within various life settings. In the next section, we identify the main approaches used to develop groups and then provide examples of team development interventions.

Team Development Intervention Approaches

Team development interventions refer to activities delivered with members of groups to improve team effectiveness. These interventions are systematically delivered by either a team leader or by a consultant (e.g., sport psychologist), using either *direct* or *indirect* approaches (Carron & Eys, 2012). Within an indirect approach, a consultant works alongside a group leader who then introduces the intervention to the team. Because the focus is on training a leader like a coach to manage the group, the consultant may never even meet all of the team members. Meanwhile, within a direct approach, a consultant is invited to work directly with the athletes and facilitates one or more team development sessions.

Team-Building

Most team development interventions within sport fall under the category of team-building. Team-building is designed to improve team effectiveness by enhancing members' perceptions of group cohesion (Brawley & Paskevich, 1997). The main idea behind team-building is that, by strengthening team members' perceptions of cohesion, you will create the foundation for members to (a) work hard toward group goals and (b) value their affiliation with the group. Although team-building tactics are often used to improve team performance, their main function is to help members bond and feel attracted to the team.

One review of 17 interventions revealed that team-building typically produces improved team performance, along with enhanced task and social cohesion, and reduced competitive anxiety (Martin et al., 2009). Importantly, Martin and colleagues advised against "one-off" sessions, as team-building interventions were more effective when delivered across two or more weeks. Clearly, team-building *works*.

Regarding the "working parts" of team-building, researchers have identified four approaches that are most common (Lacerenza et al., 2018). One type focuses on fostering *interpersonal relationships*, where members participate in activities that aim to strengthen social bonds or build understanding of members' values. Interpersonal relationship strategies are evident in many of the social activities that coaches intuitively use to develop teams. A second tactic is *group goal-setting,* where athletes contribute to the process of establishing collective goals and evaluating goal progress throughout the season. Although goal-setting activities might seem especially task-focused, sport-based interventions reveal that they can increase both task and social cohesion perceptions (e.g., Senécal et al., 2008). Third, *problem solving* involves exposing teams to a novel challenge to overcome. Often, these are challenges that a group might not normally face, such as an outing with team members to complete an obstacle course. Fourth and finally, tactics to enhance *individual role involvement* are common. These activities increase role communication among members and with coaches, with a goal of ensuring that members understand and perform their roles.

Other Team Development Categories

Although team-building is the prevailing category of team development interventions in sport, there are three additional families of interventions that group dynamics researchers have distinguished (see Lacerenza et al., 2018). Recall that team-building is designed to enhance cohesion, so the remaining families focus on goals that do not necessarily target cohesion or personal relationships. The first additional category is teamwork training and usually involves training members to efficiently coordinate their actions. Although teamwork training activities can increase cohesion, the chief focus is on ensuring that members can effectively cooperate. Leadership training is the second category and involves helping leaders to better-integrate members and create an inclusive team. Finally, team debriefing is a unique category of strategies that can help guide teammates through adaptive discussions following training sessions or performances. For instance, Martin and Eys (2019) interviewed members of an acrobatic jet team, who indicated that detailed debriefing sessions were essential after every flight. Debriefing was seen as a way to prompt individual learning and reflection, while also providing opportunities for every member to acquire a sense for the group's objectives and approaches to solve problems.

Illustrative Interventions

Examples are perhaps the best way to understand what team development involves. Below, we introduce two example team-building interventions, and one example intervention focused on teamwork training.

Carron, Spink, and Prapavessis's (1997) Team-Building Framework

Carron, Spink, and Prapavessis's (1997) framework outlines an indirect approach, in that the consultant trains coaches who then deliver activities with their teams. The defining feature of this framework is that it is delivered through coaches, who learn to brainstorm tactics to regulate their team environment.

Consultants using this framework conduct coach training across one or more workshop sessions in three stages: (a) introduction (i.e., coaches are introduced to team-building and its value), (b) conceptual (i.e., consultant explains theory regarding the different aspects of groups that can be targeted in team-building), and (c) practical (i.e., coaches brainstorm their intervention plan). During the conceptual and practical stages, coaches are trained to focus on three distinct aspects of groups. Coaches are first prompted to enhance the *group environment*, using strategies to draw members together and help members to feel distinct from other groups. Second, coaches are prompted to enhance the *team structure*, by considering activities that can help clarify roles, embed positive norms, and improve athlete leadership. Third, coaches are trained to prompt positive *team processes* by creating chances for cooperation, goal setting, and for members to make sacrifices for the team. After being educated about these aspects of team-building and brainstorming their strategies, coaches independently implement the plan throughout the season.

Box 26.3
Insights from Group Dynamics Research About Fostering Optimal Groups

1. **Team development should be deliberately implemented.** One misperception is that informal social events or cooperative activities are the primary approaches to team-building. Although informal social activities can effectively foster interpersonal relationships, a risk is that teams will feel that social activities are the *only* way to develop the team. Instead, team development is likely most effective when it targets many aspects of the group environment, and when it is carefully designed by group leaders and athletes.
2. **Strategies to develop groups should last throughout the lifespan of the group.** Another misperception is that team-building is mainly required during the early season. The early season is a critical time, but is not the only time to intervene. Group leaders may find that members waver between conflict and being closely integrated, and that the group can be negatively impacted following key events like poor performances. For instance, one study with intercollegiate athletes revealed that injuries to key players sent shockwaves throughout the team (Surya et al., 2015). Athletes described how this was a time to consolidate the team, and for the coaches to discuss how the group was expected to manage these shifts (i.e., adjusting roles).
3. **Team development starts the moment a member joins the group**. Any time that new members are introduced into a team is a time to consider the group environment. Benson and Eys (2017) specifically reported that positive perceptions like cohesion and commitment were most common in teams where: (a) coaches communicated their role expectations to each newcomer directly while sharing how the athletes could increase the scope of their role, (b) existing members were included in the steps to introduce new members (e.g., mentors), and (c) social activities were planned, and everyone could participate in them.
4. **Team development can replace hazing**. Hazing is a practice that many organizations are striving to eliminate, where more senior members demand that newcomers engage in behaviors that are often risky or embarrassing. Group leaders should consider pathways to replace the socializing functions that athletes ostensibly design hazing to serve. For instance, Johnson and Chin (2016) reported an outdoor adventure activity that teams of intercollegiate athletes completed early in the season, which was seen as a way of reducing risks of hazing in teams.
5. **Athlete leaders can take ownership**. Shared leadership is an attribute of high-performing groups (e.g., Cotterill & Fransen, 2016), whereby leadership functions are shared between coaches and athlete leaders. Athlete leaders–such as team captains–may have special value for team development because they have access to aspects of team relationships that cannot be accessed by coaches. As such, it is important for coaches to cooperate with athlete leaders when determining how they will develop an optimal group environment.
6. **Team development often involves entire organizations**. Team development is often focused on the sport team and specifically on the athletes of a given team. However, sport teams often belong to broader organizations that can include several teams, staff members, and administrative roles (e.g., intercollegiate athletics departments; professional or youth sport clubs). Fletcher and Wagstaff (2009) therefore explain that those in sport should consider how to develop the optimal organization – often borrowing strategies that are used to enhance environments in organizations outside of sport.

Personal Disclosure as Team-Building

Compared with the indirect approach of Carron and colleagues (1997), personal-disclosure mutual-sharing team-building interventions are often completed over a shorter period of time. These interventions involve consultant-led team discussions, where members share personal values/experiences or express what the given sport or team "means" for them (e.g., Barker et al., 2014; Holt & Dunn, 2006). For instance, Barker and colleagues (2014) reported on an intervention with elite adolescent cricket athletes from the United Kingdom during an overseas tour. Athletes on the touring group were oriented to the expectations for the intervention and were asked to prepare written responses to disclosure prompts (e.g., why they compete in cricket). Athletes then attended disclosure sessions during the tour where every member took turns sharing their disclosure.

These discussions can often be powerful experiences that draw members together. Along with the potential for success, disclosure sessions may feel uncomfortable for some athletes. Disclosure may also cause harm to teammate relationships or athletes' reputation if inappropriate information is disclosed or if their disclosure is used against them. Accordingly, Holt and Dunn (2006) stress the need to carefully present the disclosure expectations (e.g., confidentiality) and to consider whether athletes will be likely to follow these expectations.

Teamwork Training

McEwan and Beauchamp (2020) developed and pilot-tested an intervention that aimed to train teammates to work together more efficiently. In this intervention, athletes received a workbook and engaged in two teamwork training sessions over a 10-week period. The teamwork training intervention sessions included group goal-setting practices alongside several types of activities designed to improve members' skillsets and knowledge about how to cooperate (e.g., how to provide constructive feedback). Simulations were one example of an intervention activity. Athletes identified the key teamwork behaviors required for their group to perform optimally, and developed simulation activities that targeted these behaviors during a subsequent practice (i.e., scrimmages to simulate competitive environments that stressed certain components of task communication). As another example, athletes worked together to create a team charter during the second workshop session. Each team charter outlined the behaviors that members should expect from one another in terms of: (a) providing social support and (b) resolving interpersonal conflicts.

Conclusion

Many of our sport experiences occur in group contexts. In interdependent sports, we must learn to engage in effective teamwork behaviors to maximize group productivity. Group dynamics are also salient in individual sports, where members interact, train, and compete with teammates, and/or collectively contribute to an overall group achievement. In this chapter, we explored various factors and components that pertain to group member attributes, structures, processes, and states, and also described strategies for developing effective teams. Clearly, groups are complex. It is this complexity that makes it challenging for any leaders to effectively guide their team to success. However, this complexity is also what makes sport participation experiences much richer and more meaningful. Overall, groups are prevalent and influential, and thus considering the nature of groups is fundamental for researchers and practitioners alike for better understanding and enhancing people's sport experiences.

Box 26.4
Awareness of the Group as a Component of Team Development

Discussions of team development tend to focus on the tactics that enhance the team. Just as we need to equip leaders with the tools to develop groups, we nevertheless need to foster awareness of the team. Awareness can help group leaders identify the most ideal approaches to enhance their group: If a coach wanted to use the most relevant team development tactic, how might they know which to use? Another reason to develop awareness is that leaders who are aware of what is "going on" among members tend to act in their group's best interest. As an example, outside of sport, school teachers who are more aware of the network of student relationships are more likely to create classrooms where peers accept one another, compared to teachers who poorly recognize peer relationships (Gest et al., 2014).

We adapted five example items from a tool developed by Bruner et al. (2020) that can help assess group development interventions and foster awareness among members. Specifically, athletes would respond by indicating the extent to which they disagree or agree with comments like:

- Role Clarity: "Team members clearly understand their role on the team."
- Conformity to Norms: "Team members conform to the team's established group norms (e.g., if the team prioritizes promptness, members try their hardest to be on time)."
- Cooperation: "Team members work together as a group rather than as individuals."
- Sacrifices: "Individual team members make sacrifices to benefit the whole team (e.g., team members make sacrifices such as picking up water bottles, ensuring that the dressing room is clean, or listening to others' warm-up music to benefit the team)."
- Communication: "All teammates interact and communicate freely with one another (e.g., the team uses lots of drills that encourage communication)." (Bruner et al., 2020, p. 69)

These items could readily be used to increase awareness of how members perceive their group. If you lead a group, consider implementing items like these to assess aspects of the group that you value. For example, you can consider including items that assess the group environment in weekly training/coaching journals – if athletes are already monitoring their training volume, why not also track perceptions of the group? To prompt willingness to disclose, coaches might also consider anonymous ways to report on the group environment or enlist an independent individual (i.e., consultant) to manage the data.

Box 26.5
Among the Key Concepts from this Chapter, Here are Several Main Takeaways from Each Section:

Member Attributes. Each group is composed of members with unique combinations of characteristics like age, gender, ethnicity, personality, and personal values. The nature of this composition can shape how members interact with one another.

Structure. Structural components include the roles and norms within the group. These can underlie member interactions because they help members anticipate actions that are expected within their group.

Process. Group processes refer to the things that members actually *do* when working together toward group and individual goals. Members must maintain effective teamwork processes (e.g., planning, coordination, communication) to maximize productivity.

Emergent States. Team members hold several important perceptions regarding the team and teammates. Group cohesion is a key emergent state that can impact individual and team outcomes, although there are several others that sport researchers examine (e.g., social identity, interdependence, collective efficacy).

Developing Teams. It is crucial for leaders and members to deliberately implement various team development techniques to enhance the group’s functioning.

Learning Exercises

1. List and briefly describe the five definitional characteristics of a “group” that distinguish them from a random collection of individuals.

2. Call to mind the following three different ‘collectives of individuals’ – and for each example, explain the extent to which you feel that they feature the five ‘hallmark’ characteristics of a *group*:
    a. a free drop-in program that meets once a week for youth to play pick-up basketball in a community gym, with a different collection of about 20 youth participants on any given week.
    b. a figure skating club, including adolescent males and females who share the same coaches, training facilities, and logo, but who all compete in different events.
    c. a women’s national football (soccer) team competing in the World Cup.

3. Describe the two major schools of thought that have been adopted to help explain the impact of cultural diversity on group functioning.

4. Describe the functions of each type of role in sport teams: *specialized task, auxiliary task, social,* and *leadership*.

5. What are some of the reasons an athlete could experience role ambiguity? Based on these reasons for experiencing ambiguity and the recommendations in this chapter, describe three strategies that a coach can employ to enhance their athletes’ clarity regarding their responsibilities.

6. What is the definition of role commitment, and what are its three antecedent bases?

7. What are the six types of sport teams that are classified based on the degree of structural interdependence? Name an example sport/event of each type.

8. Describe a few ways subgroups can form in a sport team and discuss how coaches/leaders can effectively manage subgroups.

9. What are the four phases of team performance regulation? Identify each phase and describe the subcomponents of each phase.

10. Briefly describe one experience where someone in a group to which you belonged was clearly engaging in social loafing. Describe how that experience made you feel, and then indicate two strategies that you learned in this chapter that you think would have reduced the extent to which that person engaged in social loafing.

11. What is the definition of group cohesion and what are its four dimensions? Create questions that can be used to ask athletes about their perceptions pertaining to each dimension.

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Chapter 27
Self, Relational, and Collective Efficacy in Athletes

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Chapter Overview

Athletes and their coaches know that successful performance in sport is based, in part, on psychological factors. One of those factors is self-efficacy: the confident belief that one can perform skillfully, cope with performance pressure, and sustain the hard work necessary to perfect one's skills (Bandura, 1997). In fact, self-efficacy is considered one of the most influential cognitive variables involved in athletic performance. Not only is one's self-efficacy beliefs important to performance, but the relational beliefs between athletes and coaches and athletes with athletes, that is, their relational efficacy, is important to performance outcomes. Athletes and coaches also realize that much of sport performance occurs in teams. It is essential that athletes and coaches have confidence in their team's abilities, referred to as collective efficacy, to be successful. Bandura's theory (1977) of self-efficacy (and its collective efficacy extension) has been proposed as a cognitive explanation for differences in the abilities of athletes, teams, and their relational confidence in each other to carry out their challenges in sport performance. In this chapter, we provide an overview of self-efficacy, relational efficacy, and collective efficacy constructs. In each section, we outline the concepts, provide some research examples, and identify ways to enhance efficacy beliefs.

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Self-Efficacy

One factor that consistently distinguishes more successful athletes from less successful ones is self-efficacy. Self-efficacy refers to “beliefs in one’s capabilities to organize and execute the courses of action required to produce given attainments” (Bandura, 1997. p. 3). Practically speaking, self-efficacy is analogous to a task specific form of confidence, but for clarity and consistency, we will only use the term self-efficacy in this chapter. Self-efficacy does not simply reflect the skills a person has, but rather it represents one’s beliefs about what can be accomplished with those skills. This distinction explains how similarly skilled athletes in the same situation, or the same individual under different conditions, can perform at different levels. Self-efficacy beliefs are task specific and vary across time and circumstance. Accordingly, a baseball player may have high self-efficacy for hitting a fastball, but low self-efficacy for fielding a groundball. Likewise, an athlete can be highly confident one day, but experience significant self-doubts another day. These beliefs are generally referred to as task self-efficacy in the research literature because they involved beliefs about performing a particular task rather than beliefs about one’s capability to cope with a situation or to learn a new skill (Feltz et al., 2008). Self-efficacy beliefs are important because they influence one’s affect (e.g., anxiety, depression), behavior (e.g., task choice, effort, persistence), and cognitions (e.g., goals, attributions). Athletes with high self-efficacy choose demanding tasks, set challenging goals, invest a great deal of effort in pursuit of those goals, and persist in the face of failure and obstacles. In situations where an athlete has the requisite skills and motivation, efficacy beliefs play a central role in determining the success of a performance (Bandura, 1997).

Sources of Self-Efficacy

Self-efficacy judgments are formed by complex cognitive processes involving the selection, interpretation, and integration of information derived from six different sources: performance accomplishments, vicarious experiences, verbal persuasion, physiological arousal, emotional states, and imaginal experiences (Feltz et al., 2008). Self-efficacy beliefs are the mediating mechanism between these sources and affect, behavior, and cognitions.

Performance Accomplishments

Performance accomplishments, or enactive experiences, are based on an individual’s past performances. These previous performance experiences provide an authentic evaluation of a person's capabilities and are therefore considered to be the most powerful source of efficacy information. Efficacy beliefs are enhanced by experiences that are perceived as successful, whereas perceived failures undermine efficacy beliefs. For example, a runner who perceives her past few races and practices as successful will have higher self-efficacy for the upcoming race than she would if she had viewed those recent performances as unsuccessful. However, the impact of enactive mastery experiences on self-efficacy is influenced by several factors, such as task difficulty (e.g., a more difficult race), effort expenditure (e.g., knowing one could have tried harder), causal attributions (e.g., viewing mistakes as a learning experience rather than a physical limitation), and temporal pattern of success and failure (e.g., occasional early failures, but improving times; Feltz et al., 2008). Research has consistently reported past performance to be a significant source of self-efficacy on a wide variety of sports skills (see Feltz et al., 2008 for a review).

Vicarious Experiences

Vicarious experiences (e.g., observational learning, modeling, demonstration) shape efficacy beliefs by observing and comparing oneself to other people. This source influences self-efficacy by providing opportunities for social comparison, conveying task relevant information, and demonstrating effective learning and coping strategies (Bandura, 1997). For instance, a young volleyball player may observe a teammate of similar ability masterfully executing a jump serve, a skill the athlete has never herself attempted before. By watching her teammate, she gains information about the basic technique and timing of the skill, identifies strategies to overcome common errors, and begins to view this as a challenging, yet achievable skill. The influence of vicarious experience on self-efficacy depends on various factors, such as observer experience, model competence, and observer or model similarities. Self-efficacy beliefs based on vicarious information tend to be weaker and more susceptible to change than those formed through performance accomplishments. However, vicarious experiences can be an especially influential source of efficacy information on novel skills where the athlete lacks significant experience. Likewise, this is a crucial source of information for tasks lacking clear, objective indicators of competency in which an individual's performance can only be gauged in comparison to the performance of others (Bandura, 1997).

Verbal Persuasion

Verbal persuasion (e.g., evaluative feedback, others' expectations, self-talk) involves direct expressions of support in a person's capabilities. For example, a coach telling a player "you got this, just like in practice" is using verbal persuasion to make the athlete feel more efficacious. Verbal persuasion is most effective when given by a knowledgeable, credible, trustworthy source. Some caution is necessary, as verbal persuasion has greater power to sow seeds of doubt than it does to build self-efficacy. By itself, verbal persuasion usually produces weak efficacy beliefs that are easily undermined by perceived failures or poor performances. Verbal persuasion is most effective when used in conjunction with other sources of ability information, such as providing corrective performance feedback (Bandura, 1997).

Physiological States

Interpretation of one's physiological states (e.g., arousal, fatigue, and pain) can also inform self-efficacy beliefs. An athlete who believes that a racing heartbeat and sweaty palms signify fear, distress, or self-doubt, will likely experience a decrease in self-efficacy. Conversely, the athlete will likely feel more efficacious if those same symptoms are viewed as signs of being "psyched up" and ready for action. Additionally, athletes may read some physiological states as a sign of their physical fitness to boost or lessen their efforts during grueling performances. Accordingly, it is not the actual physiological states that matter, but rather how the athlete views or interprets those states. While this efficacy source is generally weaker than past performance accomplishments, Bandura suggests that physiological states are particularly salient in domains that involve physical accomplishments, such as sport (Bandura, 1997).

Emotional States

Self-efficacy beliefs are also influenced by emotional states, such as mood and emotional arousal. As with physiological states, an individual's interpretation of the emotional state determines its influence on self-efficacy. A positive emotional state tends to enhance efficacy beliefs, whereas a negative emotional state often decreases self-efficacy. Likewise, intense emotional states have a greater impact on efficacy beliefs than do weaker states. Emotional states can also bias efficacy judgments, particularly when there is a mismatch between the emotional state and performance. For instance, athletes who fail while in a positive emotional state tend to overestimate their abilities. Conversely, success that is achieved while in a negative emotional state often leads individuals to underestimate their capabilities (Bandura, 1997).

Imaginal Experiences

Efficacy information can also come from imaginal experiences, referred to by Bandura as cognitive self-modeling or cognitive enactment. This source involves visualizing oneself (or another person) performing a task. This simulated experience allows athletes to rehearse an endless array of skills, situations, and outcomes, such as shooting free throws, executing set plays, and preparing for various end of the game scenarios. For example, a young tennis player can envision themselves hitting an ace to win the Wimbledon title. Visualizing successful performance and effective mastery strategies increase efficacy beliefs, whereas images of failure usually result in a decreased sense of self-efficacy (Feltz et al., 2008).

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Research on Self-Efficacy in Sport

Influence of Self-Efficacy on Performance

Not surprisingly, much of the research on self-efficacy in sport has focused on performance. One study involving elite male ski jumpers found that self-efficacy was significantly related to performance in competition. Specifically, athletes with high self-efficacy finished the competitive season with a higher World Cup ranking and performed better on the first day of a multiday competition (Sklett et al., 2018). Self-efficacy has consistently been shown to have a positive effect on performance in a wide array of team and individual sports (see Feltz et al., 2008 for a review). In fact, a meta-analysis reported that self-efficacy accounted for approximately 16% of the variance in sport performance (Moritz et al., & Mack, 2000).

It is important to understand that the relationship between efficacy beliefs and performance is reciprocal. In this manner, high self-efficacy leads to improved performance, which then enhances efficacy beliefs. Numerous studies have examined and confirmed the reciprocal relationship between efficacy beliefs and performance using path analytic techniques (see Feltz et al., 2008 for a review).

Influence of Self-Efficacy on Affect, Behavior, and Cognition

In addition to performance, self-efficacy beliefs influence a wide array of emotions, behaviors, and thought patterns. In a qualitative study, researchers interviewed 12 professional golfers who reported that self-efficacy influenced their thought patterns and emotional responses. For example, one golfer remarked “When I am feeling more confident, I am more patient and I am more forgiving. A bad shot doesn't stress me out” (Valiante & Morris, 2013). Likewise, athletes who were efficacious in their self-regulation skills achieved emotional states that more closely represented their desired state and reported using emotional regulation strategies more frequently and effectively than athletes with low self-efficacy (Friesen et al., 2019). Research also suggests that, when given unambiguous performance feedback, people with high self-efficacy persist longer than those with low efficacy beliefs (Halper & Vancouver, 2016). Moreover, athletes must cope with various stressors while competing and self-efficacy has been shown to increase coping effectiveness (Nicholls et al., 2010). Furthermore, self-efficacy has also been linked to effective cognitive functioning, such as making better, faster decisions (Hepler, 2016).

Role of Self-Efficacy in Sport Injury and Rehabilitation

An emerging area of study has focused on the role of self-efficacy in sport injury and rehabilitation. For instance, a survey of 297 athletes examined the role of psychological factors in sport injury. Researchers concluded that self-efficacy played a central role in the likelihood of injury occurrence, as well as recovery from injury (Olmedilla et al., 2018). Likewise, self-efficacy has been found to affect athletes’ intention to report a sports related concussion. Athletes with high reporting self-efficacy were 3.15 times more likely to self-report a concussion than those with lower efficacy beliefs (Carpenter et al., 2020). In regards to rehabilitation, a clinical review of studies involving post-ACL reconstructive surgery patients concluded that knee self-efficacy (i.e., self-efficacy in their ability to perform various daily, sport/leisure, and physical activities as well as self-efficacy in their future knee function) was a significant predictor of adherence to rehabilitation, physical activity level, and knee symptoms/function (Burland et al., 2019).

Enhancing Self-Efficacy in Sport

Self-efficacy beliefs are critical to successful functioning in sport; therefore, it is important to understand how to increase it. In the following section, we present a few efficacy enhancing techniques, but for a more comprehensive review, see Feltz et al. (2008).

Provide Successful Performance Experiences

One proven way to build self-efficacy is to provide athletes with opportunities to experience improvement, success, and mastery. For instance, tasks and skills should be presented and practiced in a logical progression based on difficulty (e.g., in basketball, players should practice easier layups before more challenging 3 point shots). Additionally, complex tasks should be broken down into parts thereby allowing athletes opportunities to experience mastery early in the learning process. Physical guidance, such as spotting in gymnastics, and using performance aids should also be incorporated, when appropriate (Feltz et al., 2008). In youth sports, rules and equipment modifications (i.e., body scaling), such as lowering a basketball hoop, using smaller rackets and lower compression balls in tennis, and playing on smaller softball fields, can be vital to affording children the opportunity to experience success in sport.

Give Effective Feedback and Encourage Positive Self-Talk

Verbal persuasion can also be used to increase self-efficacy beliefs. To be most effective, feedback should be believable, truthful, positive, and contingent on performance (Feltz et al., 2008). For instance, surrounding oneself with people who can provide praise, encouragement, and skill related feedback can help boost self-efficacy (Valiante & Morris, 2013). In sport, coaches can be an especially influential source of verbal persuasion and feedback. Previous research has shown that coaches’ behaviors and feedback have a significant impact on self-efficacy. Two types of feedback that have been shown to be effective at enhancing athletes' efficacy beliefs are training/instruction and positive feedback (Donald et al., 2019). Self-talk is another form of verbal persuasion that can be used to increase self-efficacy. For instance, elite athletes report using self-talk to boost their sense of efficacy, particularly during performance struggles (Miles & Neil, 2013).

Seeing is Believing

Another effective efficacy building technique is imagery. Through imagery, individuals can see themselves mastering skills, achieving milestones, overcoming adversity, and coping effectively. Imagery can have both direct and indirect effects on self-efficacy beliefs (Feltz et al., 2008). Images of successful performance can directly increase feelings of efficaciousness. Indirectly, imaging success can improve performance and successful performance in turn enhances one's sense of efficacy. Imagery based interventions have reported significant increases in self-efficacy, but type of imagery and experience level should be considered (Fazel & Fatemeh, 2018).

Learning Exercises

1. What is task self-efficacy?
2. Describe the importance of self-efficacy to performance in sport.
3. Design a series of progressive skills in the sport of your choosing that would build a novice athlete's self-efficacy.

Relational Efficacy

When people are recognized for great achievements, they often mention the role that significant others had along the path to success. The person mentioned might be an important coach, teacher, trainer, or parent. People have hypothesized that having others believe in their capabilities might drive someone to work harder and persist longer in tasks. To understand the role that significant others have in the development of efficacy beliefs, Lent and Lopez (2002) introduced a relational efficacy framework (also known as the tripartite efficacy framework) to capture some of the key social influences that might shape our self-efficacy perceptions. This framework was outlined to further understand the role of social influence above and beyond the social components embedded in Bandura's initial conception of the formation of self-efficacy beliefs. The original self-efficacy framework incorporates factors that are social, including social persuasion (Bandura, 1997). However, the relational efficacy model greatly expands on the social components included as antecedents to the development of self-efficacy (Lent & Lopez, 2002).

Working from the broader social cognitive theory of which self-efficacy is a component (Bandura, 1997), Lent and Lopez (2002) proposed that the social environment has a substantial influence on self-efficacy perceptions. Specifically, two new sources of efficacy information should be considered when examining efficacy perceptions in the social environment: other efficacy and relation inferred self-efficacy (RISE). Other efficacy is defined as a person's view of another person's ability. An athlete, for instance, could have other efficacy beliefs about their coach. The athlete may judge how confident they are in their coach's ability to effectively manage practices, games, strategy, etc. These other efficacy perceptions could be based on past performance, information the athlete has gathered about the coach from others, and observations of the coach. In team sports, athletes also hold other efficacy beliefs about their teammates which could shape in game behaviors, choice of joint activities, and the amount of effort put forth in tasks. For example, if Alyssa is highly confident in Serena's ability to make a game winning shot, Alyssa is more likely to seek out passing to Serena in a critical moment of a game. RISE is an individual's beliefs regarding how they are viewed by the other people around them. RISE is Alyssa's beliefs about how Serena views Alyssa's ability. An athlete's RISE beliefs are modulated by the athlete's appraisal of the feedback they receive from teammates and coaches, as well as their own self-efficacy beliefs. Both other efficacy and RISE impact many outcomes other than self-efficacy beliefs. The original conception of the model outlined that RISE and other efficacy influence self-fulfilling prophecies, coping efforts in difficult tasks, skill development, social support beliefs, relationship satisfaction, and relationship persistence (Lent & Lopez, 2002).

Generally speaking, the model suggests that those who have more positive RISE and other efficacy beliefs are likely to have higher self-efficacy beliefs, compared to those with lower RISE and other efficacy beliefs. This would suggest that athletes in more positive sport relationships (whether it be with a coach, peer, or parent) are likely to have higher self-efficacy beliefs. However, researchers are still uncertain about the pathway in which the relational efficacy beliefs might influence self-efficacy. The original conception of the relational efficacy model hypothesizes that self-efficacy influences RISE beliefs and that RISE beliefs reciprocally influence self-efficacy beliefs (Lent & Lopez, 2002). RISE and other efficacy also have a reciprocal relationship where RISE impacts other efficacy (through impression management, e.g., an athlete trying to show their best selves), and other efficacy impacts RISE beliefs (through social cues sent from the target individual). The original model proposes that RISE sits between other efficacy and self-efficacy and has reciprocal relationships with both other efficacy and self-efficacy. However, this model has rarely been tested in the same way that it was proposed. Often RISE and other efficacy are both used as sources of self-efficacy beliefs in a cross sectional manner. This shift in methods removes the reciprocal nature of the relational efficacy beliefs and uses them as unidirectional predictors. This change in modeling approach is likely employed for cleaner, more parsimonious models; however, future work should examine these pathways experimentally and with more sophisticated modeling approaches.

Sources of Relational Efficacy

Sources of RISE

There are many interpersonal interactions, exchanges, and experiences that can shape one's RISE and other efficacy beliefs in a social context. Lent and Lopez (2002) hypothesized that RISE beliefs would largely be a function of an individual's appraisal of their partners' feedback and the level of self-efficacy that one has in a particular task. Feedback from partners can be verbal or nonverbal. In the sports context, an athlete might perceive that a coach or teammate doesn't give enough feedback, doesn't provide direct feedback, or there is too much variability in the amount of support. All of these factors affect the development of RISE beliefs in an interpersonal context. Self-efficacy might influence RISE beliefs as a buffer against overly positive or negative partner or coach communication. If an athlete has high self-efficacy, but has very negative interactions with their teammate, the high self-efficacy might mitigate any negative effects from the low RISE beliefs.

Research in sport psychology has corroborated some of these sources and added additional information for researchers and practitioners. Jackson and colleagues (2008) interviewed international level athlete dyads to better understand the development of relational efficacy perceptions. The interviews uncovered three categories that represented sources of RISE, including perceptions regarding oneself, perceptions regarding the teammate, and perceptions regarding the dyad. To further elucidate the theme of perceptions regarding oneself, the authors noted that it included self-efficacy beliefs, past mastery experiences (a traditional self-efficacy source), motivation, and physiological factors. Verbal behavior, nonverbal behavior, and affective states when with the partner were three sources that reflect the perceptions regarding the teammate. Lastly, experience with the partner and the past mastery experiences with the teammate both were minor themes that represented perceptions regarding the dyad (Jackson et al., 2008).

Sources of Other Efficacy

In the original conception of the relational efficacy model, other efficacy was hypothesized to be a function of the perceptions of the other individual's performance, beliefs about the other person's efficacy, cultural stereotypes, social cues, and third party views of the other person's ability to perform (Lent & Lopez, 2002). Other efficacy is developed based on the known performance level of the individual and relevant social cues that could be perceived with interpersonal interactions or in consultation with other individuals (e.g., a previous teammate, coach, or parent). Long lasting interpersonal relationships will likely have more stable sources of other efficacy because there are more past experiences from which the participants can draw information.

Interviewing elite athlete dyads, Jackson and colleagues (2008) found some similar sources of other efficacy and some unique sources as well. Two themes emerged that focused on perceptions regarding the partner and perceptions regarding the dyad. Sources of other efficacy that came from perceptions regarding the partner included past performances with the partner, third party comments, comparisons with past partners, comparisons with similar athletes, other athlete motivation, and physiological factors (Jackson et al., 2008). For perceptions regarding the dyad, both past experiences with the dyad and experience together were main sources in the development of other efficacy beliefs. When developing other efficacy beliefs in a sporting context, it appears that athletes rely heavily on comparing their partner with others in the sport or from their past experience in sport. Also, athletes appear to rely heavily on others (e.g., word of mouth, recommendations) when developing other efficacy perceptions.

Research on Relational Efficacy in Sport

Research on Relational Efficacy in Teammate Relationships

Athlete relationships are defined by a large number of factors. A doubles tennis pair is likely to behave differently and have different relationships than a team of 25 soccer players. However, there are likely some similarities that are worth considering when examining teams. In the studies presented for the rest of this chapter, please keep in mind the unique social context in which all of these teams exist. Dyad relationships are likely to be much closer and have stronger relational ties compared to larger teams.

The original research into relational efficacy beliefs in sport involved interviews of athlete dyads to understand the antecedents to self-efficacy, other efficacy, and RISE (Jackson et al., 2008). This seminal work helped the field better understand the antecedents and outcomes of the relational efficacy model. In the previous section, many of the antecedents were discussed. In addition to those findings, Jackson and colleagues (2008) noted that other efficacy beliefs can contribute to relationship persistence, relationship termination, relationship satisfaction, partner selection, as well as a host of other intrapersonal outcomes. In dyadic relationships, RISE contributed to the development of most of the same outcomes at the intra and interpersonal levels. Overall, positive RISE and other efficacy beliefs appear to have a positive impact on self-efficacy beliefs, as well as behavioral and affective outcomes that are known to impact participation in sports (Jackson et al., 2014).

Research on Relational Efficacy in Coach-Athlete Relationships

Relational efficacy has been a new addition to the already well studied coach and athlete relationship literature. However, through studying the dyadic relationship and the interdependence between coaches and athletes, researchers can better understand how the relationship functions for both parties involved. Jackson et al. (2010) examined intact coach and athlete dyads and found that RISE, other efficacy, and self-efficacy often played important roles in perceptions of closeness in the relationship, commitment to the relationship, and behavior that are complementarity during the relationship.

In a separate project, researchers investigated how self-efficacy, RISE, and other efficacy cluster for athletes when asked about their coach. Interestingly, researchers noted four unique cluster profiles: one had all high efficacy beliefs, one had all moderate efficacy, one had all low efficacy, and a small group was labeled as unsatisfied (Jackson et al., 2011). This result provides evidence (regardless of the causal pathway in which the beliefs occur) that when athletes have high relational efficacy beliefs, their self-efficacy beliefs are also likely to be high (and the same at the moderate and low levels of relational efficacy). In youth sport, RISE has been shown to mediate the relationship between coaching behavior and perceptions of self-efficacy. Specifically, coaching behaviors in youth sport informed the youth athletes' RISE beliefs, which lead to changes in overall self-efficacy (Saville & Bray, 2016). Overall, the relational efficacy framework can provide some information about how the coaches and athletes develop a relationship and how the relationship endures over time.

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Enhancing Relational Efficacy in Sport

While relational efficacy is one of the newer areas covered in this chapter, there have been many advances in the understanding of relational efficacy beliefs in sport during the last decade. When thinking about how to enhance relational efficacy, it is worth going back to the research that covered the antecedents of both RISE and other efficacy. Lent and Lopez (2002) proposed that RISE developed through the processing of the verbal and nonverbal social cues that occur during an exchange. Saville and Bray (2016) asked youth hockey players to describe how the coach lets the athlete know they have confidence in them. Some of the responses included, "puts me in during important situations", "tells me I can do it, even when I'm not so sure I can", "gives me the 'you can do it' look", and "takes the time to show me what I did wrong when I make a mistake." (see Saville & Bray, 2016 for a full list). Many of the exchanges, both verbal and nonverbal, that coaches and athletes give to each other provide information for the formation of RISE beliefs. Being encouraging to athletes, while also holding them to a high standard of performance develops RISE beliefs.

Other efficacy is slightly trickier to develop because some of the sources are outside the immediate interpersonal relationship. Other efficacy can be enhanced through comparison mechanisms (either with other coaches or athletes), third party comments, past performance with the athlete, as well as motivation and physiological factors (Jackson et al., 2008). It is hard for an athlete (or a coach) to alter others' perceptions of themselves. However, it is reasonable to focus on creating positive past performances and providing a space for athletes to succeed, while under challenging circumstances. It is important to create positive social and sport related experiences to enhance motivation and other psychological factors. Focusing on creating a caring environment that fosters improvement and skill development will enhance perceptions of other efficacy between coaches and athletes or athletes and their peers.

Learning Exercises

4. How does RISE differ from other efficacy?
5. What are the sources of RISE and other efficacy?
6. If Sally thinks Coach Tom has high confidence in her ability to make shots in clutch situations, what type of efficacy belief does this represent?

Collective Efficacy

In sport, successful performance is often judged by the performance of the team and not just an individual athlete. A team in the context of sport is defined as a group of two or more people, focused on the same goals and objectives, who are personally and instrumentally interdependent (Carron et al., 2005). Their interdependence includes the perceptions teammates have about their team, whether it is the social structure or contributions to overall performance. Self-efficacy refers to one's individual beliefs about one's ability to successfully perform a specific task. When athletes are part of a team, individuals will also have beliefs about their team's ability, as a whole, to successfully complete the task at hand. Bandura first defined this concept as collective efficacy, "a group's shared belief in their conjoint capabilities to organize and execute the courses of action required to produce given levels of attainments." (Bandura, 1997, p. 476).

There is some debate about how collective efficacy is socially constructed, defined, and measured in the sport psychology literature (Maddux, 1999). One point of view stresses the importance of the group's shared belief in their ability to allocate, coordinate, and integrate to successfully perform collective tasks (Zaccaro et al., 1995). These authors suggest that beliefs about the ability to allocate, coordinate and integrate should be directly measured. While those researchers who advocate for Bandura's conceptualization of collective efficacy, believe that teams automatically consider the coordination and interaction when forming their beliefs about the team's capabilities (Feltz et al., 2008). Short and colleagues have suggested that collective efficacy is a multidimensional construct consisting of five dimensions: ability, effort, persistence, preparation, and unity (Short & Short, 2004; Short et al., 2005).

Collective efficacy is not the summation of each individual athlete's self-efficacy beliefs, but rather the athlete's belief in the team's ability. Self and collective efficacy beliefs can differ for athletes.

For example, an athlete like Lebron James (NBA allstar) can have very high self-efficacy in basketball but play for a basketball team in which he has low collective efficacy (e.g., 2018 L.A. Lakers). Bandura (1997) recommends that athletes need high efficacy beliefs in their own ability as well as the team's ability to perform at the highest level. Research has shown that the measurement of collective efficacy differs by definition and there are methodological issues with collective efficacy involving the unit of analysis. See Myers and Feltz (2007) for a thorough explanation of methodological issues with the study of collective efficacy in sport.

Sources of Collective Efficacy

Some sources of collective efficacy are thought to be similar to the sources of self-efficacy previously described (e.g., performance accomplishments, vicarious experiences, verbal persuasion), with some unique sources related to being part of a team. The process in which athletes combine and weigh various sources of information about the team's ability may involve more complex socially and situationally mediated interactions than do sources of self-efficacy (Bandura, 1997). The most common sources of collective efficacy are described below in categories of individual and team sources. Selection and emphasis of these individual and team sources may change over the course of a season, even if the level of collective efficacy remains relatively consistent (Chase et al., 2003; Magyar et al., 2004).

Individual Sources

Individual sources are variables that athletes perceive to be more self-determined than team determined. Perceived importance of the task, task difficulty, conception of ability, task efficacy, role efficacy, verbal persuasion (e.g., self-talk), and perceived control are examples of individual sources of collective efficacy noted in the literature (Feltz et al., 2008). Athletes will appraise sources in determining the team's ability to successfully complete the task. For example, games that are not viewed as important in the preseason or nonconference schedule might not produce the same amount of incentive for athletes as games perceived as very important, such as the conference championship game. When athletes conceive of ability as a fixed entity, view the task as too difficult or out of their control, then they may have a weaker sense of collective efficacy. Verbal persuasion in the form of self-talk has the same tenets for collective efficacy beliefs as self-efficacy. Task efficacy and role efficacy have been suggested to be a predictor of collective efficacy, especially at the end of the competitive season when athletes have more experience with and knowledge about the team.

Team Sources

Team sources involve variables that have more to do with the team environment or team determined factors. Past performance of the team will be the best predictor of collective efficacy, with practice performance sometimes being more salient than game performance (Chase et al., 2003). This research also suggested that teams may form collective efficacy beliefs around the idea that the team will bounce back from a poor performance or the team is due to perform better after an unusually poor performance. Some teams may be more optimistic during the preseason and have a sense of high expectation based upon team potential and experience of the team last season (e.g., volleyball team has 5 of the 6 starters returning). Some interesting research by Fransen and colleagues (2014) suggests that in soccer and basketball, sources that are processed during the game are more predictive of collective efficacy than sources selected before the game. Teams will make social comparisons with other teams and adjust their collective efficacy accordingly. For example, if Team A views Team B as similar in ability and sees Team B as having a successful performance during league play, then Team A may have increased collective efficacy about their team when they begin league play. High efficacy leader behavior from team captains or other team leaders in the form of verbal persuasion or modeling can increase collective efficacy, whereas nonefficacious coaches can lower collective efficacy in their teams

(Fransen et al., 2017). Teams that are more cohesive, especially in task cohesion, tend to have higher collective efficacy. Research has found that a motivational climate that has at least a moderate or higher mastery-oriented climate is often associated with higher collective efficacy. Overall, individual and team sources often work together to influence the formation of collective efficacy beliefs, which then influence performance, feelings and thought patterns.

Research on Collective Efficacy in Sport

Influence of Collective Efficacy on Performance

Teams with higher collective efficacy tend to perform better and accomplish their goals more so than if they have lower collective efficacy. In turn, performance accomplishments serve as a source of collective efficacy. The reciprocal nature of performance and efficacy beliefs positively or negatively influencing each other is often referred to as spirals (e.g., spiraling up or spiraling down; Fransen et al., 2017). Some of the first research to examine the relationship between collective efficacy and performance was conducted in laboratory settings, with teams artificially constructed in experiments. In general, these studies found that collective efficacy did predict performance; however, the studies were not viewed as realistic or easily applied to real sport teams. Several field studies of intact teams were conducted by Feltz and colleagues (Feltz & Lirgg, 1998; Myers, Feltz, & Short, 2004; Myers, Payment, & Feltz, 2004). Their studies with existing teams in real competitions repeatedly found that collective efficacy predicted performance, and in turn performance predicted collective efficacy for different men's and women's sports. In a comprehensive meta-analysis of 96 studies, Stajkovic et al. (2009) found that collective efficacy consistently predicted performance. One common finding amongst all the studies was the more interdependence of the team, the stronger collective efficacy beliefs predicted performance. Keep in mind that this relationship between collective efficacy and performance can spiral up in a positive direction or spiral down in a negative direction.

Influence of Collective Efficacy on Affect, Behavior, and Cognition

Collective efficacy also influences what athletes choose to do as a team, how much effort they put forth, the goals they set, and their persistence when efforts seem to fail (Bandura,1997). Teams can hold collective beliefs about their team's ability to maintain composure when the game is on the line or to control their worry if they fall behind by a lot of points. Some other common variables influenced by collective efficacy are anxiety, satisfaction, team cohesion, teamwork, attributions, and motivation (Chow & Feltz, 2008; Heuzé et al., 2006). And, like positive and negative performance spirals, the same positive and negative spirals can happen with collective feelings, thoughts, and efficacy beliefs in teams.

Enhancing Collective Efficacy in Sport

Coaches and athletes are aware of the positive relationship between collective efficacy and performance, feelings, and thought patterns. Although some may think that collective efficacy would be enhanced by simply increasing self-efficacy, researchers know that strategies to enhance collective efficacy need to be more specific to the team, as a result of complex interactions between teammates and team play (Feltz et al., 2008). Therefore, we recommend understanding the context of the team, type of sport, amount of interdependence among teammates, and preferences of the team when targeting which sources of collective efficacy to enhance. For example, from the description of individual and team sources, collective efficacy can be enhanced using the following five strategies.

Provide Success Performance Experiences

Providing successful past performance should be the primary focus and there are several methods to do this. In practice, and especially during the early stages of forming the team, the coach or team leader should modify the difficulty of the task, drill, or competition. Early success with step by step progressions from simple to more difficult simulations of competitive situations will build collective efficacy. Prior to competitions, in practice or pregame warmup, coaches should include those drills that the team favors and is a strength. Lastly, performance success should not be defined by wins and losses. Team leaders can help redefine the meaning of success for the team by setting performance goals that are specific to a team's growth and development. Achieving those goals can be beneficial to collective efficacy over the course of a season.

Encourage the Team

As stated earlier, coaches provide an important source of efficacy information for teams. There is a plethora of research about coaching effectiveness and the impact coaching feedback, reinforcement, and nonverbal behaviors have on teams. In general, the words and actions of the coach should be viewed as encouragement, have a positive tone, and include information about how to improve performance. Having a positive coach and athlete relationship can improve the team's collective efficacy (Hampson & Jowett, 2014). Encouragement in the form of self-talk or team talk among teammates should also be positive. Depending on the age of the athletes, coaches should monitor overinvolvement of team parents. Youth sport teams can be negatively impacted and lose collective efficacy if parents become too negative or critical about the coach or teammates. One of the best types of encouragement is to reward effort. Effort is controllable, as opposed to a lot of uncontrollable variables that teams face, such as the ability of the opponent, the game officials, the weather, injuries, or illness.

Use Appropriate Comparisons with Other Team

So much of team sports involve one team being compared to another team. While this comparison is hard to escape, coaches should attempt to focus teams' judgments on self-comparisons. For example, team leaders could clearly state strengths and weaknesses and a plan for how to improve the team. Practices and games could be video recorded throughout the season. Watching good performances and positive interactions among the team can build collective efficacy (Bruton et al., 2014). Another strategy could be to set mastery goals that specify targets for the team to accomplish. For example, basketball teams may target turnover/assist ratios, comparing their second 10 games to the first 10 games of the season. Realistic role models who represent the goals that teams seek to achieve may be emphasized. Lastly, failures by the team should not be blamed on others, such as opponents or officials. Teams should own the failure, set new mastery goals, and direct effort to improve.

Build Team Cohesion

Team cohesion is typically improved by focusing on social cohesion and task cohesion in teams. Social cohesion will benefit from off the field activities where teammates get to know each other better. Team leaders may use team building activities to promote cohesion and identify team leaders. Social cohesion must stay positive and avoid a negative group think of questionable moral behavior or hazing that is sometimes falsely believed to improve team bonding. Task cohesion is best built by clearly identifying team goals and the role for each team member to contribute to the task. In turn, having high role efficacy can build collective efficacy and task cohesion.

Establish a Positive Productive Culture and Team Environment

A positive productive team culture will look different among teams in different sports but the strategies to build the culture are similar. Coaches should help athletes define, discuss, and hold teammates accountable to the culture deemed important. Understanding the importance of any team task is needed for proper incentive and sustained motivation. Coaches can work with athletes so they learn to make stable, controllable attributions about success and failure. The best motivational climate has both a mastery and performance orientation established in practice and reinforced in competitions, with an emphasis on a mastery climate. For example, a cross country coach who recognizes every runner on the team who improved their race time and contributed to the team effort, demonstrates to the team that improvement is important. Positive leader behaviors by the coach and team members will help set the culture of the team and provide a positive team environment.

Team leaders should incorporate all of these strategies into their interactions with the team. Coaches and team leaders would do well to remember that sources of collective efficacy are combined and weighed, selected or emphasized differently over the course of a season, during preseason, or in the offseason. By using these strategies and making them a part of the team culture, over time teams will compete with a higher level of persistence and effort. Team performances will be better, and as a consequence, everyone will notice more satisfaction and higher collective efficacy.

Learning Exercises

7. How does collective efficacy differ from the summation of each team member's self-efficacy beliefs?

8. What are the sources of collective efficacy?

9. Describe the reciprocal relationship between collective efficacy and performance accomplishments and explain how this can produce a spiral?

Conclusion

Research and practical applications, based on self-efficacy theory in sport, have continued to grow over the four decades since Bandura's (1977) seminal paper. This work has expanded to include collective and relational efficacy. The findings from research on efficacy beliefs and sport performance is robust. Other areas of research in sport self-efficacy emerged that have contributed to the expanding knowledge base in the athletic realm but are not included in this chapter. These include coaching efficacy (Feltz et al., 1999), referee efficacy of sports officials (Guillén & Feltz, 2011), administrative and career self-efficacy in sports organizations (Machida et al., 2016) and efficacy beliefs during the learning or training phase of performance (Feltz & Wood, 2009). These topics and the ones we have described will continue to be explored and expanded to further advance theory and applied practice related to efficacy beliefs in sport.

Learning Exercises

10. Think back to your own sport or physical activity experience where you felt highly efficacious. What made you feel efficacious during that experience? List five experiences that made you feel more efficacious and then identify where those experiences would fit within the efficacy models discussed in the chapter.

11. Past performance is a particularly influential source of efficacy beliefs, but we can't all win all the time. In fact, losing is a common and almost inevitable experience in sports. Reflect on your own sport experience and recall how losing affected your efficacy beliefs. How did you manage to maintain or regain your efficacy? Now, imagine that you are coaching an athlete or team that has recently experienced numerous consecutive losses in competition. What can you, as the coach, do to help reduce the negative impact of competitive losses on the efficacy of your athletes? Identify at least 3 specific ways that you could increase efficacy beliefs in the face of consistent performance losses.

12. Coaching an interdependent team involves managing the self-efficacy, relational efficacy, and collective efficacy beliefs of each team member. Detail at least 2 strategies you would use to increase each type of efficacy among each of your athletes. Do you think any of these types of efficacy beliefs are more important in interdependent team sports than other types? Why or why not?

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Chapter 28
Diagnosing Problems, Prescribing Solutions, and Advancing Athlete Burnout Research

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Chapter Overview

Burnout is highly problematic for athletes. It is unsurprising that, like outside of sport, there is growing interest in this area of research. However, while we know a lot about the correlates of athlete burnout, there are few guidelines for how to deal with burnout in practice. In the present chapter, my aim is to diagnose problems that are preventing progress in this regard. In doing so, I have identified nine key problems that I think are the most important issues currently facing athlete burnout research. These include conceptual (e.g., whether burnout is the same as depression), methodological (e.g., whether self-report is a sufficient means to measure burnout), and practical problems (e.g., whether current interventions work). I have also prescribed possible solutions. It is hoped that my proposed solutions can help advance the development of evidence-based guidelines and, in doing so, aid prevention and intervention of burnout in athletes.

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Introduction

Burnout is a growing public health concern. For example, several organizations and public health bodies including Health Education England (2019), the NHS (2019), and the European Union (2017) have all now formally recognized burnout as a serious problem facing individuals in many contexts. In addition, the World Health Organization recently revised and significantly expanded its description of burnout in the 11th revision of the International Statistical Classification of Diseases (World Health Organization, 2018). However, all these organizations have highlighted that there are few available guidelines on how to prevent, monitor, and reduce burnout. This is particularly the case in relation to burnout in athletes (Madigan et al., 2019). It is against this background that, in the present chapter, I have diagnosed problems that continue to hinder progress in this area. I have also prescribed possible solutions to these problems. To aid these discussions, I begin by introducing the concept of burnout and outlining its consequences for athletes.

What is Burnout?

Research on the phenomenon of burnout began in the human services professions in the mid-1970s. The term was coined to describe the process of gradual exhaustion and loss of commitment that had been observed in those working in these contexts. Based on these observations, burnout was defined as a multidimensional psychological syndrome that develops in response to chronic work stress (Maslach & Jackson, 1981). As a multidimensional syndrome, burnout is characterized by three symptoms, namely, reduced professional efficacy (feelings of reduced competence and achievement in one's work with people), cynicism (an unfeeling and impersonal response toward recipients of one's service, care, treatment, or instruction), and emotional exhaustion (feelings of being emotionally overextended and exhausted at one's work; Maslach et al., 1986).

To reflect differences in the context of sport compared to human services settings, the definition of burnout was contextualized for athletes. In this regard, athlete burnout reflects an extreme form of sport disillusionment and is comprised of three symptoms that mirror those in the work domain: a reduced sense of athletic accomplishment, devaluation or cynicism directed at sport, and physical and emotional exhaustion (Raedeke & Smith, 2001). Reduced sense of athletic accomplishment is characterized by a negative evaluation of one’s sporting abilities and achievements. Sport devaluation is the development of a cynical attitude towards sport participation. Finally, physical and emotional exhaustion is characterized by the perceived depletion of emotional and physical resources resulting from training and/or competition.

Raedeke and Smith (2001) developed the Athlete Burnout Questionnaire (ABQ) to measure these symptoms in athletes. The ABQ consists of 15 items, with five items reflecting a reduced sense of accomplishment, five items reflecting sport devaluation, and five items reflecting physical and emotional exhaustion. Athletes respond to questions in relation to how frequently they are experiencing these symptoms, with higher scores reflecting a greater frequency (*almost never* to *almost always*). Since its development, many studies have explored the validity and reliability of the ABQ. In this regard, there is evidence to support its use with athletes of many ages, competitive levels, and across a large range of individual and team sports (Eklund & DeFreese, 2020). Consequently, the ABQ is currently considered the gold standard manner in which to measure athlete burnout. I have provided example items and the response format in Table 28.1.

Why is Burnout Important?

Several studies have explored typical levels of burnout in athletes. These studies have produced various estimates of how common it is for an athlete to experience burnout symptoms. Together, they suggest that approximately 10% of athletes experience moderate-to-severe burnout symptoms at any particular point in time (Gustafsson et al., 2007). In addition, because burnout is considered to gradually develop over time, many more athletes are at risk of developing burnout symptoms throughout an athletic season (e.g., Cresswell & Eklund, 2006). Indeed, there is even evidence to suggest that most professional athletes will experience frequent burnout symptoms sometime in their career (e.g., Eklund & DeFreese, 2015).

Many studies have examined the antecedents, correlates, and consequences of burnout in athletes (see Eklund & DeFreese, 2020; Goodger et al., 2007; Gustafsson et al., 2017, 2018; Smith et al., 2019 for reviews). Research on burnout in athletes has now spanned several decades. The first systematic collation of this research was provided by Goodger et al. (2007). Across a total of 27 studies, these authors showed that a range of psychological (e.g., coping), demographic (e.g., age), and situational factors (e.g., training load) were all related to burnout. This systematic review was followed by a series of quantitative meta-analyses that focused on specific factors. For example, Li et al. (2013) provided a meta-analysis of 18 studies examining motivation, psychological needs, and burnout. Burnout was consistently associated with need thwarting and maladaptive forms of motivation (e.g., controlled). Hill and Curran (2016) showed that, across 19 studies, perfectionism (a personality trait characterized by excessively high standards and overly critical evaluations of behavior) predicted more frequent burnout symptoms. Most recently, Pacewicz et al. (2019) showed that across 20 studies, social support was negatively associated with burnout, while negative social interactions increased the likelihood of burnout.

Aside from the factors that have been summarized in reviews, there is evidence that burnout has many other consequences. For example, not only does burnout reduce performance, but it also diminishes physical and psychological wellbeing (e.g., DeFreese & Smith, 2014). Other specific outcomes include an increased risk of depression, more frequent negative emotions (e.g., anxiety), and heightened fear of failure (e.g., Gustafsson et al., 2015). Burnout also negatively affects interpersonal relationships, perceived recovery, and reduces the likelihood that athletes enjoy their sport participation (e.g., Appleton & Duda, 2016). Perhaps most troubling of all, especially for youth athletes, are the links that have been found between burnout and dropout (see Larson et al., 2019). In particular, those who experience very frequent burnout symptoms are likely to leave their sport, and in some instances, never return.

Table 28.1

Symptoms, Example Items, and Adapted Response Format for Determining the Frequency, Intensity, and Duration of Athlete Burnout

			Frequency					Intensity					Duration				
Symptom	**Athlete report**	**Coach report**	Almost never	Rarely	Sometimes	Frequently	Almost always	Very mild		Moderate		Very strong	No time		Some time		A very long time
Reduced sense of athletic accomplishment	"I am not achieving much in my sport"	"My athlete does not think they are achieving much in their sport"	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Sport devaluation	"I feel less concerned about being successful in my sport than I used to"	"My athlete seems less concerned about being successful in their sport than they used to"	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Physical and emotional exhaustion	"I am exhausted by the mental and physical demands of sport"	"My athlete appears exhausted by the mental and physical demands of their sport"	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5

Note. Adapted from Madigan et al. (2019). First published in The Sport and Exercise Scientist, Issue 61, Autumn 2019. Published by the British Association of Sport and Exercise Sciences - www.bases.org.uk

Diagnosing Problems, Prescribing Solutions, and Advancing Research

The summary of the literature clearly illustrates that burnout is problematic for athletes. It is somewhat surprising, then, that there are few guidelines for how to deal with burnout in practice. In the remainder of the chapter, I have diagnosed nine key problems that I think are preventing progress in this regard. I have also prescribed possible solutions with the aim of advancing research in this area. To aid in this goal, I have grouped my discussion into conceptual, methodological, and practical problems.

Conceptual Problems

I first discuss problems that pertain to the theoretical basis of burnout. These span (a) which theoretical lens is best to understand burnout development, (b) whether burnout is different from depression, (c) whether it is sufficient to measure only the exhaustion dimension of burnout, (d) should emotional exhaustion be differentiated from physical exhaustion, and (e) whether burnout is contagious.

Which Theoretical Lens is Best to Understand Burnout Development?

Many theories have been proposed to explain the development of athlete burnout (see Gustafsson et al., 2018). This includes stress-, commitment-, and motivational-based explanations (see also Cresswell & Eklund, 2006). Most research, however, has focused on two specific theories:

1. Smith's (1986) cognitive-affective model. This theory posits that burnout develops because of chronic stress. Specifically, when athletes appraise an imbalance between the demands of a situation (e.g., training) and their resources to cope with these demands, they will experience stress. Over time, a chronic imbalance between perceived demands and resources will result in a range of emotions (e.g., anxiety) and rigid behavioral responses (e.g., withdrawal) that comprise the athletes' attempt to alleviate the negative experiences associated with chronic stress. This model argues that one such behavioral response is burnout development.
2. Deci and Ryan's (2002) self-determination theory (SDT). This theory argues that social-environmental conditions are fundamental to the progression or attenuation of self-motivated behavior and health via the satisfaction or thwarting of three basic psychological needs (autonomy, relatedness, and competence; Ryan & Deci, 2017). SDT assumes that characteristics of the social environment are critical to the level of need satisfaction that individuals experience (Ryan & Deci, 2000). As such, athletes who are in particularly controlling environments (e.g., working with an authoritative coach) will have their needs thwarted, develop less intrinsic motives for participation, and, over time, this will lead to burnout development. For more on SDT, see 3 (Quested et al., 2021).

Many studies have sought to examine the validity of these theories (see Smith et al., 2019). However, empirical tests (studies) typically yield some degree of confirmation (e.g., a significant correlation coefficient). Enough, at least, to keep the theory being tested from being rejected. In burnout research, it is rare to see one theory pitted against another. Thus, despite a large empirical literature, there is still no consensus that one of these models of burnout is more accurate than the other or that certain variables are more influential than others (e.g., stress vs. motivation; see Weinstein, 1993). Researchers have yet to engage in the winnowing process that is necessary for scientific progress in this area. To help progress research in this regard, I recommend that researchers increase their focus on the refutation of burnout models. This should include explicit comparative tests of their predictive and explanatory validity (Meehl, 1967). These approaches will help develop this area of research into a mature scientific discipline.

Is Burnout More than Depression?

Since the scientific study of burnout as a phenomenon began, researchers have frequently discussed the overlap between burnout and depression (see Maslach & Leiter, 2016). There are certainly some similarities between these concepts. For example, they share similar developmental pathways (e.g., chronic stress) and manifest similarly in some regards (e.g., negative affect). Because of these similarities, some researchers have argued that they are not unique constructs but are instead one and the same construct (see Bianchi et al., 2015); a case of the so-called Jangle Fallacy (that two identical or almost identical things are different because they are labeled differently; Marsh 1994). This argument clearly has important and wide-ranging implications with one being bringing the entire empirical edifice of burnout research into question. For further discussion of exercise and depression, see Chapter 15 (Brush & Burani, 2021).

I think that burnout is distinct from depression for two main reasons. The first reason is that they are conceptually distinct. Depression is a pervasive affective disorder (Beck et al., 1998). That is, it affects all an individual's experiences, no matter what they are doing or where they happen to be. Burnout, however, is context specific (Maslach & Leiter, 2016). It manifests in specific domains of life such as sport, education, or work. Burnout may well have effects beyond a specific domain, but these are likely to be indirect, smaller in size, and unlikely to affect all areas of life. For example, individuals experiencing frequent burnout symptoms are still able to derive pleasure from other activities. Those suffering from depression are not (Pizzagalli, 2014).

The second reason is that they are empirically distinct. In sport, there are three studies that have examined the correlation between burnout and depression in athletes (N = 856; Cresswell & Eklund, 2006; Raedeke et al., 2013; Smith et al., 2018). On average, across the symptoms of burnout, this correlation is around .50. Although this is what is classically termed a "large" correlation (Cohen, 1992), these findings suggest that the majority of variance between burnout and depression–75%–is unique, rather than shared between the constructs. Interestingly, a relatively similar pattern of relationships is found across the burnout symptoms suggesting that all dimensions are similarly separated from depression.

Both conceptually and empirically, burnout diverges from depression. It is therefore appropriate to consider these distinct constructs, and to study them as such. Additional research is, however, required to explore their similarities. As a starting point, this work could examine whether burnout and depression do share similar developmental pathways (e.g., chronic stress).

Is it Sufficient to Measure Exhaustion on its Own?

Athlete burnout is multidimensional. Nonetheless, there is a growing trend for researchers to examine only the exhaustion component of burnout. There are likely many reasons for doing so. However, it would appear that the main reason for the shift to this approach is based on a recent conceptual debate that has arisen in the broader burnout literature. This debate centers around alternative models of burnout that define burnout simply as exhaustion, or subtly different forms of exhaustion (e.g., Shirom & Melamed, 2006). This is obviously at odds with the definition provided by Maslach and colleagues. While there is some evidence to support this notion in sport (e.g., some studies have shown that exhaustion shows the strongest relationships with various outcomes), this line of theorizing and operationalizing burnout is problematic. This is for several reasons. First, exhaustion is not always the strongest predictor of outcomes. For example, several reviews attest to the differential predictive ability of burnout dimensions (e.g., Li et al., 2013). Second, and perhaps more importantly, this line of argument brings into question the discriminant validity of the construct; if burnout is exhaustion, then why study burnout at all, why not study exhaustion? And so, we end up in a similar place as to where the discussions of the burnout-depression overlap led us.

There are inevitably going to be some instances where it is appropriate to examine only the exhaustion dimension of burnout. For example, when researchers are interested in quantifying burnout but do not have the time to measure all three dimensions. If this does end up being the case, and only the exhaustion dimension is measured, it is essential that researchers are clear about this when they are reporting their findings (i.e., that they pertain to exhaustion, rather than burnout per se; e.g., Jordalen et al., 2016). I suggest that researchers wishing to measure burnout as originally defined (and contextualized by Raedeke and Smith [2001]), which is in keeping with the broader scientific consensus (World Health Organisation, 2018), measure all three dimensions of burnout wherever possible. This approach will ensure that burnout is measured in a manner consistent with its definition.

Is it Necessary to Differentiate Physical from Emotional Exhaustion?

As defined by Raedeke and Smith (2001), the exhaustion dimension of burnout comprises both physical and emotional aspects. In this regard, of the five-items that comprise the physical and emotional exhaustion subscale of the ABQ, three items focus on exhaustion in general (e.g., "I feel overly tired from my sport participation"), one focuses on physical exhaustion ("I feel physically worn out from sport"), and the final item focuses on mental and physical exhaustion ("I am exhausted by the mental and physical demands of sport"). It has been argued that as a consequence, researchers are unable to examine whether the forms of exhaustion (i.e., physical and emotional) are part of a single construct or if they are separate dimensions (Quested & Duda, 2010; see also Isoard-Gautheur et al., 2018).

It is currently unclear whether athletes make this distinction, or whether instead they experience a general sense of exhaustion. The notion that burnout shares some overlap with the consequences of physical training (e.g., overtraining) supports the latter idea (see Lemyre et al., 2007). Indeed, there is a small amount of empirical evidence suggesting training load is associated with athlete burnout (Goodger et al., 2007). In addition, factor analyses show that the five items of the ABQ (encapsulating different parts of exhaustion) load onto a single factor (rather than two or more), suggesting that the underlying latent construct of exhaustion is best represented by one factor. Together, these points question whether athletes do differentiate between different forms of exhaustion. It is possible that burnout represents a broad appraisal of one's resources relevant to sport. Future research is required to further substantiate these ideas.

Does Burnout Transfer from One Athlete to Another?

We have a limited understanding as to whether athlete burnout is "contagious". That is, whether burnout can pass from one athlete to another (Bakker & Schaufeli, 2000). Research in sport has explored the possibility for athletes to pick up and imitate others' emotions (see e.g., Friesen et al., 2013), and there is evidence that athletes are particular astute at doing so. Aside from this indirect evidence, however, we have little understanding of the potential of a burnout contagion in sport. Following work in other settings, and education in particular, that has found evidence for interpersonal burnout transmission (e.g., Madigan & Kim, 2021; Oberle & Schonert-Reichl, 2016), studies that look to explore this pathway as a mechanism of burnout development in athletes are warranted. In doing so, researchers should seek to examine the conditions under which this process may be exacerbated. These conditions could include competition failure (e.g., how the stress of losing affects the emotions and stress of players collectively) and coach-created environments (e.g., coach controlling practices). This line of research will help further understand whether burnout is not just an individual issue, but that other people also have a significant part to play in its development.

Methodological Problems

In the next section I discuss problems related to methodological, measurement, and analytical factors. These include (a) whether self-report is a sufficient means to measure burnout, (b) whether frequency of burnout symptoms could be expanded upon, and (c) which designs and analyses are most appropriate for future burnout work.

Is Self-Report Enough?

Much like many other areas of sport psychology, we rely exclusively on self-report measures. Self-report is extremely useful, especially when the construct of interest is a primarily psychological phenomenon, as is the case for burnout. However, there are several issues associated with an over-reliance on this method of measurement. These issues include a high chance of methodological bias in terms of socially desirable responding; some athletes are likely to respond in a manner consistent with how they think they should respond based on perceptions of others (e.g., their coach; see Paulhus, 2002). This issue is even more relevant when the same source of report (i.e., athlete self-report) is used for both dependent and independent variables (for example, when athletes provide self-reports of burnout and its potential consequences). Here, the risk of common method variance is also inflated. This is when the explained variance is attributable to the measurement method rather than to the constructs that are trying to be measured (see also Podsakoff et al., 2003).

There are two proposed solutions. First is the development of observational tools for athlete burnout. This would provide a means for those working in sport –such as the coach– to monitor burnout in their athletes. This could be as simple as altering the referent of the ABQ (see Table 28.1 for examples). Exploring the viability of this option should be a priority of athlete burnout research. Second would be an increased emphasis on the measurement of potentially objective antecedents or outcomes of athlete burnout (see Gerber et al., 2018). In this regard, it would be very interesting to see more research on biomarkers. So far, three studies have been conducted examining biomarkers and athlete burnout. These studies have explored salivary Immunoglobulin A (a marker of immune function), cortisol (a marker of stress), and eucapnic voluntary hyperventilation (a test of lung function). Unfortunately, all studies have relied on small sample sizes and, unsurprisingly, have found small, non-statistically significant effects. The hunt for relevant biomarkers and objective correlates and consequences of burnout in sport continues (see Danhof-Pont et al., 2011).

Is Frequency Enough?

When Maslach and Jackson developed their original measure of burnout, it included frequency ratings and also intensity ratings; respondents reported how frequently they were experiencing burnout symptoms, and at what intensity (i.e., “how strong” from *very mild* to *very strong*; Maslach & Jackson, 1981). The utility of this approach was demonstrated in several early studies. However, Maslach and colleagues subsequently removed the intensity rating arguing there was a degree of redundancy between it and the frequency rating (see Maslach et al., 1996). In addition, research on other psychological constructs also includes duration ratings: for what duration do they experience symptoms (e.g., from *no time* to *a very long time*; see Arnold et al., 2013).

To date, neither the intensity nor duration rating methods have been employed in athlete burnout research. Why is this important? Doing so may allow for further insight and understanding of burnout in sport. In particular, it may allow for more detailed exploration of the temporal dynamics by which burnout develops over time (e.g., do increases in frequency precede increases in intensity, or vice versa?). It may also provide a means to differentiate those most at risk from the more severe consequences. For example, when athletes’ burnout experiences are not only frequent but intense and enduring. Likewise, these response formats may prove useful in further unpicking the determinants and antecedents of burnout. As such, including intensity and duration formats may be appropriate for athlete burnout. To aid burnout research in this regard, I have provided an example of these response formats in Table 28.1.

Which Research Designs Should We Use?

It is ever more commonplace for a review of a psychological construct to lament the lack of longitudinal studies. This is because temporal precedence (that one thing precedes the other in time) is a necessary (but not sufficient) condition for causal claims. It also allows researchers to test the direction of effects across time (including reciprocal effects between multiple constructs). There is indeed a growing tendency towards the use of longitudinal designs in the field of sport psychology as a whole, and this is also the case for research on athlete burnout. In fact, with over 25 longitudinal studies, athlete burnout research is leading the way. These studies have explored a range of antecedents (e.g., perfectionism; Madigan et al., 2015; 2016a; 2016b) and outcomes (e.g., motivation; Cresswell & Eklund, 2005) and provided us with important information about burnout development and consequences.

I am not calling for a change in designs—the increasing use of longitudinal designs is very promising—but I do have some comments regarding the ways in which such data are analyzed. Longitudinal studies will have a nested data structure (e.g., time points nested in individuals), and so the analyses must take this into account. Much longitudinal work in this area has, however, relied on cross-lagged panel models, which do not do so (Hamaker et al., 2015). Techniques that allow for a multilevel disaggregation of effects (e.g., intercept and slope) are necessary (see also Selig & Preacher, 2009). Thus, future studies are encouraged to use multilevel models to consider how burnout changes over time, and how its antecedents or consequences do too (see Madigan et al., 2020; Stenling et al., Lindwall, 2017).

Practical Problems

In the final section of the chapter, I focus on the main practice-based problem. This is how can we, as researchers, coaches, parents, and athletes, intervene to prevent and reduce burnout symptoms.

How Do We Intervene?

This is perhaps the most important, and yet most problematic issue. Important because of the numerous negative consequences of burnout, and problematic because so few interventions to reduce burnout symptoms have been tested using athlete samples. In fact, my search of the literature returned only three studies. Of these, two are observational studies that focused on student athletes and one is a randomized controlled trial focused on Gaelic football players. These studies are summarized in Table 28.2.

The earliest study adopted an observational design and examined the effectiveness of a self-regulation-based intervention in a small sample of athletes from various sports (Dubuc-Charbonneau & Durand-Bush, 2015). The intervention was informed by the Resonance Performance Model. This is a framework that is used to help individuals learn how to regulate how they feel, think, and behave to achieve congruency between their self and their environment (Callary & Durand-Bush, 2008). The intervention employed athlete and researcher discussions about topics such as perceived demands, resources, behavioral and emotional responses, preferred standards (e.g., how they wanted to feel), goals, preparation and coping strategies, and performance outcomes. Following 7–9 biweekly sessions, reductions in both exhaustion and reduced sense of accomplishment were found.

More recently, Gabana et al. (2019), also adopting an observational design, explored the efficacy of a gratitude-based intervention. Gratitude is defined as acknowledging a benefit received from someone else, or recognizing the value of a general benefit to one's life (Lambert et al., 2009). The intervention consisted of a workshop where gratitude was defined, participants reflected on what they were grateful for, and why they were grateful for it, and reflected on what meaning this brought to their life. Four-weeks following this single 90-minute workshop, reductions in athletes' total burnout were found.

As noted, the study by Gabana and colleagues, and that of Dubuc-Charbonneau and Durand-Bush (2015), were observational in design. Such designs are limited, however, because it is extremely difficult to determine whether changes in burnout are causally related to the intervention. In this regard, the final study (Langan et al., 2015) may provide stronger evidence for causality because it adopted a randomized controlled design. Specifically, the unit of randomization were the coaches (and their athletes), which is known as a cluster randomized design. Langan and colleagues based their intervention on SDT. In this regard, they trained coaches to adopt strategies designed to increase their provision of need support and reduce their use of a controlling interpersonal style (e.g., Reeve, 2009). In terms of need supportive behaviours, these included explanatory rationales, informational noncontrolling language, displaying patience and allowing time for self-paced learning. Following six training sessions in the experimental group, no changes in burnout were found, but increases in burnout were found in the control group. This finding suggests that the intervention may have attenuated any potential increases in burnout over the study period.

The findings in this area can be best described as preliminary, especially considering that two of the three studies did not include a control group. This being said, the evidence is promising given that all three studies reported beneficial effects to some degree.

Luckily, in addition to the small amount of evidence in sport, there is an abundance of intervention studies in other contexts (e.g., West et al., 2016). This includes studies in healthcare (e.g., physicians, nurses) and also education (e.g., teachers, students). While these contexts may reflect different experiences and environments than in sport, these studies can be used as a basis from which to help us intervene with athletes. I have recently made some suggestions in this regard (Madigan et al., 2019). This evidence suggests that the following strategies may be particularly useful. Cognitive-based therapies are effective in reducing burnout in other contexts, and are effective for other disorders in sport, so it is likely they will also be useful for athlete burnout (see Gustafsson et al., 2017). In this regard, developments from what is known as the third wave of cognitive behavioral therapy including mindfulness and acceptance have great potential. Mindfulness relates to the ability to stay attuned to the present, rather than ruminating about the past or worrying about the future and has a growing body of evidence supporting its use in relation to reducing stress and burnout (Suleiman-Martos et al., 2020). Furthermore, rational emotive behavior therapies are gaining traction in sport psychology (see Turner, 2016) and are useful based on evidence in other contexts. Such approaches seek to identify, challenge, and restructure irrational beliefs that are believed to underpin a negative pattern of behavior. Therefore, challenging irrational beliefs that may underpin burnout development (e.g., need for perfection) may also be worthwhile in sport. Taken together, these studies provide an excellent starting point from which to develop and test interventions for athlete burnout.

Table 28.2
Studies Examining Interventions to Reduce Burnout in Athletes

Study	*N* Exp	*N* Con	Sport	Burnout measure	Design	Mode of delivery	Duration	Intervention	Main Findings
Dubuc-Charbonneau & Durand-Bush (2015)	8	–	Hockey (*n* = 4), swimming (*n* = 2), fencing (*n* = 1), and basketball (*n* = 1)	ABQ	Pre-post design	In-person, individual [athlete]	7–9 biweekly sessions	Self-regulation intervention	E and RSA significantly reduced over the intervention period.
Gabana et al. (2019)	51	–	Wrestlers (*n* = 27) and swimmers (*n* = 24)	ABQ	Pre-post design	In-person, group [athlete]	90-minute workshop	Gratitude-based intervention	Total burnout significantly reduced at 4 weeks post intervention.
Langan et al. (2015)	3 coaches, 41 athletes	3 coaches, 46 athletes	Gaelic football (*n* = 87)	ABQ	Cluster randomized control trial	In-person, individual [coach]	6 sessions, 50–90 minutes	SDT-based intervention	Burnout (total and all dimensions) increased in control group but did not change in experimental group.

Note. ABQ = Athlete Burnout Questionnaire. E = exhaustion. RSA = Reduced sense of accomplishment. SDT = Self-Determination Theory. Exp = experimental. Con = Control.

Conclusion

Commensurate with the increasing interest in burnout in relation to public health, a growing body of work is examining burnout in athletes. We have begun to make significant progress in our understanding of the correlates and consequences of athlete burnout. My comments presented in this chapter are aimed to help advance our overall ability to protect athletes from this syndrome. In summarizing my thoughts, a focus on conceptual, methodological, and practical problems is integral to progressing the scientific study of athlete burnout. I hope that my prescribed solutions not only stimulate academic debate, but also provide impetus for better research that can be used to develop guidelines to protect athletes from burnout and its consequences.

Learning Exercises

1. What are the symptoms of athlete burnout?
2. What are the consequences of burnout for athletes?
3. In what ways does burnout differ from depression?
4. What are the problems with self-reporting burnout symptoms?
5. What strategies are currently available to reduce burnout in athletes?

Further Reading

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Chapter 29
Psychological Stress and Performance

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Chapter Overview

Psychological stress is inherent in sport, particularly at the higher levels of competition, and has implications for individuals' well-being and performance. Athletes, coaches, officials, and parents alike are influential stakeholders in sport and each of these groups of individuals are likely to experience stress at some point during their own or others' sport careers. Psychological stress is an umbrella term that refers to many concepts that are each interrelated and idiosyncratic. This makes stress a complex area to learn about. This chapter will focus on some of the most widely studied components and outcomes of stress (i.e., stressors, appraising, coping, and well-being) and their relationships with performance to offer an introductory text that encourages further reading. Theoretical perspectives of stress are covered briefly to offer frameworks from which stress can be understood. Exercises are offered at regular intervals throughout the chapter to facilitate transference of readers' knowledge. The chapter closes with implications for practitioners, national governing bodies, and researchers, and with concluding comments that consolidate important points from the chapter.

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Psychological Stress and Performance

Theoretical Perspectives

Psychology based theories help us to understand cognition and behavior. Theories also offer frameworks that facilitate understanding of how concepts are related and act as a basis for the development, exploration, and testing of research questions. Many theories of psychological stress exist. For example, research on stress in sport was historically framed by stimulus (e.g., Hardy et al., 1996) or response (e.g., Tenenbaum et al., 2003) based theories that conceive stress as an independent or dependent variable respectively. Stimulus based approaches stem from physics and engineering (e.g., Hinkle, 1974) and suggest that stressors are environmental stimuli that exert a demand on an individual (Hardy et al., 1996). Response based theories, however, focus on the ways that individuals react to stimuli and have origins in Cannon's work on the fight or flight response (Cannon, 1914) and Selye's first writings about his general adaptation syndrome (e.g., Selye, 1936).

Despite their popularity in early stress research, many difficulties associated with and confusion surrounding stimulus and response-based theories of stress have been documented (see e.g., Hardy et al., 1996). It is based on these difficulties that more recent research in sport (e.g., Didymus & Backhouse, 2020; Harwood et al., 2019; Potts et al., 2019) has endorsed transactional and relational conceptualizations of stress (Lazarus, 1999, 2000; Lazarus & Folkman, 1984). Such conceptualizations suggest that stress resides neither in the environment (i.e., as a stimulus) nor in the person (i.e., as a response) but in the relationship between the two. Thus, transactional theories of stress consider both person factors (e.g., beliefs, values, goals, personality) and situation factors (e.g., the duration and timing of stressors) to be influential during stress transactions (see, for a review, Didymus & Jones, 2021). These theories suggest that stress transactions begin with the juncture of a person and a stressor, that individuals engage in cognitive-evaluative processes (i.e., appraising) to ascribe meaning to stressors, and that attempts to cope are made using cognitive and or behavioral efforts (Lazarus, 1999, 2000; Lazarus & Folkman, 1984). Transactional stress theories are contextual in that they seek to understand people in specific contexts and focus on what is happening at that time cognitively, emotionally, and behaviorally. Thus, such theories view stress and emotions as closely entwined and suggest that stress has implications for performance and well-being.

Two theories of psychological stress that are based on a transactional conceptualization and have been applied widely in sport are transactional stress theory (Lazarus & Folkman, 1984) and the cognitive-motivational-relational theory (CMRT; Lazarus, 1999). From these perspectives, stress is defined as a "relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being" (Lazarus & Folkman, 1984, p. 19). In sport, researchers have used transactional theories to explore the ways that individuals appraise stressors (e.g., Didymus, 2017; Didymus & Fletcher, 2012, 2017a; Ritchie et al., 2017); the ways in which athletes, coaches, and teammates work together to manage demands (e.g., Doron & Bourbousson, 2017; Staff et al., 2017a); and various outcomes of stress transactions (e.g., burnout, Hassmén et al., 2019; psychological well-being, Norris et al., 2017). Many other theories of psychological stress exist alongside those already mentioned. For example, Jones and colleagues (Jones et al., 2009) developed and later revised (Meijen et al., 2020) the theory of challenge and threat states in athletes (TCTSA-R) to explain how athletes anticipate motivated performance situations (e.g., sport competitions). This theory focuses on physiological and emotional responses to stress and how sport performance might be affected. Other theories that focus more specifically on one or two components of stress also exist. For example, appraisal theories (e.g., Roseman & Smith, 2001) help to explain why and how emotions are elicited by evaluations of stressors and theories of dyadic coping (e.g., Staff et al., 2017a, 2017b, 2020) provide insight to the ways in which people work together to manage stressors. We adopt a transactional perspective throughout this chapter and hang the subsequent sections on elements of stress transactions that have been most widely researched: stressors, appraising, coping, and well-being.

Stressors

Stressors are the starting point of stress transactions and can be defined as "environmental demands (i.e., stimuli) encountered by an individual" (Lazarus, 1999, p. 329). Stressors can be acute or chronic. Acute stressors are experienced in the short-term and are time-limited (e.g., an official making a "bad" call; Anshel et al., 2013). In contrast, chronic stressors are longer term demands (e.g., injury, finances) that can lead to burnout and ill-being (e.g., Goodger et al., 2007). While stressors can sometimes be detrimental for well-being and performance, they can also have an energizing effect for some individuals in certain circumstances. Indeed, division one American college coaches reported that stressors can enhance focus and motivation (Frey, 2007). It seems, therefore, that stressors can have either a detrimental or a positive effect on individuals' performance and well-being depending on how they are appraised. The situational properties that underpin stressors (e.g., novelty, ambiguity; see Didymus, 2017; Didymus & Fletcher, 2012, 2017a; Lazarus & Folkman, 1984) are likely to influence how stressors are appraised as well as their implications for well-being and performance.

Stressors that have been identified in the sport psychology literature span a range of issues and are frequently reported in a three-category system: competitive, organizational, and personal. Stressors that relate to each of these categories are known to be relevant to coaches and athletes but significantly less is known about the stressors that parents and officials encounter. There is also documented confusion about the best way(s) to categorize stressors (Norris et al., 2017). This confusion stems from the lack of conceptual clarity and exclusivity of the aforementioned three category system, which makes it difficult to clearly show whether a stressor is, for example, purely competitive, organizational, or personal. Nonetheless, this chapter focuses on the three categories of stressors that are most widely reported in the sport psychology literature while drawing attention to other categorization systems that exist (see e.g., Norris et al., 2017).

Competitive Stressors

Competitive stressors are demands associated directly with sport performance (e.g., pressure to perform; see Table 29.1). A noteworthy competitive stressor is an individual's own performance (e.g., Mellalieu et al., 2009). For athletes, this may relate to reaching athletic potential during training and competition while officials, for example, may be more concerned with making appropriate decisions in a timely manner. The performance of others is a pertinent competitive stressor for coaches (e.g., Didymus, 2017). This may be because coaches' function well when they believe they have control over a situation and, whilst they can prepare athletes for performance, they have little control once athletes are out to compete.

A noteworthy competitive stressor that is specific to officials is the lack of respect they often receive from players, coaches, and spectators (Anshel et al., 2013). This is partly due to the knowledge that winning teams rarely mention the quality of officiating while losing teams or players can attribute at least part of the loss to the referee. Officials also experience stressors related to the possible threats of physical or verbal harm (Anshel et al., 2013; Stewart et al., 2004). Within the sport parent literature, research examining stressors remains relatively limited. In the research that does exist, parents have indicated that the competitive stressors they experience include watching their children compete when they are upset or losing, which can be difficult because they feel for their child and share their disappointment (e.g., Harwood & Knight, 2009). Physical and nutritional preparation of their child, their child's psychological state before a competition, behavior of children during competition, gamesmanship, cheating, and other parents making negative remarks about their child are other competitive stressors that have been reported by sport parents (Harwood & Knight, 2009).

Organizational Stressors

Organizational stressors refer to demands that are related primarily and/or directly to the sport organization (e.g., the training environment, Fletcher et al., 2006). Scheduling is an organizational stressor that is experienced by athletes, coaches, officials, and parents alike. For student-athletes, schedule clashes between training and university have been reported as an important stressor (Cosh & Tully, 2014). These clashes may force athletes to prioritize either sport or education, and students may face academic failure for not attending courses or may be concerned that they have missed learning opportunities by being absent. Athletes also experience organizational stressors relating to relationships and interpersonal demands, athletic career, and coaching style, for example (e.g., Hayward et al., 2017; Mellalieu et al., 2009). The coach being perceived as both a stressor and a support mechanism for athletes is consistently reported in the literature with findings showing that coaching style is important (Cosh & Tully, 2014). Changes in verbal and non-verbal communication (e.g., negative change in tone, changes in coach behavior) can influence the training or match environment (Thelwell et al., 2017).

The sport environment is also a known stressor for coaches (e.g., Potts et al., 2019) because coaches strive to create settings that ensure players can perform at their best. Other commonly encountered organizational stressors for coaches include relationships with the board, finances, and team factors (e.g., Didymus, 2017; Frey, 2007). For officials, organizational stressors such as the presence of a supervisor or being evaluated by superiors are pertinent (Anshel & Weinberg, 1995; Anshel et al., 2013). For parents, organizational stressors can relate to lack of communication and information from the organization and or national governing body (NGB; Harwood et al., 2019). Parents can feel frustrated when attending international tournaments because travel and accommodation can be difficult to organize due to a lack of timely information (e.g., regarding competition timings, athlete schedules) from the organization (Harwood & Knight, 2009).

Personal Stressors

Personal stressors relate to demands associated with personal life outside of sport (e.g., maintaining significant relationships). A common and important stressor for all individuals in sport is work-life balance (see Table 29.1). Particularly at the higher levels of performance, it can be difficult to balance the needs of sport with family life (e.g., McKay et al., 2008). Relationships with members of their social support network can be a stressor for both athletes and coaches (e.g., McKay et al., 2008; Norris et al., 2020). For example, a lack of support from coaches, peers, significant others, family, and friends can leave the athlete or coach feeling isolated. For coaches and officials, the volume of traveling, preparation, and unsociable working hours involved with sport can result in conflict between sport and other demands (e.g., Stynes et al., 2017). Literature that has focused on parents' stressors has illustrated that the time commitment required for sport can impede occupational, social, and family life (Kirk et al., 1997). This can be problematic if parents' time and attention becomes centered on one child-athlete at the expense of other siblings (Harwood et al., 2019), and can be exasperated by the financial commitment often required to support sport participation.

Learning Exercise One

List and categorize (i.e., as a competitive, organizational, or personal) all of the stressors that you can remember experiencing in sport. It might be helpful to think of a particular event (e.g., an important fixture) or situation that you remember well.

Moderators and Mediators of Stressors

Researchers have often focused on factors that influence (i.e., moderators) or explain (i.e., mediators) the relationship between individuals and the stressors they experience. For example, competition and skill level can influence the types of stressors that athletes experience. Elite athletes tend to experience and recall more stressors associated with the sport organization than with competitive performance (Mellalieu et al., 2009) and higher skilled participants are thought to encounter more organizational stressors than lower skilled participants (Hanton et al., 2005). Athletes' mental toughness is thought to be associated with stress intensity, perceived control, coping, and coping effectiveness (Kaiseler et al., 2009) whilst the Big Five dimensions of personality (i.e., neuroticism, extraversion, agreeableness, conscientiousness, and openness to experience) have been shown to influence coping selection, coping effectiveness, stress intensity, and perceived control of stressors among athletes (Kaiseler et al., 2012a).

With reference to coaches, both men and women collegiate tennis coaches who reported more coaching stressors and were lower in the personality trait of hardiness experienced higher levels of perceived stress (Kelley et al., 1999). Further, women coaches were found to have a higher tendency than men to experience coaching stressors. In a different study with university coaches, the level of burnout (e.g., intensity, frequency, and duration of high-pressure situations) among men and women coaches did not significantly differ but male coaches did tend to burnout more frequently than women (Malinauskas et al., 2010). Thus, whilst women coaches may encounter more stressors, men may be more likely to experience burnout (for more discussion on burnout, see Chapter 28; Madigan, 2021). Demographic and contractual factors and job-related characteristics can influence coaches' perceptions of stress (Knight et al., 2013).

Photo by [football wife]() from [Pexels]()

Table 29.1
Examples of Competitive, Organizational, and Personal Stressors

Competitive	**Organizational**	**Personal**
Athlete coachability (C)	Administration (C)	Career development (A, C)
Attitude of players (C, O)	Athletic career (A)	Child education (P)
Behavior of opponents (P)	Coach (A, P)	Family issues (A)
Behavior of child (P)	Coaching style (A)	Finances (A, C, P)
Commitment of players (C)	Conflict with others (A, C)	Ineffective social support (A, C)
Confrontation/abuse (O)	Environment (A, C, P)	Interpersonal conflict (A, C, O)
Decision making (C, O)	Finances (A, C, P)	Sibling inequality and guilt (P)
Expectations from others (A, C, O)	Governing Body (A, C, P)	Time constraints (C, P)
Fitness concerns (A, O)	Lack of communication (A, C, P)	Work-life balance (A, C, O, P)
Fear of failure (O)	Lack of recognition (O)	
Fear of physical harm (O)	Lack of respect from organization (O)	
Injury (A, C, O, P)	Leadership (A, C)	
Interference from other parents (P)	Organization (A, C, P)	
Lack of respect from coaches, players, and spectators (O)	Overload (A, C)	
Lack of skills in helping child manage emotions (P)	Performance development (A, C, P)	
Managing own emotions (A, C, P)	Presence of media (A, C, O)	
Match environment (A, C, P)	Schedule (A, C, O, P)	
Match outcome (A, C, P)	Self-presentation (A, C)	
Performance of player (A, C, P)	Team factors (A, C)	
Performance of self (A, C, O)	Training environment (A, C, P)	
Poor preparation (A, C, P)	Travel (A, C, P)	
Poor refereeing (A, C, P)	Uncertainty around signing and release (P)	
Presence of supervisor (O)		
Pressure game (A, C, O)		
Professionalism (C)		
Recovery (P)		
Rivalry (A, P)		

Note. Letters in brackets correspond to the performer(s) who may experience the stressor. A = athlete, C = coach, O = official, P = parent. Stressors included in this table are collated from the literature discussed throughout the chapter. The table is not exhaustive.

Appraising

Now that the array of stressors that athletes, coaches, parents, and officials may experience has been explored, it is timely to consider how individuals may evaluate, or appraise, these stressors. Appraising is an intra-individual cognitive mechanism that bridges the gap between stressors and coping and lies at "the theoretical heart of psychological stress" (Lazarus, 1999, p. 61). When viewed from a transactional perspective, appraising is conceived as an evaluation of situations that is influenced by an individual's beliefs, values, and/or goals (Lazarus & Folkman, 1984). At this juncture it is worth briefly discussing the distinction between the terms *appraising* and *appraisal* (cf. Lazarus, 1999). Appraising refers to the act of making an evaluation whereas appraisal refers to the evaluative product of appraising. Unfortunately, this distinction is rarely made in the sport psychology literature where it is more commonplace to use *appraisal* as an umbrella term for all aspects of appraising and appraisal.

Transactional stress theory (Lazarus & Folkman, 1984) suggests that appraising involves two different but related processes: primary and secondary appraising. Although these two processes are interdependent, they are best discussed separately because of their distinct contents (Lazarus, 1999). Before moving to a deeper discussion of primary and secondary appraising, it is pertinent to note that the terms *primary* and *secondary* were not intended by Lazarusian works to infer that one process occurs before the other or that secondary appraising is of less importance. The qualifying adjectives (i.e., primary, secondary) are reflective of the contents of each type of appraising rather than of their importance or temporal occurrence during stress transactions (Lazarus, 1999). It has been noted elsewhere (e.g., Didymus & Jones, 2021) that it is not entirely clear when the two types of appraising occur during stress transactions; how they interact with each other; or whether any given appraisal is purely primary, secondary, or a combination of the two.

Primary Appraising

Primary appraising refers to evaluations of whether an encounter is relevant or significant to an individual's beliefs, values, goal commitments, and situational intentions. These types of appraisals are influenced by goal relevance, goal congruence, and type of ego involvement (Lazarus, 1999). Lazarus and Folkman (1984) suggested three types of primary appraising: *irrelevant*, *benign-positive*, and *stressful* (see Table 29.2). If an encounter is appraised as stressful, there are four possible transactional alternatives that may be experienced: *challenge*, *benefit*, *threat*, and *harm/loss* (Lazarus & Folkman, 1984; see Table 29.3). These transactional alternatives are important because they represent the essence of appraisals and have implications for individuals' health and well-being. For example, an individual who typically appraises stressful situations as a challenge is more likely to have higher morale, quality of functioning, and somatic health compared to an individual who typically experiences threat appraisals (Lazarus, 1999). Challenge appraisals are likely to increase quality of functioning, for example, because they are related to elevated confidence, reduced emotional strain, and an increased capability to draw on coping resources when managing stressful encounters.

Table 29.2
Types of Primary Appraising

Type of Primary Appraising	Operationalization
Irrelevant	The stressor is evaluated as having no implications for well-being (i.e., there is no potential for loss or gain).
Benign-positive	The stressor is evaluated as having the potential to enhance well-being.
Stressful	The stressor is evaluated as being significant for well-being (i.e., there is potential for loss or gain).

Table 29.3
Transactional Alternatives During Stressful Appraisals

Transactional Alternative	Operationalization
Challenge	When personal significance is in proportion to the available coping resources and gain may result from the situation.
Benefit	When the individual perceives that enhancement of their well-being has already occurred.
Threat	When personal significance outweighs available coping resources and damage to the individual's well-being is anticipated.
Harm/loss	When the individual perceives that damage to their well-being has already occurred.

Although threat and challenge appraisals differ in their cognitive (judgment of potential harm or loss versus mastery or gain) and affective (negative versus positive emotions) components, researchers (e.g., Lazarus, 1999; Lazarus & Folkman, 1984; Moore et al., 2019) have long asserted that they can occur simultaneously. Thus, transactional alternatives are not mutually exclusive but are discrete, related constructs that are essentially different forms of a common process (Lazarus, 1999; Lazarus & Folkman, 1984). The transactional alternatives experienced by an individual can evolve in any given encounter. For example, transference from threat to challenge may occur if the person-environment relationship changes for the better. Take the example of a lacrosse player who did not make her team's starting line-up but is subbed into play during the first quarter of the game. This athlete may have initially experienced a threat appraisal but, after joining the field of play, her appraisal may shift to one of challenge (i.e., she feels enthusiastic toward playing) or even benefit (i.e., enhancement of her well-being occurred when she was moved from the bench).

Sport psychology research on primary appraising has highlighted associations between this process and other psychological constructs. For example, relationships have been suggested between situational properties of stressors (e.g., duration, timing) and appraisals (e.g., Didymus & Fletcher, 2012) and between appraisals and anxiety (Quested et al., 2012). Threat appraisals have been shown to mediate relationships between satisfaction of basic psychological needs (i.e., autonomy, competence, relatedness) and anxiety intensity (Quested et al., 2012) and between trait anxiety and burnout (Gomes et al., 2017). Some sport psychology researchers (e.g., Nicholls et al., 2012) have suggested that primary appraisals consistently influence the coping strategies employed but doing so undermines the foundations of transactional conceptualizations of stress. This is because each stress transaction is context dependent and, thus, common or consistent appraisal-coping associations cannot be expected

(Didymus & Fletcher, 2014). Indeed, appraising, coping, and the associations between them are idiosyncratic and will change according to the person-environment relationship in any given situation.

Researchers have also examined the relationships between primary appraisals and outcomes of stress transactions. For example, threat and challenge appraisals have been shown to: partially mediate relationships between mastery-based goals and well-being (Adie et al., 2008), be linked with performance (Calmeiro et al., 2010; Didymus & Fletcher, 2017a, 2017b), mediate relationships between organizational stressors and psychological need experiences (Bartholomew et al., 2017), and influence affective responses (Rumbold et al., 2020). All of the aforementioned research has been conducted with athletes. Coaches, parents, and officials have received scant academic attention and the limited research that does exist is exploratory and largely descriptive in nature. One study (Thatcher, 2005) that has examined rugby league officials' primary appraisals found that the same stressor was perceived as a threat by some individuals and as a challenge by others. In a study that examined coaches' primary appraisals, Didymus (2017) found that Olympic and international level coaches predominantly experienced challenge and threat appraisals when evaluating stressors. The limited research that has focused on sport parents' appraisals highlights that stressors were predominantly appraised as harm or challenge, that harm appraisals increased negative emotions, and that challenge appraisals increased positive emotions (Harwood et al., 2019).

Learning Exercise Two

From the list of stressors that you created during exercise one, choose one or two that you can remember clearly. Write briefly about how you appraised the stressor(s). For example, did you perceive it to be a challenge, a benefit, a threat, or a harm/loss?

Secondary Appraising

If a stressful appraisal is made during primary appraising (i.e., one of challenge, benefit, threat, or harm/loss), the individual will engage in secondary appraising. Secondary appraising is defined as an evaluation of available coping resources in relation to the stressor encountered (Lazarus & Folkman, 1984). In short, this is when the individual decides what might and can be done to cope with a situation. Secondary appraising involves a complex evaluation of the degree of control that an individual has over the stressor, the coping resources that are available, the likelihood of various coping options effectively managing the situation, and the possibility that one can employ a particular strategy (or combination of) effectively (Lazarus & Folkman, 1984).

When compared to the literature on primary appraising, notably less work in sport has examined secondary appraising, perhaps because of the lack of accurate measures of such and the difficulty of assessing a process that often occurs below waking consciousness. Researchers have, however, reported a significant negative correlation between perceived stressor intensity and perceived stressor control (Nicholls et al., 2009), suggesting that some stressors may be perceived as more controllable than others (e.g., Reeves et al., 2011) and that challenge and threat appraisals are related to more and less controllability respectively (e.g., Nicholls et al., 2012; Williams & Cumming, 2012). Person factors (e.g., culture, personality, gender) have also been linked to perceptions of control (e.g., Kaiseler et al., 2012a, 2012b; Puente-Díaz & Anshel, 2005) and control has been shown to mediate the relationship between primary appraisals and basic psychological needs (Bartholomew et al., 2017). As was shown to be the case with sport psychology literature on primary appraising, research that focused on secondary appraising has been almost exclusively conducted with athletes. Thus, substantial gaps in understanding relating to how coaches, parents, and officials evaluate stressors are evident.

Coping

From a transactional perspective, coping is defined as "constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person" (Lazarus & Folkman, 1984, p. 141). Understanding coping in sport is important because it can have implications for athletes', coaches', parents', and officials' performance and or well-being (Gould et al., 2006; Kelley et al., 1999; Stewart et al., 2004). Historically, researchers have examined coping from either a trait- or state- perspective (see Krohne, 2001). The trait perspective suggests that individuals cope with stressors in a somewhat consistent manner (e.g., Voight, 2009). Research that adopts a state perspective, however, is more common in sport psychology (e.g., Olusoga et al., 2010), is more closely aligned to transactional conceptualizations of stress, and emphasizes the ways in which coping changes according to the context.

Researchers have explored coping in sport by identifying the specific strategies that individuals use and the wider categories of coping that differ according to the adaptive functions and or intentions of coping efforts (Didymus, 2017; Didymus & Fletcher, 2014, 2017a; Skinner & Zimmer-Gembeck, 2007). Lazarus and Folkman's (1984) categorizations of coping (i.e., problem-focused and emotion-focused) have informed much of the research in sport. However, this two-factor structure may oversimplify the roles of coping during stress transactions (Skinner et al., 2003). As a result, researchers have proposed additional categorizations relating to avoidance, approach, and appraisal (see Table 29.4). These five categories are the most widely used among sport psychology researchers to date (Norris et al., 2017).

Table 29.4
Categories of Coping, Definitions of Each Category, and Exemplar Coping Strategies

Category of Coping	Definition	Exemplar Coping Strategies
Problem-focused	"…change the troubled person-environment relationship by acting on the environment or oneself" (Lazarus, 1993, p. 238).	Problem-solving, information seeking
Emotion-focused	Change either the way the person-environment relationship is attended to or the meaning of the stressor for an individual (Lazarus, 1993).	Self-blame, venting, wishful thinking
Avoidance-focused	Actions and decisions to disengage oneself from a stressful situation (Anshel, 2001).	Blocking, distraction, behavioral avoidance
Approach-focused	Actions and decisions to attend to the stressor for the purpose of reducing or managing the unpleasant experience (Anshel, 2001).	Action planning, goal-setting
Appraisal-focused	Efforts to re-evaluate the stressor (e.g., Thelwell et al., 2010).	Looking into the future, keeping things in perspective

The majority of sport coping research has focused on the strategies that athletes and coaches use to manage stressors. Research in these areas that adopts a transactional perspective has highlighted that athletes and coaches use a plethora of strategies related to each of the aforementioned categories, and that these strategies are deployed either in isolation or in combination. The multitude of individual coping options that athletes and coaches use are too extensive to review in a chapter of this nature, but commonly reported coping strategies include planning, increased concentration, thought stopping, relaxation, minimization, venting of emotions, and self-talk (e.g., Didymus, 2017, Didymus & Fletcher, 2014; Potts et al., 2019). With reference to parents, some researchers (e.g., Lienhart et al., 2020) have reported that parents detach from sport and seek information to cope with stressors. Others (e.g., Gould et al., 2006) have shown that parents who do not cope effectively and, thus, experience strain, are more likely to exhibit negative behaviors (e.g., criticizing their child) and that these behaviors could have a detrimental impact on their child's performance (Lienhart et al., 2020). Research with officials has highlighted that these individuals may also detach from sport and or avoid situations to manage stressors in high-performance sport (Neil et al., 2013). Coping among all individuals in sport can be either adaptive (e.g., facilitative of performance; Nicholls et al., 2016) or maladaptive (e.g., facilitative of burnout; Madigan et al., 2020) and, as a result, can have implications for their own and others' performance and well-being.

The degree to which a coping strategy or combination of strategies is effective is tied to the perceived success of coping in alleviating stress. Effective coping contributes, for example, to sustained motivation (Crocker et al., 2015) and enhanced psychological well-being (Nicholls et al., 2016), while ineffective coping is associated with decreased performance satisfaction (Britton et al., 2019), burnout (Madigan et al., 2020), and lower levels of psychological well-being (Nicholls et al., 2016). Some researchers (e.g., Kaiseler et al., 2009) have suggested that certain strategies (problem-focused) may be more effective than others (emotion-focused or avoidance) when managing stressors in sport. However, from a transactional perspective, coping strategies are considered multi-dimensional and multi-functional and, thus, are neither inherently effective nor ineffective (Lazarus, 1999). For example, an athlete who avoids sharing information about an injury with her coach to maintain a place on the team may perceive this strategy as effective in the short term yet coping in this way may have detrimental consequences for her performance, health, and well-being. Levy et al. (2009) explored one coach's coping strategies and their perceived effectiveness over a 28-day period. They identified that problem-focused strategies were used more frequently than emotion-focused and avoidance-focused strategies. The effectiveness of such strategies declined as the volume of stressors increased. Nicholls et al. (2009) reported that athletes employed different coping strategies on training days when compared to competition days and that coping effectiveness was higher on competition days.

Learning Exercise Three

Write down some of the stressors that you have experienced in sport or life over the past seven days. How did you cope with these? List the coping strategies that you used and categorize them according to the five categories presented in Table 29.4. Rate each strategy on a scale of one to ten according to how effective it was in helping you to cope with the stressor(s) in question (1 = completely ineffective, 10 = completely effective).

Although the study of coping among individuals has offered considerable understanding of and practical implications for those operating in sport, researchers have suggested that significant others can influence an individual's coping resources and efforts (Neely et al., 2017; Staff et al., 2017a). This means that coping should be considered and researched from an interpersonal perspective to understand how people (e.g., athletes and coaches) may work together to manage the stressors they experience.

Interpersonal Coping

Researchers in general psychology have used various terms to refer to the interpersonal nature of coping (e.g., dyadic coping, Bodenmann, 1997; communal coping, Lyons et al., 1998). *Dyadic coping* generally refers to the process whereby "sport based dyads (e.g., coach-athlete) manage stressors together" (Staff et al., 2020, p. 2) whereas *communal coping* relates to the pooling of coping resources and the efforts of several individuals (e.g., teams or communities) to confront adversity (Lyons et al., 1998). It is important to understand how relationships (e.g., between athletes, coaches, and parents) influence coping because stress transactions usually involve at least one other person (Doron & Bourbousson, 2017; Staff et al., 2017a).

To facilitate understanding of coping among dyads and groups, researchers have proposed various theories of interpersonal coping. The Communal Coping Model (CCM; Lyons et al., 1998), for example, recognizes that two or more individuals can perceive a stressor as *our* problem, instead of *my* or *your* problem, to enhance individuals' well-being. Use of communal coping depends on three factors:

1. One individual in the group must hold a communal coping orientation (e.g., the belief that working together to manage a stressor is valuable).
2. At least one individual must communicate the stressor within the group.
3. Individuals must collaboratively construct coping strategies to try and reduce the consequences of a stressor.

Developed with and for athletes and coaches, Staff et al. (2020) proposed a theory of dyadic coping in coach-athlete relationships. This theory focuses on dyadic, rather than communal, coping and is underpinned by the systemic-transactional model of stress (Bodenmann, 1995). The theory states that, when athletes and coaches communicate a stressor within their dyad, each partner individually appraises that stressor and the available coping options. If they perceive the stressor to be meaningful to their goals, dyadic coping strategies are used to manage the stressor together. These strategies are then appraised individually by both members of the dyad, which leads to positive or negative outcomes (e.g., on performance and well-being) and influences the dyad's future coping efforts.

In addition to the recognition and application of general psychology theories of interpersonal coping in sport, the development of a sport specific theory of dyadic coping appears promising for the future of sport coping research. Indeed, this theory provides researchers with an initial understanding of the ways in which dyads and groups manage stressors together. They also pave the way for researchers to move beyond a focus on coping at an individual level, to develop a more sophisticated understanding of how coping occurs between people, and, importantly, to explore the influence of interpersonal coping on well-being and performance.

Implications of Psychological Stress for Well-being and Performance

This chapter so far has highlighted how individuals experience, appraise, and cope with stressors. In addition to considering these components of stress transactions, it is important to explore the implications of psychological stress for well-being and performance. Indeed, well-being should be of paramount importance to researchers, organizations, and NGBs because of the consequences that impaired well-being has for individuals, particularly for his or her health (Steptoe et al., 2015). From a sport policy and high-performance management perspective, it is important to put well-being at the heart of work with performers. A number of organizations have indeed done so. For example, The English Institute of Sport (2017), High Performance Sport New Zealand (2019), and the Australian Institute of Sport (2019) have each highlighted athlete well-being as a key priority area. The Australian

Institute of Sport suggests that "a successful high-performance culture includes athletes finding the right balance between well-being, engagement in activities outside of training and competition, and the requirements of elite sport" (2019, n.p.). A notable shift in the culture of high-performance sport is created when NGBs put well-being high on their list of priorities and when all members of the sport system truly buy into the prioritization of performer well-being.

Defining well-being is a notable challenge. Indeed, there is little consensus among the academic community about how best to do so. From a positive psychology standpoint, well-being can be defined as "a broad category of phenomena that includes people's emotional responses, domain satisfactions, and global judgements of life satisfaction" (Diener et al., 1999, p. 277). Aside from striving to define what well-being is, researchers (e.g., Dodge et al., 2012) have focused on discovering and exploring various dimensions of well-being. For example, in seminal research, Ryff (1989) and Ryff and Keyes (1995) proposed a multidimensional conceptualization that captures the depth and breadth of well-being and focuses on optimal psychological functioning (see Table 29.5).

Table 29.5
Characteristics of Well-Being and Their Definitions

Characteristic of Well-being	Definition
Autonomy	An individual's perceptions of control and the independence and regulation of his or her thoughts or behaviors.
Environmental mastery	An individual's ability to choose or create environments that are suited to them, control an array of complex external activities, and make effective use of surrounding opportunities.
Personal growth	An individual's emphasis on continual growth and development whilst remaining open to new experiences and challenges.
Relationships with others	An individual's ability to have strong feelings of empathy and affection towards others, to develop deep friendships, and to warm to and care for others.
Purpose in life	An individual's goals, ambitions, and sense of direction that contribute to a meaningful life.
Self-acceptance	An individual's positive attitude towards the self, understanding and acceptance of multiple aspects of the self (both positive and negative), and positivity about his or her past life.

In more recent work, Robertson and Cooper (2011) referred to two dimensions of well-being: hedonia and eudemonia. Hedonia relates to an individual's happiness, subjective well-being, and positive emotions whereas eudemonia refers to purposeful aspects of life such as self-acceptance, personal growth, and environmental mastery. Aligned with this two-factor conceptualization, Diener (2000) likened well-being to life satisfaction (global judgements on one's life), low levels of negative affect (experiencing few unpleasant emotions and moods), high levels of positive affect (experiencing many pleasant emotions and moods), and satisfaction with important domains (e.g., work satisfaction).

Learning Exercise Four

Think about and make notes on a recent competition or training session. Using the information in Table 29.5, write down the parts of that experience that enhanced or reduced your well-being. For example, did you have opportunities to develop your skills (i.e., personal growth) or maintain relationships with others?

Sport psychology researchers have typically focused on the study of well-being among athletes. The findings of this research highlight that impaired well-being can have a detrimental impact on performance (e.g., Stenling et al., 2015). It is also evident that policy makers, program managers, and NGBs should develop an athlete-centered approach to promote and protect well-being (e.g., Kihl et al., 2007). This requires consideration of athletes' rights and developmental needs, rather than simply focusing on athletic performance and achievements (Wicker et al., 2020). By adopting an athlete-centered approach, well-being and health can be enhanced (Kerr et al., 2017), which can in turn encourage better performance (Kihl et al., 2007).

With reference to coaches, their experiences of stress can lead to emotional exhaustion, depersonalization, cynicism, and a reduced sense of personal accomplishment (Kelley et al., 1999). Each of these factors can contribute to burnout (e.g., Goodger et al., 2007), which can have negative ramifications for coaches' well-being and performance. To prevent negative consequences of stress and facilitate coach well-being, researchers have highlighted three conditions that are needed (see, for a review, Norris et al., 2017): basic psychological needs satisfaction, lack of basic psychological needs thwarting, and self-determined motivation (e.g., Alcaraz et al., 2015; Stebbings et al., 2012). Furthermore, greater job security, opportunities for professional development, and lower work-life conflict have been linked with improved well-being among coaches (Stebbings et al., 2012).

As alluded to in previous sections of this chapter, officials are performers in their own right and their contribution is essential if sport, particularly that of a competitive nature, is to operate in a fair manner. Despite the important role that officials play, very few studies have explored well-being among this population. In one of the only studies in this area, Dell et al. (2016) reported that receiving abuse within a game was one of the main reasons why football referees considered leaving the profession. This was due to the impact of abuse on officials' well-being and, consequently, their motivation to remain engaged.

The fundamental role that parents play in children's engagement with sport can compromise their own health and well-being, particularly when extensive commitments are required to support their child's journey through sport (Misener, 2020). Parents may, however, benefit in some ways from the social connectedness that sport environments offer (Misener, 2020). Research on sport parents' well-being is limited despite the important role they play, particularly in the youth sport experience (Inoue et al., 2020). It is important that practitioners work with parents (Harwood et al., 2019) to offer support, to indirectly support athletes and coaches, and to foster well-being among all parties.

There are a number of ways in which a performer's well-being can be enhanced. The following is not an exhaustive list but provides insight to some of the approaches that can be used to develop well-being among those who are involved with sport:

- Goal setting to facilitate long-term goal attainment (Smith et al., 2011).
- Resilience building to facilitate management of a variety of stressors (Fletcher & Sakar, 2012).

- Enhancing a sense of role and position security among athletes and coaches (Stebbings et al., 2012).
- Building self-determined motivation (e.g., Alcaraz et al., 2015).
- Building relationships to develop a strong social support network (Norris et al., 2020).

Applied Implications

The content presented in this chapter highlights a number of implications for practitioners, researchers, and sport stakeholders (e.g., athletes, coaches, officials, parents, NGBs). For example, while stressors are an important element of stress transactions, it is likely that appraising and coping have more bearing on well-being and performance. Indeed, different appraisals (e.g., threat and challenge) have varied implications for performance and well-being and coping can be either adaptive or maladaptive. Thus, stress management interventions that focus on the ways in which individuals perceive demands (e.g., via re-appraisal training) and or on the optimization of coping efforts (e.g., via psychoeducation or simulation training) should be prioritized during applied work. Relationships are important during stress transactions and can act as either a buffer or exasperator of stress. This means that practitioners should work with multiple stakeholders (e.g., coaches, athletes, parents) when aiming to optimize stress transactions. Better understanding of the interpersonal nature of stress will enable the design and delivery of interventions that support performance, personal development, well-being, and relationship satisfaction among various members of sport communities. It is clear that performance should not be the sole or central focus of NGB or sport organization policy. Rather, performer and stakeholder well-being should be at the fore to ensure that the benefits of sport are realized. Policy makers, program managers, and NGBs will need to take a person-centered approach (i.e., by having a genuine interest in and by listening to all who are involved in sport) to achieve a focus on well-being for those who work at and support the front lines of sport.

Future Research

While noteworthy understanding of various components, mediators, and moderators of stress transactions has been developed since the inception of research on stress in sport, many opportunities for future research still exist. For example, research with parents and officials is limited in many areas, including that on stressors, appraising, coping, and well-being. A similar point can be made about the literature with coaches, which remains underdeveloped when compared to that with athletes. Given that appraising lies at the heart of stress transactions and has important ramifications for coping, well-being, and performance, considerable further research is needed in this area. For example, it is not yet clear when primary and secondary appraising occur during stress transactions; how they interact with each other; or whether any given appraisal is purely primary, secondary, or a combination of the two. Further work on secondary appraising is needed with all stakeholders in sport. Explorations of the positive and negative outcomes of interpersonal coping are warranted, as are considerations of how best to capitalize on both individual and interpersonal coping resources. Examining the links between stress and well-being among athletes, coaches, officials, and parents will contribute to understanding that has relevance both within and outside of sport, and will offer insight to the benefits of sport for individuals and society. The majority of the aforementioned priorities for future research could be facilitated by more robust sport-specific measures of stress and well-being. Innovative qualitative approaches (e.g., diary methods, social network analysis, think aloud protocols) will be needed to develop depth of knowledge and understanding.

Conclusions

This chapter has offered a brief overview of theoretical perspectives of stress and has introduced stressors, appraising, coping, and well-being, and their links with performance. Athletes, coaches, and officials have each been considered performers in their own right and parents are regarded throughout the chapter as key stakeholders in sport. The chapter reports a myriad of stressors that can be experienced and highlights some of the commonalities and differences between stressors encountered by athletes, coaches, officials, and parents. The helpful or unhelpful implications that stress has for well-being and performance is likely to depend on how individuals appraise and cope with stressors. All elements of stress transactions should be considered from an interpersonal perspective that recognizes the complex networks of people who are involved in sport.

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Chapter 30
Organizational Stress in Competitive Sport

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Chapter Overview

Organizational stress continues to generate interest and research attention in sport psychology. This is largely because anecdotal and research evidence continues to highlight that the organizational environment in which sport performers, coaches, sport scientists, and other personnel operate is a breeding ground for experiencing stress. Although some individuals may interpret, respond, and cope well with the varying demands that they encounter in their sport teams and organizations, for others, this may have negative outcomes for their sport relationships, well-being, performance, and desire to continue participating in sport. For these reasons, research continues to be conducted to understand the concept of organizational stress in sport, and how it may be best managed to support the well-being and performance of individuals. This chapter will outline key concepts and theory relating to the concept of organizational stress. In addition, a summary of the origins of organizational stress in sport along with discussions of contemporary research in this area will be provided. Finally, a series of practical implications and future research recommendations will be outlined.

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The Concept of Organizational Stress

The topic of organizational stress in sport has continued to receive interest and increased attention since its induction to sport psychology research almost 20 years ago (Woodman & Hardy, 2001). Organizational stress was first introduced as “work-related social psychological stress” (Shirom, 1982, p. 21). However, most sport psychology research in this area now employs the following definition, which follows Richard Lazarus’ (1966) conceptualization of stress: An ongoing transaction between an individual and the environmental demands associated primarily and directly with the organization within which he or she is operating (Fletcher et al., 2006, p. 329). This definition is often employed to accommodate the ambiguity surrounding the landscape of professional and amateur sport, whereby sport performers and personnel may or may not be paid whilst operating within sport organizations. This ambiguity leaves Shirom’s (1982) aforementioned definition of work-related stress less appropriate for competitive sport contexts. However, the main reason for the adoption of Fletcher and colleagues’ (2006) definition is the theoretical approach that has commonly underpinned organizational stress in sport research to date. The following section outlines the cognitive-motivational-relational theory of stress (Lazarus, 1991a) which has been mainly adopted in understanding organizational stress in competitive sport.

The Cognitive-Motivational-Relational Theory of Stress

The cognitive-motivational-relational theory (CMRT) of stress emphasizes understanding the dynamism of the psychological processes of cognitive appraisal and coping that underpin a stressful encounter (Lazarus, 1966, 1991a, 1999; Lazarus & Folkman, 1984). Inherent to this transactional based theory of stress is the view that stress is an ongoing transaction between environmental demands and a person’s resources, with strain resulting from an imbalance between the two (Lazarus & Folkman, 1984). The CMRT contends several antecedents, processes, and outcomes that encapsulate stress in the organizational environment (Cooper et al., 2001; Lazarus, 1991b). Firstly, antecedents refer to the environmental conditions of a transactional encounter and a person’s characteristics that interact to influence cognitive appraisals of the person-environment relationship (see Chapter 29; Didymus et al., 2021). According to Lazarus (1999), environmental conditions may include demands (i.e., stressors), constraints, opportunities, or the culture in which an individual functions. In addition, imminence, uncertainty, and duration are some of the properties of stressors that provide information about what is being encountered. The main personal characteristics that interact with environmental conditions to influence appraisals are a person’s goals and goal hierarchies, beliefs about the self and the world, and personal resources (i.e., those that are used to cope).

Lazarus’ CMRT asserts that stress is the result of three interacting processes: appraising of stressors, affective responses, and coping (Lazarus, 1999). Cognitive appraisals are the evaluations a person makes in terms of the significance for one’s affective well-being and goals (primary appraisal) and the evaluation of coping options (secondary appraisal). According to Lazarus and Folkman (1984) and Lazarus (1999), if events are perceived to be significant for well-being and goals, they will be appraised as a threat, harm/loss, challenge, or benefit. Threat appraisals refer to the potential for damage, harm/loss appraisals represent damage that has already occurred, challenge appraisals refer to the potential for progressing towards one’s goals, and benefit appraisals refer to gain that has already occurred (Lazarus, 1991a). In secondary appraisals, a person evaluates coping resources and options by questioning what they can do to cope. In so far that primary and secondary appraisals are believed to work in combination, the appraisals are hypothesized to amalgamate in the concept of core relational themes (i.e., an explanatory statement of what a person is thinking) for experiencing different emotions (see Chapter 29; Didymus et al., 2021). In this way, immediate emotional responses can be seen as short-term outcomes to primary and secondary appraisals, through action tendencies that can motivate coping efforts. These coping efforts may serve the function of regulating distressing emotions (emotion-focused coping) or doing something proactive to change the situation causing distress (problem-focused coping). The degree to which an individual is able to appraise and cope with their relationship with their (organizational) environment may influence the type of short-term (e.g., physiological changes, affect) or long-term outcomes of stress (e.g., physical and mental health, burnout, performance; Lazarus, 1991a).

In comparing the CMRT to other approaches used to understand organizational stress (e.g., stimulus-response approaches; Seyle, 1956), the main distinction lies in the former's emphasis on understanding the adaptive and ongoing flow of events and processes over time, the varied meaning construed by individuals, their adjustment to different antecedents, and their ability to cope with their personal transaction with the environment (Cooper et al., 2001; Lazarus, 1991b). To date, the CMRT and associated transactional approaches to stress (e.g., transactional stress theory, Lazarus & Folkman, 1984) are the most widely employed approaches for underpinning organizational stress in sport psychology, and therefore inform the majority of studies that are reviewed in this chapter.

Transactional Based Definitions of Stress-Related Terminology

Before reviewing the origins and development of organizational stress research in competitive sport, it is important to define various organizational stress-related concepts (see Table 30.1):

Table 30.1
Definitions of Organizational*-Stress Related Concepts*

	Definition	Citation
Organizational stress	An ongoing transaction between an individual and the environmental demands associated primarily and directly with the organization within which he or she is operating.	Fletcher et al. (2006, p. 329)
Organizational stressors	Environmental demands associated primarily and directly with the organization within which an individual is operating.	
Organizational strain	An individual's negative physiological, physical, and behavioral responses to organizational stressors.	
Cognitive appraisals	An evaluation of the significance of what is happening in the environment in relation to one's well-being.	Lazarus (1991, p. 122)
Coping	Constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person.	Lazarus and Folkman (1984, p. 141)

A Review of Organizational Stress in Sport Performers

Research exploring sport performers' experiences of organizational stress first came about due to a series of observations that were made from studies (e.g., Gould et al., 1993; Scanlan et al., 1991) that attempted to identify sources of stress (i.e., stressors) in competition environments (Woodman & Hardy, 2001). These qualitative studies unearthed a range of stressors that appeared to originate from the sport organizations in which sport performers trained and operated. These stressors included team selection, financial costs, training demands, travel, coaching/manager leadership and communication issues, refereeing decisions, tournament organization, negative behaviors of coaches, relationships and experiences outside of sport, and negative interpersonal relationships. The discovery of these stressors lent support for the suggestion that the social and organizational environment in which sport performers function imposes numerous demands, for which there was limited empirical evidence relating to how they may be best managed (Fletcher et al., 2006). These observations stimulated a program of qualitative research that aimed to explore sport performers' experiences of organizational stress and to identify dimensions of organizational stressors.

Organizational Stressors

The Qualitative Movement

Woodman and Hardy (2001) were the first researchers to directly explore elite sport performers' experience of organizational stressors in sport. Since previous research studies had identified sources of stress relating to team environments and relationships (e.g., Gould et al., 1993; Scanlan et al., 1991), Woodman and Hardy (2001) developed a framework of organizational stressors that was based on Albert Carron's (1982) model of group cohesion. Based on interviews with 15 elite athletes from the United Kingdom (U.K.), the framework highlighted organizational stressors related to four main areas: environmental issues, personal issues, leadership issues, and team issues. The main environmental issues that were identified included selection, the training environment, and finances. The main personal issues related to nutrition, injury, and goals and expectations whilst leadership issues most often included coaches and coaching styles. Finally, the main team issues that were identified included team atmosphere, support network, and roles and communication. Although this organizational stressor framework was later evaluated as focusing predominantly on group and relationship-related stressors to the potential neglect of other organizational factors, research using this framework with athletes from a range of sports provided support for the majority of stressor themes that had been identified (e.g., Fletcher & Hanton, 2003; Hanton et al., 2005). These studies did, however, identify some additional organizational stressors not previously reported, including those relating to accommodation, travel, and safety. These additional themes suggested that a new stressor framework may be warranted that focuses less exclusively on interpersonal relationships. In doing so, it was suggested that this may reveal greater insight in to a wider range of organizational issues that sport performers encounter (Fletcher & Hanton, 2003).

Based on this critique of Woodman and Hardy's (2001) framework, a new conceptual framework was developed by Fletcher and colleagues (Fletcher & Hanton, 2003; Fletcher et al., 2006, 2012a), that closely aligned to research advancements in the field of organizational psychology (Cooper et al., 2001). In a series of qualitative studies that were conducted with elite sport performers (Fletcher & Hanton, 2003; Hanton et al., 2005; Fletcher et al., 2012a), support was provided for identifying organizational stressors as related to one of the following five general dimensions: factors intrinsic to the sport, roles in the sport organization, sport relationships and interpersonal demands, athletic career and performance development issues, and the organizational structure and climate of the sport. Table 30.2 illustrates these general dimensions along with some examples of specific organizational stressors that have been reported in empirical research.

Table 30.2
Summary of the Conceptual Framework of Organizational Stressors Among Sport Performers (Fletcher & Hanton, 2003; Fletcher et al., 2006, 2012a)

General Dimension	Higher-Order Stressors
Factors intrinsic to the sport	Training and competition environment, training and competition load, training and competition hours, travel and accommodation arrangements, nutritional issues, technological change, exposure to hazards and risk of injury.
Roles in the sport organization	Role ambiguity, role conflict, role overload, responsibility.
Sport relationships and interpersonal demands	Personality type, leadership style, lack of social support.
Athletic career and performance development issues	Position insecurity, income and funding, career and performance advancement.
Organizational structure and climate of the sport	Cultural and political environment, coaching and/or management style, lack of participation in the decision-making process, inadequate communication channels, no sense of belonging.

What is clear from this conceptual framework is that there are a diverse range of organizational demands that sport performers can encounter. Indeed, this has been evidenced in several sports that have been sampled since the publication of this framework. Similar critique to that of Woodman and Hardy's (2001) framework was, however, evident. The general dimensions developed by Fletcher and colleagues were directly applied from Cooper et al.'s (2001) organizational psychology framework with working populations. A further critique was that the framework developed by Fletcher and colleagues (Fletcher & Hanton, 2003; Fletcher et al., 2006, 2012a) was originally meant for illustrating organizational stressors encountered by elite sport performers only, despite some studies providing support for the framework in non-elite athlete populations (Rumbold et al., 2008; Fletcher et al., 2012a). Subsequently, it was argued that a framework needed to be developed to provide a comprehensive classification of organizational stressors encountered by a wider range of athlete populations.

In addressing these limitations, Arnold and Fletcher (2012) conducted a meta-synthesis of 34 qualitative studies that had each been conducted to identify organizational stressors among sport performers. From this synthesis of literature, the organizational stressors were inductively grouped into the following four general dimensions: leadership and personnel issues, cultural and team issues, logistical and environmental issues, and performance and personal issues (see Table 30.3).

Table 30.3
Summary of Arnold and Fletcher's (2012) Taxonomic Classification of Organizational Stressors

General Dimension	Higher-Order Stressors
Leadership and personnel issues	The coach's behaviors and interactions, the coach's personality and attitudes, external expectations, support staff, sports officials, spectators, media, performance feedback, governing body.
Cultural and team issues	Teammates' behaviors and interactions, communication, team atmosphere and support, teammates' personality and attitudes, roles, cultural norms, goals.
Logistical and environmental issues	Facilities and equipment, selection, competition format, structure of training, weather conditions, travel, accommodation, rules and regulations, distractions, physical safety, technology.
Performance and personal issues	Injuries, finances, diet and hydration, career transitions.

There were a number of noteworthy strengths of this meta-synthesis. First, by incorporating all of the known published and unpublished studies that had been conducted up until 2011, it was possible to identify a greater commonality of organizational stressors encountered across sports, competitive standards, ages, sex, and nationalities. Second, the synthesis provides the most comprehensive classification of organizational stressors identified to date. Third, contemporary qualitative studies continue to provide support for this framework, despite often identifying new and unique stressors in specific team and organizational contexts that are beyond typical comparison (e.g., Arnold et al., 2017a; Didymus & Fletcher, 2012, 2017a; Rumbold et al., 2018; Smith et al., 2017; Whittingham et al., 2020). The findings of this meta-synthesis were seminal in initiating the development and validation of the Organizational Stressor Indicator for Sport Performers (OSI-SP; Arnold et al., 2013). In doing so, this questionnaire facilitated quantitative research that examined organizational stressors in sport performers.

Learning Exercise One

Tables 30.2 and 30.3 illustrate two frameworks by which organizational stressors can be classified in competitive sport performers. As a comparison, what are some of the common stressors that both frameworks share? Can you spot any themes from one stressor framework that don't appear to be highlighted in the other framework? Why do you think this might be?

The Quantitative Movement

A key argument that led to the development of a questionnaire designed to measure organizational stressors was the notion that it is unlikely that all organizational stressors will lead to negative outcomes for an athlete's well-being and performance. It was therefore argued that researchers need to demonstrate which organizational stressors are related to which outcomes and in what ways. One way to address this challenge was through the examination of the situational aspects of stressors; namely the degree to which each organizational stressor encountered by athletes varies according to their frequency (i.e., how often the organizational stressors occur), their intensity (i.e., how demanding the stressors are for the individual), and their duration (i.e., how long the stressors occur for). The OSI-SP (Arnold et al., 2013) was developed and evaluated to assess these three dimensions of organizational stressors in five different subscales (see Table 30.4). The 23-item questionnaire measures the organizational stressors that sport performers have encountered as part of their participation in competitive sport over the past month (e.g., "In the past month, I have experienced pressure associated with …"). For each of the 23 items, athletes are required to complete three rating scales with options ranging from 0 to 5. The scales include frequency ("how often did this pressure place a demand on you?"; 0 = *never*, 5 = *always*), intensity ("how demanding was this pressure?"; 0 = *no demand*, 5 = *very high*), and duration ("how long did this pressure place a demand on you?"; 0 = *no time*, 5 = *a very long time*).

Table 30.4
Subscales of the 23-item Organizational Stressor Indicator for Sport Performers (OSI-SP; Arnold et al., 2013)

Subscale	Subscale Description	Example Questionnaire Item
Goals and development (6 items)	An individual's feedback, progression, and transitions within their sport.	... *the development of my sporting career"*
Logistics and operations (9 items)	The arrangement and implementation of procedures for training and / or competition.	... *travelling to or from training or competitions"*
Team and culture (4 items)	The attitudes and behavior within the team.	... *the atmosphere surrounding my team"*
Coaching (2 items)	The coach's personality and interpersonal skills.	... *my coach's personality"*
Selection (2 items)	How sport performers are chosen for teams and / or competitions.	... *how my team is selected"*

Demographic differences in athletes' experiences of organizational stressors have been identified using the OSI-SP. For example, in one of the first cross-sectional studies using the OSI-SP (Arnold et al., 2015), demographic differences were identified in a large sample (N = 1277) of sport performers of varying ages, sports, sex, and competitive standards. These findings demonstrated sex differences in the frequency, intensity, and duration of different organizational stressor subscales. Specifically, males rated themselves higher than females in experiencing logistical and operational stressors for all ratings of frequency, intensity, and duration. In comparison, females rated themselves higher on selection issues than males for all ratings.

Differences in subscale stressors were also observed for individual versus team sport performers. Team sport performers rated themselves higher than individual sport performers for three of the five stressor subscales (logistics and operations, team and culture, selection; for all ratings). A series of other findings has demonstrated that national and international sport performers rated themselves higher in all five subscales in comparison to athletes of different competitive standards (Arnold et al., 2013). These findings were important from an applied perspective as they highlighted that a ”one size fits all” approach to developing stress management interventions would not make sense since the experience of organizational stressors may vary based on personal and sporting demographics. These demographic differences in experiencing stressors could lend support to the suggestion that not all stressors will lead to negative outcomes. To further explore this idea, studies are, in recent years, very much focused on identifying statistical relationships between organizational stressor subscales (and ratings of frequency, intensity, and duration) in relation to various stress components (e.g., Arnold et al., 2017, 2018; Bartholomew et al., 2017), physical and mental well-being (e.g., Larner et al., 2017; Simms et al., 2020), and performance outcomes (e.g., Roberts et al., 2019; Tamminen et al., 2018).

These quantitative studies suggest that the situational dimensions of frequency, intensity, and duration are not consistently applied across studies. For example, some studies report statistical relationships between specific stressor subscales/dimensions (e.g., team and culture frequency) and outcomes (Arnold et al., 2017b), whilst other studies focus purely on reporting the findings of specific situational dimensions, such as frequency for each subscale (e.g., Tamminen et al., 2018), or even totaling the frequency for all organizational stressor items regardless of subscale (e.g., Larner et al., 2017). This makes it difficult to tackle the original purpose of developing the OSI-SP, which was to examine which organizational stressors are related to which outcomes and in what ways. Whilst most of the aforementioned research has been conducted using cross-sectional research designs, contemporary studies in the area are beginning to examine organizational stressors temporally (Roberts et al., 2019; Tamminen et al., 2018) and longitudinally (Kristiansen et al., 2019; Larner et al., 2016; Simms et al., 2020).

The qualitative studies on organizational stressors have identified a wealth of common demands that are encountered by athletes who participate in a diverse range of sports. In addition, the quantitative studies in this area are continuing to show the ways in which organizational stressors may be related to different well-being and performance outcomes. However, a fundamental limitation in exclusively focusing on the main effect of organizational stressors for well-being alone is the degree to which individuals might appraise, respond to, and cope with their organizational environment differently. These mediating processes, as outlined by theorist Lazarus (1991, 1999), require greater attention. Sport psychology researchers are now beginning to acknowledge the importance of cognitive appraisals, and emotional and coping processes in mediating the potential influence of organizational stressors on various well-being and performance outcomes for sport performers. The following section outlines some of the research conducted to date that has explored sport performers’ cognitive appraisals of, and emotional and coping responses to, organizational stressors as a means of more fully applying Lazarus’ (1991) transactional conceptualization of organizational stress.

Appraisals and Emotional and Coping Responses to Organizational Stressors

Appraisals

In the past decade, a series of qualitative studies have sought to explore how competitive sport performers cognitively appraise the organizational stressors that they encounter. For example, Neil et al. (2011) indicated that athletes respond negatively to organizational-related demands, but some athletes are able to interpret their emotional responses to stressors in a positive way for their performance. Although this study was able to distinguish between positive and negative appraisals of organizational stressors, cognitive evaluations were not examined in great depth so as to understand the different primary appraisals originally proposed by Lazarus and Folkman’s (1984) transactional stress theory. To address this limitation, Hanton et al. (2012) used a six-week stress log with four international sport performers who were competing in different sports. Their findings suggested that most athletes appraised organizational stressors as threatening or harmful, with little perceived control.

In one of the most detailed examinations of sport performers' appraisals of organizational stressors, Didymus and Fletcher (2012) conducted a 28-day diary study with 13 national standard U.K. swimmers. Whilst the qualitative analysis provided support for previous studies in highlighting that many swimmers appraised organizational stressors as a threat or with a sense of harm/loss, the authors were also able to highlight that the situational property of imminence (i.e., how much time there is before an event occurs) was linked to the greatest number of threat appraisals, and that swimmers did also experience challenge appraisals. Other qualitative studies have provided examples of how threat, harm, challenge, and benefit appraisals may be linked to specific organizational stressors. For example, Rumbold et al. (2018) conducted a series of interviews and focus groups with a professional rugby union academy team (*N* = 40). Players in this study predominantly viewed a range of organizational stressors as threatening and harmful, including: making the transition from amateur to professional rugby, negative feedback, asking for advice, job uncertainty, team hierarchies, unfriendly teammates, and competition for playing positions. However, the findings also illustrated how some players appraised the professional academy team set up that they were operating in as beneficial. Moreover, some players appraised getting injured as a challenge to work on aspects of their conditioning whilst unable to play.

Whilst currently relatively limited, there is some quantitative evidence to demonstrate how organizational stressors may be linked to specific appraisals. In a study of 315 high-level British athletes who completed the OSI-SP (Arnold et al., 2013), Bartholomew et al. (2017) found that the frequency of goals and development (positively), logistics and operations (positively), and team and culture (negatively) subscales were all significantly related to challenge appraisals. In addition, the frequency of team and culture and coaching stressors were positive predictors of athletes' threat appraisals. Significant relationships with threat and challenge appraisals were also observed in regard to the intensity and duration of some of the organizational stressor subscales. However, this study could be critiqued because it only measured general primary and secondary appraisals and, therefore, the athletes participating may only have been rating how they generally appraise demands as a threat, challenge, or harm/loss, rather than how they appraise each specific organizational stressor in these ways.

Emotional Responses

To date, emotional responses to organizational stressors have been explored in the sport psychology literature but to a lesser extent to that which has focused on athletes' appraisals. The collective findings of a series of qualitative studies sampling a range of team sports suggest that athletes can respond in a variety of ways to specific organizational stressors. These emotional responses include: anger, anxiety, boredom, disappointment, duress, excitement, fatigue, guilt, happiness, hope, jealousy, relief, reproach, resentment, sadness, and shock (Fletcher et al., 2012b; Rumbold et al., 2018). Using a cross-sectional design with 414 sport performers across varying sports, Arnold et al. (2017b) found that no organizational stressors as measured by the OSI-SP were related to positive affect. However, the intensity and duration of goals and development stressors, and the intensity and frequency of team and culture stressors were found to be significantly associated with sport performers' negative affective (i.e., emotional) states. Perhaps surprisingly, no significant relationships were identified for three of the five OSI-SP dimensions (logistics and operations, coaching, and selection) and negative affect. One of the reasons for this could be that cognitive appraisals are likely to be a stronger predictor of affective responses than organizational stressors themselves.

In a longitudinally focused quantitative daily diary study, Rumbold et al. (2020) provided support for the argument that cognitive appraisals may be strong predictors of affective responses to organizational issues, irrespective of the organizational issues encountered. Specifically, this detailed study highlighted that daily threat and harm appraisals of organizational stressors over a five-week period of training and competition were significantly related to daily negative affective responses to organizational events. Similarly, daily challenge (positively) and harm appraisals (negatively) were strongly related to daily positive affective responses to organizational events. This study also provided evidence to suggest that stable threat, challenge, and harm appraisals over the five-week period were strong predictors of daily fluctuations in positive and negative affective responses to organizational events within a professional rugby union academy team. These findings offer the first quantitative insight into how daily changes in cognitive appraisals of organizational events in professional sport environments may be linked to daily changes in affective responses, and, how these relationships are still significant when controlling for a range of personal (e.g., personality) and situational factors (e.g., playing position, key decision makers in the team), that could potentially reduce the influence of appraisals on affective responses.

Coping

Researchers have investigated coping functions and strategies in relation to organizational stressors (Didymus & Fletcher, 2017a; Kristiansen et al., 2012; Kristiansen & Roberts, 2010; Rumbold et al., 2018) and appraisals (Didymus & Fletcher, 2014, 2017a; Rumbold et al., 2020) in sport performers from club level to international elite and professional competitive standards. In a study by Kristiansen and Roberts (2010), it was reported that elite Norwegian youth athletes tended to use different types of social support resources (e.g., tangible, information, emotional) to manage organizational stressors encountered at a major European youth competition. Similarly, in a study with U.K. based swimmers, Didymus and Fletcher (2014) reported that swimmers employed a range of coping strategies following each type of appraisal of organizational stressors. In a more recent study, Didymus and Fletcher (2017a) investigated transactional pathways between organizational stressors and their underpinning situational properties, appraisals, coping, and perceived coping effectiveness among high-level field hockey players. Interview data that were analyzed using content analysis highlighted a variety of organizational stressors relating to leadership and personnel issues, cultural and team issues, logistical and environmental issues, and performance and personal issues. These stressors were underpinned by the situational properties of ambiguity, duration, event uncertainty, novelty, and timing in relation to life cycle. The hockey players appraised the stressors either as a challenge, a threat, or with a sense of harm/loss, and most commonly used problem-solving coping to manage the negative outcomes of them. Support for some of the aforementioned findings can be seen in the daily diary study of Rumbold et al. (2020) in which professional academy rugby union players' threat and challenge appraisals were significantly associated with the daily use of seeking social support to solve problems and regulate emotions. From a practical perspective, what these findings highlight is that athletes need to learn or be taught a variety of social support based and problem-focused coping strategies to manage the various organizational stressors that can be appraised as significant for their goals and well-being.

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Outcomes of Organizational Stress in Sport Performers

A series of studies have acknowledged the importance of investigating potential outcomes that may result from training and operating within structured sport teams and organizations. Studies have indicated that competitive performers may experience various well-being and performance-related outcomes, such as changes to their physical and mental health (Roberts et al., 2019), sleep disturbances (Rumbold et al., 2018), deselection, and dropout (Rothwell et al., 2020). Two common ways in which researchers continue to demonstrate outcomes of organizational stress include the experience of burnout and assessments of sport performance.

Burnout

In one of the first studies to explore the relationship between organizational stressors and burnout, Tabei et al. (2012) found that English and Japanese soccer performers experienced burnout symptoms (physical and emotional exhaustion, devaluation, a reduced sense of accomplishment) in relation to their training and competition loads, insufficient rest from training, and injury-related stressors. In addition, Japanese performers experienced some burnout symptoms in relation to authoritarian leadership styles and relationship issues with teammates. In comparison, English players appeared to experience more burnout symptoms than Japanese players in relation to selection issues and the formation of cliques in their soccer teams. A recent quantitative study by Fransen et al. (2020) provided support for some of these qualitative findings by highlighting that athletes' perceptions of their teammates' leadership is linked to their own health and burnout symptoms. In a cross-sectional quantitative study of sport performers and staff working in sport organizations (N = 487), Larner et al. (2017) found that the frequency of organizational stressors encountered was statistically related to experiences of burnout symptoms. In addition, the relationship between stressors and burnout was moderated by individuals' tendencies to express emotions merely for the benefit of aligning with organizational goals (i.e., emotional labor).

Performance

A variety of studies have taken different approaches to measuring sport performers' subjective ratings of their sport performance in relation to organizational stress. In the first study to explore performance in the context of organizational stress, Didymus and Fletcher (2017a) reported that subjective performance satisfaction was an intricate phenomenon that was linked to athletes' appraisals, rather than perceived coping effectiveness, for example. Using a cross-sectional quantitative study design, Arnold et al. (2017b) found that the intensity of selection stressors was positively related to performance satisfaction. A surprising observation from this study was that no other organizational stressors were statistically associated with athletes' performance evaluations. Of the 14 non-significant relationships between different stressor subscales/dimensions and performance, nine of these showed negative non-significant relationships between stressors and performance, and five showed positive non-significant relationships. The findings of both of these studies suggest that the relationship between organizational stressors and performance is complex. The findings of Arnold et al. (2017b) may have been due to aspects of the research design whereby sport performers were asked to reflect on their performances that had taken place over the past month. This meant that the findings will have been subject to memory decay and the potential ramifications of retrospective recall. Another study that employed the same research design with a smaller sample of sport performers (Arnold et al., 2018) suggested that the frequency of some organizational stressors was negatively associated with subjective performance evaluations. This means that the more frequent an organizational stressor, the more negative the evaluation of performance.

Using a temporal rather than a cross-sectional design, Tamminen et al. (2018) conducted a study in Canada with 84 varsity athletes from a selection of team sports: field hockey, volleyball, basketball, and ice hockey. Athletes completed the OSI-SP, measures of perceived esteem support, and competition appraisals five days before a weekend competition. A week following competition, the athletes then rated their evaluation of their performance at the competition. The findings from this study indicated that whilst athletes' perceived support and secondary appraisals were linked to subjective performance a week after competing, the relationship between perceived support and secondary appraisals was moderated by the frequency of coaching stressors (negatively) and the frequency of team and culture stressors (positively). Other temporal approaches have been used to explore the relationships between organizational stressors in the lead up to and on the day of competitive performance. In a study of military veterans, for example, Roberts et al. (2019) found that the frequency and intensity of organizational stressors was generally linked to negative subjective performance on the day of the Invictus Games.

A key observation relating to all of these studies is the reliance on athletes' subjective evaluations of their own performance, which is likely due to the challenges associated with the objective measurement of performance in sport psychology. However, in judging selection to be an important longitudinal measure of performance for high level youth performers, Rumbold et al. (2020) found that professional rugby academy players' use of some coping techniques to deal with organizational events (e.g., seeking support to regulate emotions) during a five-week training period was statistically associated with the number of professional senior club appearances attained five years after the initial data collection period. This goes some way toward illustrating that the ways in which youth performers cope with organizational issues during the stages of development in their sports may be linked to how well they achieve success in their sport in the future as an adult.

Learning Exercise Two

Think back to your experiences of participating and competing in sport. What examples can you think of where you may have personally encountered organizational stressors? Can you remember how you responded, coped, or behaved at the time? The above section on Outcomes of Organizational Stress in Sport Performers suggests that there might be difficulties in measuring performance in sport. Consider some ways in which you think performance could be measured differently to understand how organizational stress may lead to better or worse sport performance.

Organizational Stress in Other Performers

So far, this chapter has focused exclusively on the organizational stress experiences of competitive sport performers. However, it is clear that an athlete's well-being, development, and success in sport is often the outcome of positive relationships, instructions, support, and care that they have received from various individuals who also operate (directly or indirectly) within the same sport organizational environments. For these reasons, sport psychology researchers have begun to explore the organizational stress experience as it pertains to *other* performers in sport. To date, these have included coaches, parents, referees/officials, sport science and management staff. Below, we briefly outline some of the main findings on coaches' and parents' experiences of organizational stress. Due to space limitations, we provide suggestions for further reading on the stress experiences of referee/officials (Dorsch & Paskevich, 2007; Neil et al., 2013) and sport science and management staff (Arnold et al., 2019; Fletcher et al., 2011) at the end of this chapter.

Coaches

Since the work of Frey (2007), sport psychology researchers have examined the stress experiences of coaches, partly because coaches' stress may impact on their relationships with athletes (Thelwell et al., 2017), and, also because stress that is unmanageable could lead to burnout and coach turnover (Kilo & Hassmén, 2016). In a systematic review conducted by Norris et al. (2017), 24 studies that had examined stress in coaches were synthesized. It was concluded from this review that coaches encounter numerous demands relating to their performance and that they also encounter a series of stressors relating to the teams and organizations in which they coach. The organizational stressors reported in this systematic review included workload (e.g., extended working hours, completing multiple coach roles), relationships (e.g., poor communication from managers, relationships with the performers and teams they coach), and career development concerns (e.g., job insecurity) to name a few (see Chapter 29; Didymus et al., 2021). The issues of workload and work-home imbalance are some of the most cited stressors that coaches report as being stressful, and studies continue to highlight that these factors are closely linked to burnout and intentions to leave the coaching profession (Bentzen et al., 2016; Kilo & Hassmén, 2016; Knight et al., 2015; Potts et al., 2019). On the basis that coaches encounter a vast range of stressors, researchers have developed and validated a measure to assess how stressors are linked to various well-being and performance outcomes for coaches. Despite currently only being validated for use among coaches in South Africa, Kubayi et al. (2018) have made promising progress toward the quantitative measurement of stressors when developing the Stressors in Sports Coaching Questionnaire (SSCQ). This questionnaire assesses coaches' perceptions of the environmental, task-related, performance, and athlete stressors that they encounter in their roles. Within this questionnaire, a variety of items relate to organizational related demands such as the coach's role, their relationships with athletes and staff, the work-home interface, and requirements to travel.

How coaches cognitively appraise and cope with organizational stressors has also received some attention (Didymus, 2017). Moreover, researchers have given consideration to how coaches and their athletes may communicate with and protect one another when using dyadic coping efforts to manage shared stressors (Staff et al., 2017). Taken together, these studies on coach stress that incorporate information about organizational stress transactions demonstrate the need to examine the environmental, personal, and relational factors that may influence how coaches cope with stressors in their vocational and occupational roles. In addition, with continued reports of stress among coaches both anecdotally and in research evidence, advances need to be made in developing interventions to support coaches' well-being.

Parents

It is starting to be more commonly recognized that parents of sport performers experience organizational stressors that can impact their own experiences, those of their children, and the coaches with whom their children train. In a multipart concurrent mixed method study with 135 British tennis parents, Harwood et al. (2019) reported that parents experienced organizational stressors relating to finances, time, coaching and training, organizing bodies, tournaments, and injury. These stressors were predominantly appraised as harm or challenge, and parents typically experienced anxiety and anger in relation to the stressors experienced. Interestingly, the parents experienced greater anger following competition stressors than they did following organizational (and developmental) stressors. The parents reported using various coping strategies relating to mastery, internal regulation, and goal withdrawal, which varied statistically in degrees of reported effectiveness.

Lienhart et al. (2020) conducted one of the most comprehensive studies examining parents' experiences of stressors and coping in elite sport contexts. First, 1299 parents of adolescent sport performers completed an open-ended survey to identify stressors associated with their child's sport involvement. Next, 16 parents participated in semi-structured interviews. Organizational stressors included demands related to health (e.g., doping and injuries), sport systems (e.g., scheduling, quality of training and coach, and communication), logistics (e.g., domestic tasks and organization), and personal investments (e.g., time and finance). For each stressor cited, parents were asked to rate whether the organizational stressor was easy to manage or difficult to manage. Out of 2,762 responses to this question, parents cited that organizational stressors were difficult to manage 73.43% of the time. Leinhart et al. (2020) identified six different coping dimensions that were used by the parents themselves, their child, or the sport organization to manage stressors. These included detaching from sport, information seeking, managing emotional reactions, avoidance, taking control, and parents providing support. The authors of the study provided participant-derived examples of how specific coping strategies were adopted to deal with specific organizational stressors. For example, under the coping dimension of detaching from sport, some parents spoke of trusting their sport organization to prevent doping, to help manage parents' stress from a lack of information and concerns about athlete doping. In addition, under the coping dimension of information seeking, parents spoke of getting information from other parents to help manage a lack of clear communication from their child's sport organization. This study highlights the complex nature of sport parents' stress experience and suggests that educational interventions are needed to improve effective coping strategies. Such interventions would assist in enhancing the sport participation experience for parents, their children and sport staff working in elite sport organizations.

Applied Implications

The organizational stress research that we have highlighted in this chapter demonstrates that there are a range of complex individual and group differences that influence the prevalence of organizational stressors, and the extent to which the frequency, intensity, and duration of organizational stressors may be linked to various outcomes (e.g., burnout and performance). Some studies do appear to suggest that the outcomes of organizational stressors are not always negative when cognitive appraisals and coping attempts are also considered. From an applied perspective, this suggests that a one size fits all approach to developing organizational stress management interventions will simply not work, and that tailored interventions are clearly necessary. To this end, we briefly outline how organizational psychologists have recommended that interventions could be best developed and tested to optimize performers' experiences in sport.

Organizational Stress Management

Organizational stress management has been defined as "any activity initiated by an organization, which focuses on reducing the presence of stressors or minimizing the negative outcomes associated with exposure to stressors" (Ivancevich et al., 1990, p. 252). Despite approximately 20 years of research to date on organizational stress in sport, interventions designed to tackle organizational stress are still lacking and so require development and evaluation to improve our understanding of what psychological programs might work and in what ways (Didymus & Fletcher, 2017b; Fletcher et al., 2006; Rumbold et al., 2012, 2018). This is needed to help sport psychology consultants draw on a stronger evidence base to support how they tailor psychological programs when working at multiple levels (e.g., individuals, teams, coaches, CEOs) of a sport organization.

Due to the limited number of organizational stress interventions that have been developed in sport, researchers have tended to draw parallels between the organizational psychology literature and the types of stress experienced within sport contexts. According to many organizational and work psychologists, the tailoring of specific organizational stress management interventions can typically be developed based on the purpose and target of the intervention (Cooper et al., 2001; Richardson & Rothstein, 2008). For example, organizational-level interventions could be developed where the purpose is to directly prevent or modify the organizational stressors that individuals encounter. This would involve targeting aspects of the environment or organizational structures that impact sport performers. Where stressors are unavoidable and impractical to reduce or modify, individual-level interventions could be developed where the purpose is to modify how individuals appraise, respond to, and cope with organizational stressors. This involves targeting specific individuals and groups that operate together in sport organizations. When considering the use of the OSI-SP questionnaire (Arnold et al., 2013) as a method to identify which stressors are most problematic and in need of intervention, Table 30.5 presents an example of how organizational stress management interventions could be developed based on stressors encountered by sport performers, and the subsequent purpose and target of a stress management intervention (Cooper et al., 2001). Where organizational stressors can realistically be reduced in a proactive way (e.g., improving communication channels), then organizational-level interventions should be targeted towards modifying the organizational environment in which sport performers operate. However, where stressors cannot be removed easily (e.g., changing a sport's rules and regulations), individual-level interventions targeted at modifying individuals' appraisals, emotional responses and coping abilities are more appropriate (Richardson & Rothstein, 2008; Rumbold et al., 2018). In reality, a combination of both approaches may be required to successfully combat stress in sport organizations that is judged to be detrimental to well-being and performance.

Table 30.5

An Example Framework for Developing Organizational Stress Management Interventions in Sport

		Organizational-level Interventions	**Individual-level Interventions**	
Proactive	**Purpose**	Stressor prevention / modification	Restructure / reduce stress responses	***Reactive***
	Target of Intervention	Environments and structures associated with the sport organization	Individuals and groups operating in sport organizations	
OSI-SP stressors		***Logistics and operations*** (e.g., structure of training) ***Team and culture*** (e.g., poor communication) ***Selection*** (e.g., unfairness in the selection process)	***Logistics and operations*** (e.g., rules and regulations) ***Team and culture*** (e.g., cultural norms) ***Selection*** (e.g., competition for selection)	
Example stress management interventions		Modify training structures, integrate team building, integrate regular team performance appraisals	Cognitive-behavioral treatments, individual and group goal setting, integrate social support systems	

A key area in which organizational stress research needs to advance is the evaluation of organizational stress management interventions in sport. These interventions will need to be tailored with a view to either modifying the organizational environment in which individuals function, or helping sport performers and other stakeholders to respond and adapt more positively to the organizational environment (Rumbold et al., 2018). In the only intervention study in the context of organizational stress to date, Didymus and Fletcher (2017b) developed and evaluated the effects of a cognitive-behavioral intervention that was designed to modify sport performers' appraisals of stressors and emotional responses. This intervention was conducted over 26 weeks with 4 high-level field hockey players and included 8 weeks of one-to-one sessions to educate players and facilitate acquisition of a cognitive restructuring technique. Using a concurrent, across-participants, multiple-baseline, single-case research design they found that threat and loss appraisals reduced during the intervention whilst challenge appraisals, pleasant emotions, and performance satisfaction increased throughout. Qualitative social validation data that were collected immediately post-intervention suggested that the changes in players' appraisals of organizational stressors were meaningful to the participants, and data collected during a three-month follow-up suggested that the intervention effects had been retained.

Future Research

There are a number of research studies that are currently being conducted worldwide which are highly relevant to the experience of organizational and occupational stress for those who operate in sport organizations. These include the experience of workload demands, burnout, and job turnover among sport coaches; stress and recovery in athletes and coaches; organizational culture and change for various stakeholders in sport; the work-life interface; dual careers in sport; dyadic coping between athletes and coaches; and emotional contagion in sport teams and personnel. Linking these areas to a research agenda on organizational stress, we anticipate that future studies will focus a great deal more on measuring the relationships between organizational stress processes, physical and mental health, and performance, both cross-sectionally and longitudinally, as means to justify the development of organizational stress management programs in varied sport populations. It is clear that further measurement developments are needed to stimulate new lines of enquiry on organizational stress in sport. For example, measures of stressors among coaches and parents that are developed with and validated for use with individuals worldwide are warranted, as are efforts to more effectively capture the dynamic and highly complex phenomena of appraising and coping.

Conclusion

This chapter has outlined key concepts and theory that relate to organizational stress as researched in sport settings (please also see Chapter 29; Didymus et al., 2021). Although the majority of research in this area has focused on examining organizational stressors in sport performers, it is clear that the experience of organizational stress is far from straightforward for various individuals (e.g., athletes, coaches, parents). The complexity of organizational stress can be seen in the numerous ways that organizational stressors have been found to link positively, negatively, or not at all with both well-being and various measures of sport performance. The findings related to individuals' cognitive appraisals of, and emotional and coping responses to, organizational stressors also indicate that organizational stress is not simply a case of understanding the direct effects of the organizational environment on various health and well-being related outcomes. Rather, it is a case of considering how the processes of appraisal, emotions, and coping mediate whether organizational issues lead to positive or negative outcomes for well-being and performance.

Learning Exercise Three

Perhaps you have watched a series of recent sport documentaries without realizing that they illuminate various aspects of organizational stress in elite and professional sport environments. We have selected some sport documentaries that you may like to watch and, whilst doing so, consider how these documentaries illustrate organizational stress and subsequent outcomes that various individuals in sport may experience.

30 for 30: Lance Armstrong documentary (Zenovich, 2020)
All or nothing: A season with the Philadelphia Eagles (Leitner, 2020)
All or nothing: Manchester City (Huerga, 2018)
Athlete A (Cohen & Shenk, 2020)
Late life: The Chien-Ming Wang story (Chen, 2018)
Rising phoenix (Ettedgui & Bonhôte, 2020)
The last dance: The Chicago Bulls documentary (Hehir, 2020)
The playbook: A coach's rules for life (James & Carter, 2020)

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Chapter 31
Rehabilitation from Sport Injury: A Social Support Perspective

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Chapter Overview

This chapter focuses on an increasingly pervasive topic within the psychology of sport injury literature, that of social support. In the chapter, we examine the existing research literature as it relates to specific conceptualisations of social support, consider key factors that influence the effectiveness of social support, and highlight developments that have contributed to some advances in our understanding that can inform the application of social support. We also address some of the methodological challenges associated with research in the field, highlighting some of the shortcomings of the sport injury literature to date. We conclude this chapter with some of the most important applied implications for injured athletes' support providers and future research directions to address the conceptual and methodological limitations that permeate the empirical research.

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Introduction

Despite the undoubted benefits of sport and physical activity, one of the inherent risks that all athletes face, regardless of their competitive level, is injury. Sports injuries, which can range in severity from relatively minor to severe injuries requiring surgical intervention and extended rehabilitation periods, represent a challenging and stressful experience for athletes that can, in extreme circumstances, affect their ongoing health, well-being and performance aspirations (Wadey et al., 2013). It is perhaps not surprising, therefore, that the prevalence of sports injuries and their potentially negative impact has prompted researchers to explore the effect of an array of psychosocial factors on athletes' responses to, and recovery from injury. Of these factors, social support has been identified as one of the most adaptive for the recovery process (see Brewer & Redmond, 2016).

Within the psychological response literature, the majority of research has been predicated upon the integrated model of response to sport injury (Wiese-Bjornstal et al., 1998). The integrated model of response suggests that pre-injury (personality, history of stressors, coping resources) and post-injury personal (e.g., demographic variables, injury type and severity, athletic identity) and situational factors (e.g., level of sports participation, social support network, accessibility to rehabilitation) influence the athlete's cognitive appraisal of injury—which in turn influences athletes' emotional (e.g., frustration, grief, relief) and behavioural responses (e.g., adherence to rehabilitation, use/disuse of social support network) to injury and recovery outcome. Within the integrated model, social support is conceptualised as both a situational factor that can influence athletes' cognitive appraisal of their injury, as well as a behavioural response to injury (e.g., use/disuse of social support network).

While the more complex mediating and/or moderating relationship between social support and other post-injury variables specified within the integrated model have yet to be examined, a growing body of empirical and professional practice research attests to social support being a significant coping resource (e.g., Johnston & Carroll, 1998), with high levels of social support associated with less psychological distress (Rees et al., 2010) and greater rehabilitation adherence (Duda et al., 1989). However, not all research has provided support for these beneficial effects, with some research suggesting that when the provision of social support is inappropriate or ineffective, it can have detrimental effects on athletes' rehabilitation and recovery (e.g., Abgarov et al., 2012). Such equivocal findings are not unique to the sport injury context, rather they highlight the complexity of social support as a multidimensional construct (Freeman, 2020).

In a seminal paper, Bianco and Eklund (2001) attempted to deconstruct some of the complexity of social support for those interested in conducting psychology of sport injury research. In it, the authors wrote "Social support theorists have claimed that much of the confusion surrounding social support stems from the complexity of the construct coupled with a lack of conceptually driven research" (p. 86). Unfortunately, 20 years on, despite a proliferation of psychology of sport injury research within the ensuing period, little has changed; few have heeded Bianco and Eklund's recommendations and confusion around social support in an injury context remains.

Within their review, Bianco and Eklund (2001) identified three major conceptual issues, namely the differences between (a) support activities and support messages, (b) perceived support and received support, and (c) support networks, support exchanges, and support appraisals.

Support Activities and Support Messages

The first consideration was the need to distinguish between explicit and observable aspects of social support activities (i.e., what people do to be supportive) and the implicit, unobservable social support messages (i.e., what is communicated indirectly through supportive acts). In essence, to maximise the benefits of social support, it is important to ascertain whether its effectiveness is contingent upon the type of support offered, or the message it implicitly communicates.

Perceived Support and Received Support

Recognising the dimensions that comprise social support are interrelated, Bianco and Eklund (2001) advocated the need to (a) distinguish between perceived and received support when examining the mechanisms (main or stress-buffering effects) through which social support affects health outcomes, (b) simultaneously examine perceived and received support to determine which factor is more influential in the injury rehabilitation environment, and (c) ensure construct clarity in relation to perceived support, to ensure this overarching term is not used inappropriately to refer to both a recipient's perception of social support exchanges (i.e., the perception of support received) and to the perception of support availability.

Support Networks, Support Exchanges, Support Appraisals

Finally, Bianco and Eklund (2001) called for an examination of conditions that facilitate or hinder support exchanges, including the provider's ability to recognise and support the athlete's needs, the athlete's ability to communicate the need for support, and the importance of key sociocultural (e.g., culture of risk), personality (e.g., optimism), and interpersonal factors (e.g., level of intimacy) as moderators that foster or discourage support-seeking behaviours. Further, they suggested researchers should seek to identify factors influencing an athlete's support appraisals given that it is athletes' perception of support rather than the actual support they receive that has the strongest relationship with health outcomes.

Against this backdrop, we review the social support research that has been conducted within the psychology of sport injury over the last 20 years, with a specific emphasis upon six key areas that we consider to be of most significance to researchers and practitioners with a vested interest in supporting athletes' recovery following sport injury. Specifically, we focus on (a) perceived and received support, (b) support types, (c) support providers, (d) perspectives of the provider, (e) temporal aspects of social support, and (f) the multidimensional measurement of social support. Within each of these, we critically examine the social support and sport injury literature to illustrate the challenges, but also the limitations of the research; discuss, where appropriate, the conceptual developments within the social support literature more broadly (e.g., structural and functional aspects of support); and, address the methodological intricacies associated with these facets. We conclude this chapter with some of the most important applied implications for injured athletes' support providers and future research directions to address the conceptual and methodological limitations that permeate the empirical research.

What is this Thing Called Social Support?

Researchers have used a variety of terms to describe social support with definitions focusing on the quantity and quality of social relationships, support exchanges, and the perception that one is cared for and valued (Freeman, 2020). These frequently different conceptualisations, however, largely acknowledge that social support is a multifaceted construct that broadly encompasses structural and functional aspects (e.g., Gottlieb & Bergen, 2010; Lakey, 2010). The structural aspects refer to the number and range of different types of relationships individuals engage in or the extent to which they belong to different groups (Brisette et al.,2000). For example, physiotherapists, athletic trainers, coaches, team(mates), family, and friends are important relationships within injured athletes' support network. Functional aspects refer to the particular functions served by these social relationships and are separated into perceived and received (also known as enacted) support. Perceived support is one's potential access to support and reflects an individual's subjective judgment that support would be available when needed (Uchino, 2009; Wills & Shinar, 2000). Received support, on the other hand, refers to the exchange of individuals' specific helping actions (Lakey, 2010; Tardy, 1985). These can be *provided*—through the provision of support, or the observed actions individuals perform to help an injured athlete (Burleson & MacGeorge, 2002; Cohen et al., 2005; Tardy, 1985)—or *received*—the reported receipt of the amount of support during a specific time frame (Uchino, 2009). For more discussion on social support, see Chapter 10 (Wilson, 2021).

Perceived and Received Support

In order to examine the effects of perceived and received support, it is important to understand the mechanisms through which they exert their effects, and which of these functional aspects of support is potentially more influential in the recovery process. Two principle mechanisms have been proposed to explain the impact of social support on health, namely the main effect and buffering effects models (for a review, see Bianco & Eklund, 2001; Cohen & Wills, 1985). The main effects model suggests that social support has a beneficial effect on psychological responses, irrespective of the levels of stressors experienced (Cohen & Wills, 1985). This means that high levels of social support lead to favourable outcomes regardless of how much stress injured athletes' experience.

In contrast, the buffering effects model suggests that social support moderates the relationship between stress and outcomes, such that at low levels of support, stress is negatively related to outcomes, but at high levels of support, stress is unrelated to outcomes. Here, social support may intervene at specific points from encountering a stressor, through the experience of a stress response, to the eventual outcome, such as the psychological responses to sport injury (Cohen & Willis, 1985).

Despite calls from Bianco and Eklund (2001) to examine both perceived and received support simultaneously to explore their reciprocal effects, no studies to date have done this. The closest study to doing this was Mitchell et al. (2014), which examined the main and stress-buffering effects of both perceived (Study 1) and received (Study 2) social support. Their findings showed that perceived support operated as a main- and stress-buffering effect. That is, higher levels of perceived support were linked with lower levels of restlessness, isolation, and feeling cheated. In addition, the perception of available support was associated with significant stress-buffering effects in relation to restlessness, isolation and feeling cheated. Received social support also had a positive influence on these psychological responses to injury but operated only as a main effect as opposed to a stress buffer. Overall, the perception of available support was more consistently linked to positive outcomes than received support.

Other research that has focused upon the perception of available support in isolation has mainly observed positive relationships between perceived social support and post-injury responses. For example, perceived support has been associated with main effects for devastation and dispiritedness in high-performance athletes (Rees et al., 2010). For low-performance athletes, perceived support also reduced the detrimental relationships between stressors (i.e., incapacitation, slowness of progress) and devastation, dispiritedness, and reorganisation (stress-buffering effects; Rees et al., 2010). Further, increased satisfaction with perceived available support has been associated with lower levels of mood disturbance (Green & Weinberg, 2001), and increased rehabilitation adherence (Johnston & Carroll, 2000).

For received support, results have been more mixed. Studies have found that athletes who reported higher levels of satisfaction with support received were less likely to experience symptoms of depression and anxiety when they returned to play (Covassin et al., 2014; Yang et al., 2014). Further, Udry (1997) found that satisfaction with received support did not predict rehabilitation adherence. In addition, the amount of received support has been linked with beneficial outcomes such as rehabilitation adherence (Duda et al., 1989), and an increased use of performance sources to restore confidence (Magyar & Duda, 2000), while other studies have reported mixed effects of received support depending on the function provided (e.g., Levy et al., 2008), or the personality of the injured athlete (Lu & Hsu, 2013). In addition, injured athletes have noted that, at times, support attempts can be unhelpful when the support provided is unwanted, insensitive, mismatched, undermining, or of poor quality (Abgarov et al., 2012; Bianco, 2001; Johnston & Carroll, 1998; Udry et al., 1997). This begs the question, why are the findings equivocal for received and not for perceived support? The effectiveness of social support, and particularly received support, is assumed to be contingent upon several factors, namely the support type, the support provider, the timing of support, and crucially, the extent to which the support provided meets athletes' specific needs (Bianco, 2001; Bolger & Amarel, 2007).

According to the optimal matching model (Cutrona & Russell, 1990), social support is most effective in reducing the effects of stressful events when the support matches the demands created by them. This suggests that the differing demands athletes face throughout the injury process might require specific supportive functions. A central feature of optimal matching is that of controllability. When a stressor is viewed as controllable it will likely foster problem-focused coping efforts (e.g., seeking informational/tangible support) to manage it. In contrast, when viewed as uncontrollable, the stressor will likely evoke emotion-focused coping (e.g., seeking emotional support) on the part of the injured athlete (Uchino, 2004). Such a distinction can be particularly important in an injury context when different athletes may appraise stressors such as "slowness of progress" differently. For example, injured athletes who receive different pre-surgery advice (i.e., informational support) might appraise their support needs very differently. As a result, one who views the situation as controllable might seek tangible assistance (i.e., problem-focused coping) with everyday tasks. The other athlete, who appraises the situation as uncontrollable, might struggle to come to terms with the aftermath of the surgery, employ avoidance or emotion-focused coping strategies to offset intense and aversive emotional responses, and might benefit more from emotional support to facilitate recovery. Therefore, it is important to distinguish between different types of support when studying the effectiveness of perceived and received support.

Support Types

Interpersonal relationships may serve distinct functions (e.g., provide advice, encouragement, and a listening ear), functions that are widely accepted in the social support literature to comprise different "types" or "dimensions" (terms we use in this chapter interchangeably). Although there is debate as to how many dimensions exist, the injury literature has favoured drawing on two multidimensional models (e.g., Bianco, 2001; Rees et al., 2010).

The first model (Table 31.1) distinguishes between eight dimensions of support: listening support, emotional support, emotional challenge, reality confirmation, task appreciation, task challenge, tangible and personal assistance, which reflect three broad support categories of emotional, informational, and tangible support (Hardy & Crace, 1993; Richman et al., 1993). While some have questioned the content and structural validity of these eight dimensions (Rees et al., 2000; Rees et al., 2007), to date, the majority of the empirical research examining the role of social support in an injury context has tended to align with this eight dimensional model (e.g., Abgarov et al., 2012; Johnston & Carroll, 2000) or a subset of these (e.g., four dimensions: Levy et al., 2008; six dimensions: Robbins & Rosenfeld, 2001). These studies have provided some evidence for the optimal matching model. That is, Levy et al. (2008) found that task appreciation from the physiotherapist and emotional support from friends positively predicted clinic and home rehabilitation adherence, while personal assistance from family did not. Instead personal assistance predicted attendance at rehabilitation sessions.

The alternative multidimensional model (Table 31.1) which has been adopted by injury researchers comprises four dimensions: emotional support, esteem support, informational support, and tangible support (Cutrona & Russell, 1990). For example, Rees and Hardy (2000) distinguished between the four dimensions of support to reflect the social support resources of high-level sports performers and the functions served by those resources in relation to, for example, helping athletes deal with their injuries. Furthermore, Mitchell and colleagues (2014) examined the different effects of these four types of support on psychological responses to injury. By carefully matching specific social support types (i.e., esteem support) with injury stressors (i.e., loss of confidence), they tested the main- and stress-buffering effects of perceived and received support. Interestingly, they observed different buffering effects for perceived esteem, emotional, and tangible support. While esteem support buffered the negative effects of lower levels of confidence and increased incapacitation on feelings of restlessness, isolation, and feeling cheated, emotional support only buffered the effects of incapacitation on isolation. Tangible support did not have any buffering effects. Besides showing the different effects of support types on outcomes of interest, these findings also provide some support for the optimal matching model.

Regardless of which model is utilised, a multidimensional approach to examining the functional aspects of support allows researchers to examine the effects of different dimensions of support at different stages of the recovery process; which has important implications for individuals working with injured athletes. Indeed, the predominantly qualitative research has provided clear situational and temporal variations in both the types of support injured athletes need and who in their provider support network is best placed to meet these needs across the three different phases of the injury rehabilitation process, namely onset, rehabilitation, and return-to-sport.

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Table 31.1
Two Multidimensional Models of Social Support

Models	Social support dimensions	Description: Refers to…
Richman, Rosenfeld, & Hardy (1993) – eight dimensions of social support reflecting three broad categories.	*Emotional support*	
	Listening support	listening to you without giving advice or being judgmental.
	Emotional support	providing comfort and indicating to you that they are on your side and care for you.
	Emotional challenge	challenging you to evaluate your attitudes, values, and feelings.
	Informational support	
	Reality confirmation	those who are similar to you and see things the way you do, helping to confirm your perspectives of the world and helping you keep things in focus.
	Task appreciation	acknowledging your efforts and expressing appreciation for the work you do.
	Task challenge	challenging your way of thinking about your work or an activity in order to stretch, motivate, and lead you to greater creativity, excitement, and involvement.
	Tangible support	
	Tangible assistance	providing you with financial assistance, products, and/or gifts.
	Personal assistance	providing you with services or help such as running an errand for you or driving you somewhere.
Cutrona & Russell (1990) – four dimensions of social support	Emotional support	being there for comfort and security, leading the person to feeling loved and cared for
	Esteem support	bolstering a person's sense of competence or self-esteem
	Informational support	providing advice or guidance
	Tangible support	providing concrete instrumental assistance (e.g., financial assistance, physical help with tasks)

Onset

At the onset of injury, athletes often exhibit frustration, depression, and decreased self-esteem due to incapacitation and a loss of independence following their injury (Evans et al., 2012). At this time the receipt of practical assistance can help offset the disruption to normal day-to-day functioning, while the shared social reality of discussing experiences with coaches and teammates also appears to have beneficial effects (Bianco, 2001). Perhaps of greater importance, however, is the provision of listening and emotional support mainly from close personal relationships to offset the intensity of athletes' emotional responses and sense of loss.

Rehabilitation

During the rehabilitation phase, athletes often experience apathy and a lack of motivation due to a perceived slowness of progress, setbacks, and/or the monotony of rehabilitation exercises (Evans et al., 2000). In such circumstances, quality informational support and guidance from medical professionals with the prerequisite expertise can bolster athletes' confidence (Magyar & Duda, 2000), facilitate a better understanding of the injury and associated rehabilitation process (Carson & Polman, 2008; 2017), and increase adherence to both clinic and home-based rehabilitation programmes (Levy et al., 2008).

Return-to-Sport

Finally, during return-to-sport athletes commonly experience re-injury anxiety and a loss of confidence as a result of internal/external pressures to compete and the risk of re-injury (e.g., Clement et al., 2015; Johnston & Carroll, 1998). At this time, physiotherapists play a crucial role as the preferred and actual provider of informational support to help ensure realistic targets and offset any re-injury fears, while athletes who feel wanted, needed and valued (akin to esteem support) by their coach are reported to have increased perceptions of psychological readiness-to-return (Podlog et al., 2015).

Support Providers

The research describing injured athletes' experiences with various source providers has also highlighted how the salience of their role may change at each phase of the rehabilitation process. For instance, Clement and Shannon (2011) examined injured athletes' perceptions of the availability, satisfaction, and contribution of social support across three sources: athletic trainers, coaches and teammates. Their findings suggested that athletes were significantly more satisfied with the social support provided by athletic trainers, the availability of that social support, and its contribution to their overall well-being than with social support received from coaches and teammates. Eight collegiate level athletes in Clement et al.'s (2015) study highlighted seeking social support as the most consistent behavioural response throughout recovery. Initially, the primary source athletes sought support from was family members, teammates, coaches, and, to a lesser extent, athletic trainers, to counteract their negative emotional responses. As rehabilitation progressed, athletes continued to seek social support from significant others, however, the role of sports medicine professionals became more prominent. Coaches and teammates were also cited as vital sources demonstrating faith in the athlete's ability to return stronger and to relate to them with their own personal injury experiences. Further, Corbillon, Crossman and Jamieson (2008) demonstrated that although athletes did not perceive greater overall support from either coaches or teammates, athletes were significantly more satisfied with the task challenge support provided by coaches and the emotional support provided by teammates.

Nevertheless, athletes have shared mixed experiences with social support from key providers. Abgarov et al. (2012) heeded Bianco and Eklund's (2001) call to explore social support networks, exchanges and appraisals with 12 Canadian university swimmers. Findings suggested a concerning lack of support from both coaches and teammates. Specifically, coaches were highlighted as resistant to acknowledging injuries, with athletes feeling pressured to continue training and competing or risk being pushed aside and undervalued. In a similar vein, injury negatively influenced relationships with teammates due to their mistrust about the severity of injury and failure to act in an empathetic manner. Furthermore, athletes cited receiving conflicting advice and recommendations from medical professionals and coaches, reinforcing the notion that supportive acts may unintentionally be unhelpful. Conversely, athletes reported more favourable experiences of emotional support from coaches, teammates, parents and medical professionals, which facilitated their recovery. Informational support from other injured peers was also observed to be a positive resource, as was the knowledge and expertise from medical professionals, which was beneficial to rehabilitation. The provision of social support was also found to have a varied influence on the rehabilitation adherence of six recreational athletes (Levy et al., 2009). Findings showed that participants perceived social support to be most effective when associated with certain providers. Physiotherapists were cited as a prominent source of informational support due to their expert guidance and frequent feedback, whereas emotional, material, and practical support were perceived as effective when provided by family and friends. However, participants also suggested that overprovision of support from family members caused frustration and questioned the sincerity of physiotherapists as their support needs diminished during the mid and latter stages of rehabilitation. That said, the absence of a physiotherapist to communicate with during home-based rehabilitation hindered the motivation and confidence to complete exercises.

Perspectives of the Provider

Perhaps unsurprisingly, most of the social support and sport injury research has focused on obtaining an injured athlete's perceptions of their overall support network and/or specific support provider relationships (e.g., Clement & Shannon, 2011). However, an important area that has received very limited research attention is the perspectives of different support providers (i.e., significant others' perspectives of social support in an injury context; Freeman, 2020). Such an omission in the literature is particularly surprising given that providers (e.g., physiotherapists) and recipients (injured athlete) often differ in their perceptions of the support that is or isn't provided (Bianco & Eklund, 2001). The small number of studies which have looked at support providers' perspectives have focused on physiotherapists and coaches. Physiotherapists in Niven's (2007) study suggested having good support structures, adequate time and resources to complete exercises, and developing trust and understanding in the physiotherapist and prescribed exercise regimen were key to facilitating high levels of rehabilitation adherence. Ninedek and Kolt (2000) also highlighted the importance of physiotherapists communicating well with the athlete, providing a realistic timeline to full recovery and ensuring that the athlete understood the rehabilitation programme as effective strategies for facilitating successful rehabilitation.

Aside from sports medicine professionals, coaches are also considered an important source of social support for injured athletes. Indeed, Podlog and Dionigi (2010) found that coaches recognise that the provision of social support can play a pivotal role in addressing the psychosocial challenges that athletes typically experience during their return-to-sport. Specifically, maintaining an athlete's group involvement was suggested to fulfil various functions, including ensuring compliance with rehabilitation and maintaining motivation, and fostering a sense of identity, belonging, and the perception that the coach cared about their well-being. In an earlier study, Podlog and Eklund (2007) examined 14 professional coaches' perspectives on their role in assisting athletes returning to sport following a serious injury. Coaches demonstrated that they possessed a good understanding of their role in ensuring returning athletes' support needs are met through the provision of different types of social support. For example, emotional support involved simply listening to athlete concerns, managing any unrealistic expectations, and providing positive encouragement and reassurance following a poor performance or rehabilitation setback. The provision of informational support aimed to maximise feedback regarding all facets of performance, including biomechanical analyses, fitness testing, and video analysis to provide a better understanding of the athlete's current status. To help athletes build confidence, strategies included the use of goal setting, arranging meetings with sport psychology consultants, and matches against lower calibre opposition.

Ultimately however, sports medicine professionals and coaches represent just two of the potential support providers within an injured athlete's social support network. Given the paucity of research that has examined the other support providers perspectives, such as teammates or significant others (e.g., family and friends), to maximise the effectiveness of social support throughout the rehabilitation process a more holistic approach that includes the viewpoint of different support providers should be considered a research priority.

Temporal Aspects of Social Support

Research that has employed a temporal dimension has predominantly comprised retrospective qualitative studies (e.g., Abgarov et al., 2012; Arvinen-Barrow et al., 2017) and cross-sectional (i.e., one-time observations) quantitative studies (e.g., Bone & Fry, 2006; Corbillon et al., 2008; Levy et al., 2008). Retrospective accounts have enabled researchers to examine athletes' perceptions of and experiences with social support across the whole rehabilitation period, including initial support needs at onset, throughout rehabilitation and return-to-sport. These studies have provided important insights into key support providers within an athlete's support network, including coaches, teammates, and sports medicine providers (e.g., Arvinen-Barrow et al., 2017; Bianco, 2001; Johnson & Carroll, 1998). Notwithstanding these insights, there is an inherent limitation with capturing perceptions of the availability of and satisfaction with support based upon past-injury experiences (the time frame elapsed since injury has been beyond three years in some cases) and/or following a successful return to competition (e.g., Corbillon et al., 2008; Covassin et al., 2014). Specifically, such perceptions about actual support exchanges are undoubtedly confounded by athletes' current recovery status. A more rigorous approach would involve repeated assessments of the constructs of interest concurrently across the different phases of the injury process.

Unfortunately, the literature is characterised by a limited number of repeated-measures studies, which has precluded our ability to examine the "inter-related, cyclic, spiralling, dynamic, and recursive" nature of psychosocial factors, like social support, and how it affects athletes' responses to injury (Wiese-Bjornstal, 2010, p. 106). For example, many questions still remain as to whether the availability of perceived support (when conceptualised as a situational factor in Wiese-Bjornstal et al.'s integrated response model) influences an injured athlete's cognitive appraisal of and their ability to cope with the injury, and how this in turn influences the use/disuse of social support (a behavioural response), or whether athletes' amount of and satisfaction with received support influences ongoing perceptions of support or future support-seeking behaviours. Instead, the repeated-measures studies conducted to date have focused on one facet of social support, namely perceived satisfaction. For example, Udry (1997) found no significant differences in injured athletes' perceived satisfaction with support throughout the first 12 weeks following knee surgery when assessed as a composite score. However, when assessed multidimensionally (i.e., informational, emotional, and practical support separately as opposed to a total social support score), injured athletes reported higher levels of satisfaction with informational and emotional support in the middle and end of rehabilitation, which most likely reflected successful recovery and decreased negative affect, as well as reduced demand for support. There are significant advantages in adopting repeated-measures designs, and in particular, designs which encompass the entire recovery period like that of Johnson and Carroll (2000). However, such designs also raise important considerations regarding the sample composition and capturing the various phases of injury recovery.

Within sport injury research there is often a trade-off between sample size and composition (Wadey et al., 2014). In order to increase the size of their sample to sufficiently power[1] the statistical analysis (for a discussion of power in relation to sample size, see Button et al., 2013; Schweizer & Furley, 2016) and (presumably) provide findings that can be generalised across injuries, researchers often incorporate a variety of injuries which differ in severity and therefore the length of the recovery process. Indeed, social support and injury researchers have generally favoured heterogeneous samples in relation to injury type (e.g., Bone & Fry, 2006; Clement & Shannon, 2011; Mitchell et al., 2014), with definitions of injury severity ranging from a minimum period of absence from participation of one day (e.g., Hardy et al., 1991; Yang et al., 2014) to six weeks (e.g., Clement et al., 2015; Green & Weinberg, 2001). Other studies have used rating scales to categorise participants' injuries as low to high (e.g., Johnston & Carroll, 1998) or mild to severe (e.g., Lu & Hsu, 2013; Robbins & Rosenfeld, 2001). Irrespective of the classification approach, heterogeneous samples can be problematic when trying to discern the relative contribution of different types of support at different phases in the recovery process. For example, the provision of social support for lengthy injuries such as a rupture to the anterior cruciate ligament (which often requires reconstructive surgery and adherence to rehabilitation for six months or more) will be very different compared to athletes who sustain an ankle sprain that keeps them out of training and competition for a matter of days or weeks. Further, athletes with serious injury are more likely to seek social support (Green & Weinberg, 2001), and so combining injuries of differing severity may in fact mask important differences and contribute to some of the equivocal findings we see currently.

Multidimensional Measurement of Social Support

A number of measures, predominantly from social and health psychology, have been used to capture the multidimensionality of structural and functional dimensions of social support. What follows is a brief overview of the measures used in an injury context.

In its original form, the Social Support Questionnaire (SSQ: Sarason et al., 1983) assesses the perceived availability of support. It comprises 27 items asking questions such as "whom can you really count on to listen when you need to talk". For each question, participants first list the individuals they perceive as available for this, which provides a mean number of individuals for the 27 items. The second part asks participants to rate their degree of satisfaction with the support available to them (1 = *very satisfied* to 6 = *very dissatisfied*), giving a mean score for satisfaction. However, it is the shortened (six-item) version of this measure, which has good psychometric properties, that has been predominantly used in injury research (Sarason et al., 1987). For example, several studies have used this measure to identify the support providers (e.g., family, friend, coach, athletic trainer) central to the rehabilitation process and athletes' satisfaction with their "perceived support" (e.g., Covassin et al., 2014; Yang et al., 2010; Yang et al., 2014). While this measure would suggest an examination of perceived support availability in these studies, this was not always the case. For example, although Yang et al. (2010) defined social support as athletes' appraisal of the support that "might be available to them from their social network and how satisfied they were with that support" (p. 373) in line with the intended assessment of the measure, their results refer to *satisfaction with received support*. Other studies have

[1] Power refers to the ability of the test to correctly reject a false null hypothesis (i.e., not make a Type II error). Sufficiently powered studies increase the probability of detecting an effect (e.g., the contribution of social support to overall well-being; Clement & Shannon, 2011), if there is a 'true' effect to be uncovered. Power Calculations to estimate the required sample size of a study should be considered in the planning stage and can be facilitated by software packages such as NCSS PASS (Hintze, 2011).

used a modified version of the six-item SSQ to determine how the amount of “perceived support” influences athletes’ sources of self-confidence (Magyar & Duda, 2000) and rehabilitation adherence (Duda et al., 1989). As opposed to focusing on the satisfaction with the perceived availability of support, Duda and colleagues used this measure to assess the amount of support (supportiveness) provided at different stages of the rehabilitation process. As such, they appeared to use the measure (and the term “perceived support”) to reflect the *perception of received support*. Irrespective of how researchers have utilised the measure, the SSQ is a global measure of perceived support. As such, it does not provide subscores for any particular supportive functions nor does it distinguish between different sources of support.

A measure frequently used in the sport injury literature that does provide subscores for particular supportive functions is the Social Support Survey (SSS: Richman et al., 1993) The SSS focuses on eight dimensions of social support. Following the definition of each dimension, respondents indicate their perceptions of each type via four questions: (a) the number of support providers and relationship with each provider; (b) satisfaction with the quality of the support received; (c) the perceived difficulty in obtaining more of that support; and (d) the perceived importance of that support to one’s well-being. Richman et al. (1993) provided support for the content, structural, and concurrent validity of the measure. Several studies have used the SSS or adapted versions of the measure to gain an insight into the support network of injured athletes, the satisfaction with different support types received from specific providers, and the role of these support types in influencing factors important for successful rehabilitation (e.g., Clement & Shannon, 2011; Robbins & Rosenfeld, 2001). For example, Corbillon et al. (2008) used the SSS to evaluate the relative contribution of specific providers (coaches vs. teammates) in providing different types of social support to injured athletes. Levy et al. (2008) assessed specific types given by particular providers (e.g., task appreciation provided by the physiotherapist) and revealed that social support (a summed score of the latter three questions) predicted home-based and clinic rehabilitation adherence. Bone and Fry (2006) focused solely on athletic trainers to determine whether different types of support received predicted athletes’ rehabilitation beliefs. Using the same summed score, they found that task challenge was the only positive predictor of athletes’ susceptibility while tangible assistance uniquely predicted treatment efficacy. Despite its frequent use in an injury context, questions have been raised over the content and structural validity of the eight dimensions and the four questions across the eight dimensions (Rees et al., 2000). In particular, whether the eight factors are necessary given most conceptualisations of support distinguish just three of four dimensions is unclear (see Cutrona & Russell, 1990). Furthermore, in terms of the computation of scale scores and creating a summed score (such as in Levy et al., 2008), it is not clear whether some questions should be reverse scored. Therefore, some caution is warranted in using the SSS.

Despite the popularity of the two aforementioned measures, another relevant issue is that these measures were developed in social and health psychology. As a result, they may not necessarily capture the specific supportive functions that injured athletes need (Bianco & Eklund, 2001; Holt & Hoar, 2006). To address this shortcoming, Mitchell et al. (2005) developed the Social Support Inventory for Injured Athletes (SSIIA). The SSIIA is a 16-item self-report inventory that assesses the perceived availability of four support types consistent with those identified by Rees and Hardy (2000), namely emotional, esteem, informational, and tangible support. Findings from Rees et al. (2010) provided support for the four-factor structure of the measure, and demonstrated that the detrimental relationships between stressors and psychological responses (devastation, dispirited, reorganisation) were reduced for those with high social support compared to those with low social support. Mitchell et al. (2014) examined both perceived and received support by rewording the items in the perfect tense to reflect the different functions. For example, “To what extent do you have someone who gives you moral support when you’re feeling down” (perceived availability of social support) was changed to “To what extent has someone given you moral support when you were feeling down" (received support). Importantly, and unlike the majority of studies within the social support and sport injury literature using modified measures, Mitchell et al. (2014) assessed the psychometric properties of the modified measure and provided support for its four-factor structure before undertaking their analyses.

Important Measurement Considerations

Consistent with a multidimensional approach to conceptualising functional social support (i.e., types of support), most quantitative studies have utilised one of the aforementioned social support measures to collect data on multiple dimensions (e.g., Levy et al., 2008; Lu & Hsu, 2013; Mitchell et al., 2014). In practice, however, some of these studies have then combined the dimensions into an aggregate score for support (in effect creating a unidimensional construct), often because the correlations between support dimensions are moderate to high (e.g., Rees et al., 2010). These high correlations may occur as a result of injured athletes often receiving multiple support types (Bianco, 2001) or injured athletes not distinguishing between different support types (Rees et al., 2010). Indeed, the high correlations might also indicate the existence of a single higher-order factor reflecting a global support construct which is further differentiated in specific dimensions of support. Though aggregate measures are useful in identifying the overall effect of support, they may limit the potential for researchers to detect differential effects of these specific support dimensions on outcomes of interest (e.g., the aggregate score might suggest social support is beneficial overall but obscure that a specific type is detrimental to recovery). Furthermore, aggregate measures may hinder examining theoretically relevant questions about the value of matching support types with phase-specific stressors (Cutrona & Russell, 1990; Evans et al., 2012) and/or the needs of the support recipient as perceived by the support provider (Rafaeli & Gleason, 2009). That said, even when researchers consider the separate support dimensions, their findings may reveal that these have no distinct predictive utility (in magnitude and direction) on outcomes of interest (Rees et al., 2010).

A broader consideration is to recognise how the findings of studies using different conceptualisations of social support and different measures may be interpreted and compared. One example is for researchers to be mindful of interpreting findings regarding "perceived support". While some researchers use the term "perceived" support to refer to the perception of support provided (e.g., Magyar & Duda, 2000), others use the same term to refer to the perception of support availability (Mitchell et al., 2014). Furthermore, some studies examine how satisfaction with perceived (or received) support is linked with outcomes of interest (e.g., Covassin et al., 2014), while others focus on the amount of perceived/received support (Lu & Hsu, 2013; Mitchell et al., 2014). Making inferences for best practice based on particular findings requires recognition of these differences. To illustrate, while high levels of satisfaction with a particular type of received support (task challenge [informational support], Bone & Fry, 2006) likely reflects that the amount of support given was congruent with the amount of quality support the injured athlete wanted, it does not necessarily mean that more of this type of support is better (Mitchell et al., 2014). Therefore, conceptual clarity (i.e., is the study examining perceived, received, or both functions), methodological coherence (e.g., the selection of appropriate measures, definitions), and precise interpretation of findings across the research is essential.

Implications for Support Providers

The aforementioned findings provide fairly compelling evidence that social support can help injured athletes cope with the various stressors encountered throughout the injury process, promote increased rehabilitation adherence, and facilitate a safe and timely return to sport. It is essential, then, that providers of social support within an injured athlete's network develop an understanding of how to best support the athlete, particularly with regard to the quantity and the appropriateness of the support they make available and/or provide (Mitchell et al., 2014). With this in mind, we provide some recommendations for key providers in injured athletes' support network, including (a) medical professionals and athletic trainers, (b) coaches and teammates, (c) sport psychologists, and (d) significant others (e.g., family, friends, partners).

Medical Professionals and Athletic Trainers

After the initial occurrence of the injury, medical professionals (e.g., team doctors and surgeons) represent a vital source of informational support for the athlete (Johnston & Carroll, 1998). Communicating well with the athlete, providing realistic timelines to recovery, and ensuring that the athlete understands their treatment, and treatment options through informational support can increase perceptions of control at a time of great uncertainty and confusion (Chan et al., 2009; Evans et al., 2012). Although the main providers of emotional support are typically those with a high level of intimacy with the athlete, physiotherapists/athletic trainers are well placed, given the amount of time they will spend with the athlete, to help athletes regulate their emotions by listening to their concerns, offering emotional comfort by expressing empathy and encouragement, and helping the athletes rationalise their negative thoughts and feelings (e.g., Bianco, 2001; Johnston & Carroll, 1998).

During rehabilitation it is important that athletic trainers devise progressive exercises that ensure subjective and objective indicators of progress (informational support) and provide positive performance feedback (esteem support). This is especially important during the early phase of rehabilitation, as initial confidence judgments in the rehabilitation setting are the strongest determinants of confidence (Carson & Polman, 2017; Magyar & Duda, 2000), motivation (Johnston & Carroll, 1998), and perceptions regarding the effectiveness of the rehabilitation programme, all of which are associated with increased adherence to rehabilitation (Levy et al., 2008). Often this informational and technical support has taken the form of goal-setting (e.g., Evans et al., 2000), with process goals (e.g., focus on the execution of rehabilitation exercises) increasing focus, personal control and self-confidence, and performance goals, which include achieving specific standards (e.g., increased range of motion), enhancing athletes' motivation, self-confidence, and outcome-expectancy.

Coaches and Teammates

Coaches and teammates can have a significant impact on injured athletes' perceptions of the provision and availability of social support. Received support from coaching staff (e.g., a concerned remark or visit to the athletic training room) can make injured athletes feel more appreciated, and less isolated (Robbins & Rosenfeld, 2001). Indeed, some coaches have highlighted that maintaining athletes' involvement in the group helped to convey messages of concern for athletes' well-being and increased their sense of belonging and social identity (Podlog & Dionigi, 2010). However, coaches should also be aware that some athletes will need to withdraw from the sporting environment to reduce the real and perceived losses (e.g., status in the team, fitness levels, missed opportunities) they experience as a consequence of injury (Evans & Wadey, 2011). Therefore, through a process of shared understanding, coaches should discuss group involvement preferences with athletes. Upon a return to sport, coaches should safeguard a team-based approach with the physiotherapist, sport psychologist, and importantly, the athlete to ensure they are involved in the decision-making process. Ensuring direct feedback from the physiotherapist can alleviate concerns that the athlete is rushing their return-to-sport, while an individualised goal-setting programme that focuses on skill development and attaining physical benchmarks, as opposed to placing expectations on sporting performances, can promote a sense of autonomy and competence (Podlog & Dionigi, 2010).

Teammates, in particular those who have experienced injuries themselves, can provide invaluable support because they can relate to what the injured athlete is going through, and are more likely to be perceived as relatable to. In this sense, they can become role models to provide teammates with positive examples of how to make a successful return-to-sport, reinforce the belief that such efforts could be replicated, and provide emotional and informational support about how to deal with injury-related challenges. However, it is also important to recognise that in some circumstances, vicarious information (i.e., observing teammates rehabilitate) may have a negative impact on the restoration of an athlete's confidence (Magyar & Duda, 2000). Therefore, coaches and athletic trainers need to be aware of which models would be most effective for the injured athlete, to avoid social comparison and the pressure to over-adhere (Niven, 2007). Irrespective of whether they have been previously injured or not, teammates should recognise they are an influential source of emotional, informational, tangible, and esteem support. Keeping in touch with their injured teammate by sending cards, text messages, or phone calls (received support) can have a lasting impact on the recipient's perception of available support upon a return to the team environment, and help to alleviate return-to-sport concerns (Udry et al., 1997; Podlog et al., 2015).

Sport Psychologists

Sport Psychologists (SPs) are well positioned to provide emotional support, especially for athletes that don't want to "burden" their teammates or significant others (Wadey & Evans, 2011). Through the use of listening support and emotional challenge, particularly when rehabilitation progress is slow, when setbacks are experienced, or when other life demands (e.g., family commitments) are placing additional pressures on the athlete, SPs can help athletes to rationalise the experience, come to terms with the implications of their injury, and maintain a positive attitude by reframing barriers to progress (Evans et al., 2000). SPs can also be an important source of informational support. For example, SPs can facilitate educational workshops that provide athletes with information regarding the different types of social support, work with the athlete to recognise who in their support network are best placed to provide these types of support, and discuss how this support can be mobilised. Doing so can not only increase an athlete's perception of available support, but also highlight any deficits in an athlete's support needs so that early intervention can take place. Further, SPs should encourage athletes to seek answers to questions they have about their injury and the rehabilitation process from individuals with the relevant expertise (e.g., physiotherapists) and experience (e.g., formerly injured teammates; Bianco, 2001; Carson & Polman, 2008; Johnston & Carroll, 1998). This is particularly important given injured athletes' ability to communicate effectively with rehabilitation personnel can affect their access to various forms of support and encouragement (Ninedek & Holt, 2000).

Significant Others (Family, Friends, Partners)

Family, friends, and partners represent the main sources of emotional (e.g., unconditional support, love, understanding) and tangible support (e.g., assistance with transport) that are essential to alleviate the stress associated with physical incapacitation, lack of mobility, and disruption to normal daily activities early after injury (e.g., Rees et al., 2010). Emotional support at this time can also help alleviate the perceptions of isolation athletes may encounter when, either through their own choice, or through the decisions of the coaching and medical staff, they are removed from the team environment. In such circumstances, significant others should be cognizant that this can diminish an injured athlete's support network, and thus exacerbate a sense of loss. It is important therefore that well-meaning network members recognise their support may not always be welcome at this time (Bianco, 2001). Indeed, too much support which can be construed as patronising and belittling may have an adverse effect by reducing self-esteem and making athletes dwell on the situation, leading to apathy and non-adherence (Johnston & Carroll, 1998; Niven, 2007).

Future Research Recommendations

Based upon our current understanding of the role of social support in the injury recovery process, and the insights this has (and has not) afforded us in supporting injured athletes, we highlight five important areas that warrant future research attention. First, although the qualitative research findings have been fairly consistent in identifying the role of specific types of support at specific stages during the recovery process, few quantitative studies have corroborated these findings. Thus, quantitative studies which account for the multidimensional nature of social support are needed to determine the unique effects of specific support types. This should include the simultaneous examination of perceived and received support and consider both the amount of functional support and the satisfaction (or perceived adequacy) of the support.

Second, it is imperative that researchers are explicit in stating who in the athlete's support network they are referring to when assessing the effects of functional aspects of social support. A criticism of the received support studies conducted to date is that some of them have predominantly used measures designed to assess support received from any number of members of an athlete's social network (e.g., significant others, coach, physiotherapist; Duda et al., 1989; Mitchell et al., 2014). Although the support an individual receives from their network is important, examining specific relationships within this network is necessary because the effects differ across individuals' specific relationships (Bianco, 2001; Johnston & Carroll, 1998; Levy et al., 2008). Without providing explicit instructions to differentiate between providers, researchers risk aggregating these effects which may confound the support types (e.g., emotional vs. tangible support) with the source of the support (e.g., whether the support is provided by an expert or close social tie), and thus limit our understanding of how different types of support function in specific types of relationships (the magnitude and direction of effect).

Third, future research should not only assess the functional aspects of support from the perspective of the recipient (i.e., the injured athlete), but also consider the perspective of the support provider(s). In doing so, we can begin to develop a better understanding of whether the exchange of support and perceived availability between members of an athlete's support network and the athlete is aligned. For example, using a critical incident approach (see Hanton et al., 2009), providers and recipients could reflect upon support exchanges following important incidents during the recovery process (e.g., when setbacks occur) to examine if there is congruence between what the provider "gives" and what the recipient interprets, and what impact this (mis)match can have on outcomes of interest.

Fourth, in order to reflect the dynamic and recursive nature of the injury process as it unfolds over time, future correlational studies should be prospective and longitudinal with repeated assessments of the different facets of social support. Doing so would not only allow us to examine the temporal aspects of support (e.g., fluctuations in types and providers), but also some of the more complex mediating relationships between social support, cognitive appraisals, and ongoing post-injury emotional and behavioural responses (e.g., adherence to rehabilitation).

Finally, Johnston and Carroll (1998) and Mitchell et al. (2014) called for future research to examine factors that moderate the success and effectiveness of support exchanges. While some investigations have examined the role of gender (e.g., Yang et al., 2010) and competitive level (e.g., Rees et al., 2010), there are a multitude of sociocultural and interpersonal factors that have yet to be examined. Personality variables, support seeking, support preferences, support expectancy, and relationship closeness (intimacy) are among a number of moderating factors that warrant further examination.

Learning Exercises

1. Why is it important to distinguish between perceived and received support?
2. Identify the different support types that have been discussed in the literature.
3. How might injured athletes' social support needs change across the different phases of rehabilitation and what are the reasons for these changes?
4. Discuss the relative merits of various social support providers in meeting injured athletes' needs during the different phases of injury.
5. What are the reasons for the provision of social support having detrimental effects?
6. What are the challenges that providers face in meeting injured athletes' social support needs?
7. Discuss the merits of utilising longitudinal designs to assess social support across the injury rehabilitation process.
8. Describe the advantages and disadvantages of adopting a unidimensional versus multidimensional approach to assessing social support.
9. Evaluate the advantages and disadvantages of assessing a homogenous sample relative to injury type.
10. Identify two types of support that injured athletes might benefit from during each of the three phases of rehabilitation and consider who might be best placed to deliver this support.
11. Provide two recommendations for each member of the injured athlete's support network (e.g., coach, teammates, parent) that could enhance the effectiveness of the provision of social support.

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Chapter 32
Promoting Adherence to Rehabilitation through Supporting Patient Well-Being: A Self-Determination Perspective

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Chapter Overview

The purpose of this chapter is to provide a framework to demonstrate how adherence to rehabilitation programmes and patient wellbeing can be supported through the application of a growth-based social cognitive theory commonly used within sports psychology today. The chapter is divided into four main sections: (a) a brief overview of self-determination theory, describing how it can be applied to promote rehabilitation adherence and patient wellbeing, (b) a description of the personal and situational factors which influence adherence, (c) a review of the most commonly used strategies by physiotherapists to promote adherence, and (d) an illustration of how these strategies can support basic psychological need satisfaction and support patient wellbeing. We conclude with a brief discussion on potential avenues for future research.

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Introduction

Rehabilitation adherence is defined as the extent to which a patient's behaviour corresponds with the health care professionals' recommendations (World Health Organisation [WHO], 2003). It is a behavioural process, greatly influenced by the environment (Vrijens et al., 2012), and shaped by individual social context, personal knowledge, abilities, motivation and available resources (Vrijens et al., 2012). In practical terms, rehabilitation adherence is the voluntary action of patients in abiding by health professional recommendations (Granquist & Brewer, 2013).

There are several clear, obvious and direct benefits of adhering to rehabilitation advice, such as: improved physical functioning, reduced pain, and improved quality of life (Armijo-Olivo, et al., 2011; Fransen & McConnell, 2009; Kay et al., 2005). However, despite the positive impacts on psychological and physical recovery following injury, adherence rates are consistently low (Granquist & Brewer, 2013), even when the value of adherence is widely reinforced by practitioners (Naqvi et al., 2020). To illustrate, patients have been found to be adherent only 50% of the time when in clinic (e.g., Kolt & McEvoy, 2003) and between 30–67% of the time in response to home exercise instructions (e.g., Beinart et al., 2013; Peek et al., 2017). Poor treatment adherence is not only a concern within physiotherapy (McLean et al., 2010), but also within cardiovascular medicine (Kolandaivelu et al., 2014), asthma treatment (Bender & Rand, 2004), and affective disorders (Colom et al., 2005). Further to the adverse impact non-adherence has on functional outcomes, it has also been related to excess care visits, increased treatment costs and increased hospitalisation (Svarstad et al 2001). Indeed, it is estimated that the cost of nonattendance to appointments was approximately £18,000 (US $24,344) per week in a Community Musculoskeletal (MSK) Physiotherapy Service (Tan et al., 2017). Treatment non-adherence may also elicit indirect costs in terms of decreased productivity (Jin et al., 2008), further illustrating the importance of supporting adherence to rehabilitation programmes to both improve patient outcomes and decrease the burden on health care services and business.

In addition to providing direct functional support for injury rehabilitation, a broader understanding of the reasons why patients comply with rehabilitation guidance may help practitioners increase patient engagement while also facilitating post-treatment outcomes (Williams et al., 2006). Furthermore, Driver et al. (2019) reported that physiotherapists recognise the psychological effect of injury occurrence and the impact that effective psychological support following injury may have on treatment outcomes.

Healthcare professionals are influential in creating interventions to both reduce the negative responses associated with injury, and promote adherence (e.g., Gordon et al., 1998; Pearson & Jones, 1992). Mechanistically, though it is widely reported that physiotherapists use psychosocial strategies in practice to promote adherence (Driver et al., 2019), it is also important that strategies are evidence-based and theoretically underpinned (Driver et al., 2019) to increase the likelihood that injured athletes recover both physically and psychologically from injury.

Given the importance rehabilitation adherence has on outcomes, the focus of this chapter is on utilising motivational research on adherence to identify explicit and more implicit strategies used to support adherence and engagement in rehabilitation programmes. A secondary objective is to link these strategies inductively to a motivational theoretical framework that, based on the satisfaction of fundamental psychological needs, simultaneously predicts individual psychological wellbeing. More specifically, the chapter (a) discusses how motivational theory can be used as a framework for promoting adherence and enhancing psychological wellbeing; (b) provides an overview of the most utilised strategies by physiotherapists to promote adherence; (c) indicates how current strategies may satisfy basic psychological needs and support patient wellbeing, and (d) provides suggestions on future research.

Understanding Adherence to Rehabilitation

The effectiveness of musculoskeletal injury rehabilitation is often inhibited by patients failing to adhere to programmes provided by physiotherapists (McLean et al., 2013). Unsurprisingly, there are consequences of non-adherence for treatment effectiveness and the duration of treatment (Martin et al., 2005). Furthermore, it also increases the demand placed upon health care professionals, undermines the therapeutic relationship, and increases waiting times, cost of care, and ill-being (e.g., Hayden et al., 2005; Jin et al., 2008). In contrast, adhering to recommended medical advice has been associated with improved physical functioning, reduced pain, positive wellbeing, and overall improved quality of life (Armijo-Olivo, et al., 2011; Ben-Ezra et al., 2013; Fransen & McConnell, 2009; Kay et al., 2005). Non-adherence can be manifested in a number of different ways, for example: performing exercises incorrectly, forgetting or misunderstanding advice, paying inadequate attention to instructions, or failure to attend set appointments (Martin et al., 2005).

Self-Determination Theory

Specifically, in the context of rehabilitation adherence, researchers have frequently adopted psychosocial motivational theories to help explain the factors underlying behavioural change (Hagger et al., 2009; Hagger, 2010; for further discussion, see Chapter 2 [Rebar et al., 2021], Chapter 3 [Quested et al., 2021], Chapter 4 [Brand & Ekkekakis, 2021], and 5 [Delli Paoli, 2021]). One such growth-based social cognitive theory used extensively across multiple contexts and specifically within healthcare is the self-determination theory (SDT; Ryan & Deci, 2017; Ryan & Deci, 2000; also see Chapter 3; Quested et al., 2021). SDT posits that human beings have innate tendencies for growth, to master challenges and to assimilate motives as they seek a coherent sense of self (Ryan & Deci, 2000). In other words, they engage in activities that give them purpose and value. The extent of its use is attributed to its scope in encompassing the social environment and individual psychological factors, and the fact that it is growth-focused, and readily (and intuitively) applicable to interventions targeting intrinsic motivation, wellbeing and health. Further, SDT is a theory that, in addition to recognising the role of competence to motivated behaviours, incorporates the concepts of autonomy and the feeling of being connected as fundamental to motivation, enhanced performance, and wellbeing (Standage & Ryan, 2012).

SDT is a macro-theory comprising six mini theories, each of which aim to describe motivational based phenomena emerging from research (Deci & Ryan, 2000). According to SDT, growth, development, intrinsic motivation, and wellbeing are most readily achieved in social contexts that are supportive of three innate and fundamental psychological needs: autonomy, competence, and relatedness (Ryan & Deci, 2000). According to basic psychological needs theory (BPNT; Ryan & Deci, 2000) the three needs are essential nutrients for growth and effective functioning. Specifically, the need for autonomy is characterised by the desire for humans to act consistently with their own interests and values. The need for competence pertains to meeting challenge and achieving mastery in a given context, while relatedness represents the need for a supporting, caring connection with others (Deci & Ryan, 2000). It is suggested that environments perceived as supportive (socially), nurturing of confidence, and volitional, increase a sense of wellness and vitality (Ryan & Deci, 2017; Deci & Ryan, 2000).

BPNT has been used extensively to examine optimal growth, motivation and wellbeing (Hodge & Gucciardi, 2015). The satisfaction of autonomy, relatedness, and competence supports these growth tendencies and specifically, motivation is internalised (i.e., externally prompted motives become increasingly self-regulated; Deci & Ryan, 2000), and wellbeing is increased (Molix & Nichols, 2013). Consequential positive effects have been realised in health (Baard et al., 2004), work, and exercise (Gunnell et al., 2013) contexts. Ryan and Deci (2000) proposed that the degree to which the three psychological needs are fulfilled will affect the extent to which an individual will engage in positive behaviours (e.g., adherence to rehabilitation programmes). In contrast, if these needs are frustrated. ill-being and passive engagement are predicted (e.g., non-adherence; Gunnell et al., 2013).

Researchers have highlighted the beneficial influence of supporting basic psychological needs on individual's wellbeing across a variety of domains such as: education (Miserandino, 1996), work (Gagné & Deci, 2005), family (Gronlnick et al., 1997), and sport (Gagné et al., 2003). Within the rehabilitation context, previous work has demonstrated that when needs are supported, participation in treatment is more volitional, and long-term adherence more likely (Ng et al., 2013). Within an injury context, but specifically focusing on effective return to sport, Podlog and colleagues (2010) explored whether satisfying athletes' basic psychological needs would improve aspects of wellbeing and produce positive *return to sport* outcomes. They concluded that competence perception fulfilment was related to higher levels of vitality and positive affect, which partially predicted an enhanced perspective upon return to sport. Additionally, satisfying the need of relatedness was positively related to increased levels of self-esteem and vitality, which reduced concerns over returning to sport following injury. Environments that promote the satisfaction of the three basic needs can thus be instrumental in reducing concerns regarding returning to sport following injury (Podlog & Eklund, 2006; Podlog & Eklund, 2007a). Although there is an increasing amount of research exploring need satisfaction in an injury context, research examining the frustration of these needs has been limited (Gunnell et al., 2013). While health-related research has tended to focus on individuals' perceptions of their medical professionals' support of their basic psychological needs (Ng et al., 2013), additional research on the influence satisfying and frustrating basic psychological needs has on sport injury and rehabilitation may prove illuminating (Li et al., 2019).

At an organisational level, Hall et al. (2010) and Picorelli et al. (2014) suggest that, to improve treatment adherence, health professionals should function within environments that enable them to make specific rehabilitation regimen decisions based on: patient preference, clinical circumstances, personal experience, and scientific evidence. The desirability of a more patient-centred approach to rehabilitation is further supported through studies which have indicated that, at an individual level, physiotherapists understand the importance and potential to effect successful outcomes following treatment, and of using psychosocial interventions to increase rehabilitation adherence (Driver et al., 2019; Hemmings & Povey, 2002; Francis et al., 2000; Arvinen-Barrow et al., 2007; Holden et al., 2015; Arvinen-Barrow et al., 2010; Laffety et al., 2008; Niven, 2007). Moreover, they also acknowledge the value of utilising psychological strategies in their practice to help alleviate the potential negative psychological effects associated with injury (Jevon & Johnston, 2003; Clement & Arvinen-Barrow, 2013; Arvinen-Barrow et al., 2010). Although the importance of adherence and psychosocial strategies to enhance rehabilitation are clearly expressed by physiotherapists, research suggests that many practicing physiotherapists lack confidence in using such strategies (Driver et al., 2019; Jevon & Johnston, 2003). Nevertheless, it is encouraging to know that physiotherapists have explicitly expressed interest in gaining knowledge of psychosocial strategies which may increase rehabilitation adherence (Arvinen-Barrow et al., 2007; Arvinen-Barrow et al., 2010; Hemmings & Povey, 2002). One of the key predictors of effectively implementing behavioural change is understanding other factors that might impact on one's ability to do so; adherence is no different.

Moderating Factors in Predicting Adherence to Rehabilitation

It is clear from the evidence reviewed that using growth-based models such as SDT and specifically its sub-theory of basic psychological needs as a framework for promoting adherence to rehabilitation protocols may be fruitful (Podlog et al., 2007b). Unfortunately, however, simply creating environments that support basic needs and thus according to SDT, wellbeing may oversimplify the situation. Within the personal and social milieu there are a variety of other factors that can impact the relationship between received instructions and adherence in the context of injury (Jack et al., 2010).

Post-injury behaviour, such as adherence, is influenced by patients' cognitive appraisals of a variety of personal and situational factors; these in turn influence perceptions of the injury state and in turn behavioural and emotional responses (Brewer, 2001; Brewer at al., 2003; Wiese-Bjornstal et al., 1995; Wiese-Bjornstal et al., 1998). Personal factors include type of injury (e.g., type, severity), and psychological (e.g., motivation, personality, kinesiophobia), physical (e.g., physical state, activity levels) and demographic (e.g., gender, age) individual differences (Walker et al., 2007). Whereas situational factors relate to environmental (e.g., physiotherapy environment, rehabilitation sessions) and social influences (e.g., social support; Marshall et al., 2012).

Consideration of potentially moderating factors will allow practitioners to both predict lower levels of adherence (Wheeler et al., 2012), and further consider their approach to individualised patient support. Psychosocial motivational theories have been instrumental in describing behaviour regulation in the rehabilitation environment (Hagger et al., 2009; Hagger, 2010); gaining a nuanced understanding of *why* patients engage or disengage in rehabilitation will likely enhance promotion of adherence (Goddard et al., 2020). Moreover, when developing interventions to successfully facilitate behaviour change, these should be theoretically grounded and evidence-based around the factors that influence successful rehabilitation (Arvinen-Barrow & Clement, 2017; Lippke & Ziegelmann, 2008). Within this section, we will reflect on a number of personal and situational factors that have been demonstrated to moderate the relationship between prescribed rehabilitation protocols and adherence within athletic populations; these may need to be considered in targeting basic need satisfaction and wellbeing.

Personality Characteristics

In their extensive review (n = 45 studies), Appaneal and Habif (2013) identified over twenty personality characteristics associated with rehabilitation and injury outcome (e.g., anger, depression, anxiety, optimism, competitiveness, hardiness). Consequently, the role of personality in predicting rehabilitation adherence may be a significant area to examine (Wheeler et al., 2012). For a more comprehensive discussion on personality and physical activity, see Chapter 6 (Wilson & Rhodes, 2021).

Of the research that has been conducted, much has focused around the "Big Five" personality domains of Neuroticism, Openness, Extraversion, Agreeableness and Conscientiousness (Costa & McCrae, 1992), with evidence provided of associations with rehabilitation adherence. For example, positive correlations have been found between adherence and extraversion (Booth-Kewley & Vickers 1994; Courneya & Hellsten, 1998; Lin et al., 2007; Wheeler et al., 2012), agreeableness (Booth-Kewley & Vickers, 1994) and conscientiousness (Booth-Kewley & Vickers, 1994; Courneya & Hellsten, 1998; Sakofske et al., 2007). Conversely, negative correlations have been reported between adherence and neuroticism (Courneya & Hellsten, 1998; Kewley & Vickers, 1994; Sakofske et al., 2007). More recently, exploring adherence within diabetes patients, Wheeler et al., (2012) found that conscientiousness and extraversion were related to adolescents' self-report of adherence, while neuroticism was significantly related to non-adherence. In contrast, Hilliard et al. (2014), utilising the Big Five, found that there were no significant correlations between neuroticism, extraversion, and adherence to exercise participation, however, they found that conscientiousness, agreeableness, and openness were significantly correlated with adherence. According to Hilliard and colleagues (2014), the Big Five personality factors explained 9% of the variance in attendance to all rehabilitation sessions, and 16% of the variance in adherence ratings across sport settings.

Whilst the extent of the research is substantial, it is difficult to draw conclusions on specific personality characteristics as replication of research is scarce (Appaneal & Habif, 2013). Nevertheless, whether directly related to adherence, or through other identified predictors, understanding their patients, and the personality attributes that may predict adherence will assist practitioners in tailoring programmes to more effectively meet individual needs (Wheeler et al., 2012).

Self-Efficacy

Self-efficacy is a widely researched individual difference factor which has been found to impact rehabilitation adherence (McGrane et al., 2015). Defined as the belief in one's ability to execute certain tasks and to achieve a specific outcome (Bandura, 1977), research examining the role of self-efficacy on adherence has demonstrated significant positive correlations between self-efficacy and physical and mental health (e.g., Robb et al., 2013) and resultant elevated levels of physical functioning (e.g., Carlsson et al., 2004). Specifically, in a rehabilitation adherence setting, self-efficacy has shown to be a strong predictor of adherence to home-based physiotherapy treatments (McGrane et al., 2015), outpatient physical therapy (Jack et al., 2010), and cardiac rehabilitation and exercise treatment (e.g., Martin & Sinden, 2001; Slovinec D'Angelo et al., 2014). According to Mayer (2014), self-efficacy plays a significant role in adherence to rehabilitation programmes due to its association with motivation. This function may be realised through its influence on the initiation of behaviours and persistence to overcome barriers to achieve results (Bandura, 1997; Schwarzer & Luszczynska, 2007). Self-efficacy is also associated with problem solving which increases positive emotions and relates to one's sense of control over their environment and behaviour (Bandura, 2001); these may in turn facilitate rehabilitation adherence. Research on the closely related concept of self-esteem (Judge & Ilies, 2002) suggests that if a patient perceives that they are unable to accomplish tasks set and do not receive support from their medical professional, esteem is undermined (Pettigrew, 2001). Promoting self-efficacy or the belief in the patient's ability to meet the demands of rehabilitation tasks and recover effectively is therefore likely to promote both adherence and positive affective behaviours. For further discussion on self-efficacy, see Chapter 27 (Hepler et al., 2021).

Emotional Responses

Injury can be a stressful time for most individuals, and how they respond to injury is dependent on the individual's cognitive appraisals, which subsequently influence emotional responses (e.g., anger, fear, tension; see Chapter 12 for more discussion on affect, emotion, and mood; Zenko & Ladwig, 2021), and as previously mentioned, behavioural responses (e.g., rehabilitation adherence; Wiese-Bjornstal et al., 1998). In short, Wiese-Bjornstal and colleagues suggest that cognitions influence emotions which in turn affect behaviours, and these are likely to impact on wellbeing and outcomes following injury (Walker et al., 2007). Injured individuals may experience depression, anxiety, and posttraumatic stress disorder (PTSD; Giummarra et al., 2018). Indeed, research suggests that a fifth of individuals who sustain traumatic injury display psychological distress, and one in three meet the threshold for depression and PTSD (Shih et al., 2010; Sterling et al., 2011). While it is normal for athletes to encounter emotional responses such as tension, depression, anger, frustration and boredom (Evans & Hardy, 2002; Pearson & Jones, 1992; McDonald & Hardy, 1990), up to 13% report high levels of psychological distress post injury (Brewer et al., 1993) and severity of the injury exacerbates the risk of significant psychological issues (Heil, 1993). Given that psychological distress may remain high up to three years following injury (Craig et al., 2016), helping patients constructively manage their appraisals of injury and rehabilitation may be an important support function of physiotherapists.

Social Support

As alluded to at the start of this section, Wiese-Bjornstal et al.'s (1998) integrated model of responses to sports injury suggests that situational factors (e.g., rehabilitation environment, rehabilitation sessions, social support, treatment efficacy) influence cognitive appraisals of the injury, and these in turn have a significant impact on behaviour, emotional responses, and rehabilitation outcomes (Wiese-Bjornstal, 2010). The model also specifically describes the influence social support has on rehabilitation adherence; it is viewed as an important factor in assisting individual abilities to cope with the stressors associated with injury (Mitchell et al., 2014; Wiese-Bjornstal et al., 1998). Regarding rehabilitation adherence, early research suggested that social support is a key predictive factor (Byerly et al., 1993). More specifically, and in support of the model, research has confirmed that social support can facilitate rehabilitation adherence by boosting self-esteem, buffering stress, increasing perceived tangible assistance, decreasing depression symptoms (Mitchell et al., 2014; Wallston et al., 1983; Shumaker & Hill, 1991) and enhancing subjective wellbeing (Thomas, 2010). Receiving and perceiving support from friends, family, significant others (e.g., coaches), and healthcare professionals is pivotal to adherence (Magee et al., 2010), and in the context of rehabilitation, the physiotherapist is pivotal to providing social support for the patient (Gordon et al., 1998).

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Therapeutic Alliance

A strong working alliance based on consensus in relation to goals, tasks set and a positive connection between patient and provider (Fuertes et al., 2017) is important in health care (Koudriavtseva et al., 2012). A strong alliance also encapsulates emotional and cognitive components of communication, with goal setting and trust seen as vital to achieving successful outcomes (Fuertes et al., 2017). Fuertes and associates found medium to large effects when examining working alliance and patients 'buy-in' to treatment, perception of benefit from treatment, and rehabilitation adherence (Fuertes et al. 2007; Fuertes et al., 2008; Fontanella 2013; Fuertes et al. 2013; Fuertes et al. 2015).

A key component of the therapeutic relationship is the concept of trust, and while trust between patient and practitioner has been widely researched, operationalising the concept of trust has been difficult (Pearson & Raeke, 2000). Nevertheless, Rowe and Calnan (2006) found trust to facilitate strong working relationships between health care professionals and patients, and consequently, it has been the focus of several studies in recent years (Fuertes et al., 2017). Thom et al. (2002), for example, found that patients who had low levels of trust in their health care provider were less likely to maintain their treatment recommendations, report fewer symptom improvements and lower satisfaction with the care provided. Furthermore, Baker et al. (2003) identified trust between patient and health care professional as the main predictor of treatment satisfaction.

Independent of trust, the working alliance has been associated with patient belief in efficacy of treatment, treatment adherence and patient satisfaction (Fuertes et al., 2007). Brewer and colleagues (2003) reported that patients' belief in treatment predicted rehabilitation attendance and adherence. Therefore, it is important that practitioners have a close working relationship with patients to ensure that they can improve patients' perceptions of treatment efficacy (Levy et al., 2008). Exploration into the working alliance is in its infancy (Fuertez et al., 2017), nevertheless, preliminary research in this area suggests it is a promising area for interventions in adherence (Schoenthaler et al., 2009), as stronger relationships between medical professionals and patients can lead to better buy-in, increased patient satisfaction, and improved treatment outcomes (Fuertes et al., 2007; DiMatteo et al., 1993).

Treatment Efficacy

While self-efficacy pertains to an individual's belief in their ability to be successful (Bandura, 1977), treatment efficacy is described as an individual's belief that the prescribed treatment will lead to desired health outcomes (Taylor & May, 1996). Strong treatment efficacy and perceptions of effectiveness of rehabilitation has been positively associated with better adherence to rehabilitation programmes (e.g., Brewer at al 2003a; Evans & Hardy, 2002; Milne et al., 2005). Levy et al. (2008) found that treatment efficacy predicted adherence in both home-based and clinical based rehabilitation. Exploring the role of psychological processes on outcomes following shoulder physiotherapy, Chester and colleagues (2018) more recently concluded that patients who expected or believed that their treatment would lead to a complete recovery had more successful outcomes. The aforementioned research aligns with Bandura's (1977, 1982) self-efficacy theory which indicates that self-efficacy impacts cognitions, behaviours, actions, and emotions. Further, and of particular pertinence to the rehabilitation context, Bandura (1982) argued that increased efficacy would determine coping behaviours and dejection following past failures. Consequently, an athletes' appraisal of their self-efficacy following injury is highly likely to impact their future behaviour, such as adherence (Hargreaves & Waumsley, 2013). One method that physiotherapists may use to facilitate treatment efficacy and increase an individual's sense of autonomy is through the process of setting mutual goals with patients (Kingston & Wilson, 2009). Crucially, facilitating treatment efficacy through this mechanism may also increase meaningful communication, and improve relationships between the patients and the supporting medical professionals (Wadey et al., 2011).

Although there are any number of factors that can impact on rehabilitation adherence which are beyond the scope of SDT, this section highlights the importance of supporting personality factors such as conscientiousness, facilitating belief in meeting the demands of the rehabilitation process, and ensuring that patient emotional states are considered. At a situational level, it is clear that the physiotherapist can play a pivotal role in supporting the injured athlete and facilitating patient belief through effective communication and connecting with patients in a respectful and trustful manner.

The research reviewed paints a compelling picture of personal and situational factors affecting rehabilitation adherence and wellbeing. It is important therefore, that practitioners at all levels are provided with opportunities to better support engagement with rehabilitation protocols. Physiotherapists clearly already utilise many appropriate strategies to promote adherence in practice, and it is likely that these strategies also satisfy the three basic psychological needs of autonomy, competence, and relatedness. The following section of this chapter will consider research on self-reported use of strategies by physiotherapists to promote rehabilitation adherence. Further, there will be an attempt to explicitly link the reported strategies to the satisfaction of basic psychological needs to illustrate their potential wider benefits for motivation, growth and wellbeing.

Common Strategies Utilised by Physiotherapists in Practice

Goal Setting, Monitoring Progress, and Positive Reinforcement

Goals are direct regulators of human action; they can be used to provide impetus for behaviours (Kingston & Hardy, 1997; Locke & Latham, 1985; Ryan & Deci, 2000). Goal setting, (i.e., the act of identifying and strategizing around objectives) contributes to action through two main functions, a motivational function and a cognitive function. Motivationally, goal setting influences the degree of effort an individual commits towards a goal (Locke & Latham, 1990), while the cognitive effects of setting goals influence the individual through, for example, increased focus and action, increase persistence, and the adoption of alternative strategies when they are in doubt (i.e., problem solving; Locke & Latham, 1990; Locke & Latham, 2013). It is apparent, therefore, that it is not so much the goals themselves that provide volition, but the process of reflecting, setting, strategizing and pursuing goals that create the impetus for action (Kingston & Wilson, 2009).

Research examining strategies to enhance adherence to rehabilitation programmes has demonstrated that goal setting is a key strategy (Arvinen-Barrow et al., 2010; Arvinen-Barrow et al., 2007; Babatunde et al., 2017; Driver et al., 2019; Hemmings & Povey, 2002; Holden et al., 2015; Jevon & Johnston, 2003; Niven, 2007). More specifically, Niven (2007) reports that setting goals, progress monitoring, and provision of positive feedback (from physiotherapists) are frequently used to support adherence. Furthermore, goal setting is reported to encourage accountability, especially when patients have had an input into the goal setting process (Niven, 2007). Babatunde and colleagues (2017) found that a third of physiotherapists in their study used goal setting to enhance rehabilitation adherence, while Driver and colleagues (2019) found that 95% of the physiotherapists surveyed used goal setting in the last 12 months. This frequent use of goals and goal setting is also supported in research highlighting the benefits of using goal setting to increase rehabilitation adherence (Scherzer et al., 2001; Evans & Hardy, 2002).

Reinforcing the findings of Niven (2007), as well as the notion that goal setting itself positively impacts engagement and adherence, a number of researchers have demonstrated the beneficial effects of goal-based positive reinforcement and feedback to patients (Arvinen-Barrow et al., 2007; Driver et al., 2019; Francis et al., 2000; Holden et al., 2015). This starts to illustrate some of the mechanisms underpinning the positive effects of goals. Francis and colleagues (2000), for example, found that physiotherapists in a sport setting used short-term goals to increase athlete motivation and provide positive reinforcement. Extending this suggestion, Driver et al. (2019) argued that positive reinforcement may be a physiotherapists natural response to encourage desired behaviours, rather than a specific strategy to enhance rehabilitation adherence. The importance of monitoring goals as a route to providing feedback and encouragement to patients during rehabilitation has been demonstrated widely (Babatunde et al., 2017; Niven, 2007; Peek et al., 2017), and further is considered to be one of the key components to support physical activity behavioural change (National Institute of Clinical Excellence [NICE], 2014).

Whilst the evidence presented suggests that goal setting, monitoring progress, and providing positive reinforcement are beneficial for increasing rehabilitation adherence, it is also reasonable to suggest that the basic psychological needs of competence and autonomy are simultaneously being satisfied. Making the link between these two concepts, Deci and Ryan (2000) contended that to understand goal-directed behaviour (as well as the psychological development and wellbeing), one must consider the three basic psychological needs that give goals their psychological potency, and which influence the regulatory processes which direct goal pursuits. Extending this link, and in alignment with the predictions of SDT and need satisfaction, Latham and Locke, (2007) proposed that goal setting not only positively affects performance, but also increases subjective wellbeing.

Achievement has a cyclical relationship with self-confidence. In the rehabilitation context, when patients are completing their goals in their rehabilitation, they are more likely to feel confident in their injury, which in turn allows them to master the rehabilitation exercise they have been tasked with (Niven, 2007; Brewer et al., 2003; Podlog & Eklund, 2010). By providing patients with positive feedback, positive encouragement, and reinforcement, clinicians provide patients with the opportunity to develop confidence in their capability to complete their rehabilitation exercises correctly. In both cases the basic need of competence is likely being fulfilled, and behaviours become increasingly self-regulated and integrated to the self (Ryan & Deci, 2000).

One of the secondary benefits to sharing information and helping patients understand the importance of completing exercises correctly is that they perceive a greater level of autonomy around their treatment. According to Podlog et. al. (2011), if physiotherapists increase an individual's control over rehabilitation, they can reduce any external pressures following injury. This can be done, for example, by allowing patients or athletes to select when or how they carry out their rehabilitation exercises. Furthermore, allowing patients to have input in the goal setting process may also increase their sense of control. With mutually agreed upon goals, patients are more likely to adhere because there is a sense of ownership, thus satisfying the need of autonomy (Podlog & Eklund, 2010), and helping them to internalise their rehabilitation behaviours.

The process of setting goals, monitoring progress, and receiving positive reinforcement from physiotherapists is a key strategy utilised by physiotherapists to facilitate rehabilitation adherence. In addition to the direct motivational benefits around effort and persistence, by utilising these strategies, physiotherapists are also likely to be increasing patients' perceptions of competence around the injury. Moreover, encouraging patients to have an input into the goals set in rehabilitation, sharing information, and giving ownership in completing exercises correctly may support autonomy perceptions.

Providing Information and Rationale for Treatment

Babatunde et al. (2017) noted that providing patients with information and a rationale of treatment was a commonly cited strategy used by physiotherapists. Physiotherapists have suggested that increasing patient knowledge of injury can help create a strong working relationship between them and the patient (Peek et al., 2017). It can increase confidence, positive perceptions regarding the cessation of treatment, and speed the rehabilitation process (by providing clear steps of rehabilitation; Podlog & Eklund, 2009; 2010), as well as patient adherence (Peek et al., 2017).

The manner in which this information is provided can range from verbalising strategy and potential benchmarks to providing supportive written or online resources. Receiving education on self-management of treatment has been found to have a positive effect in patients with chronic low-back pain (Cooper et al., 2009). Similarly, Ninedek and Kelt (2000) reported that increasing patient knowledge and understanding of their injury increases the likelihood of effectively coping with the associated psychological stress. Educating patients and providing knowledge regarding their injury is also likely to enhance the quality of the patient-physiotherapists relationship; this has been highlighted as a key predictor of patient engagement in rehabilitation (Podlog & Eklund, 2007). Similarly, providing patients with information is likely to facilitate trust, which in turn would increase the connection between them and support the working alliance. This collaboration with and provision of resources to patients, and the closeness and enhanced connectivity that results, is likely to support the basic psychological need of relatedness. Further, providing patients with advice, guidance, and knowledge regarding their injury and prevention helps satisfy the basic need of competence through instilling belief regarding recovery, notably around returning to sport (Podlog et al., 2011).

Tailoring Exercises to Individual Patient Needs

Central to the notion of patient-centred support, is the value attached to an individualised approach. This facilitates the perception that patients' needs are the primary rationale for specific prescribed exercises. Fundamentally, by designing exercises which are patient-centred, individuals are more likely to engage in the rehabilitation process (Hall et al., 2010; Niven et al., 2007). There is an abundance of evidence to support this contention; physiotherapists provide a wide variety of exercises which are injury site and severity dependent and are often tailored to meet individual patient needs (Babatunde et al., 2017; Peek et al., 2017, Niven, 2007). In fact, 60% of physiotherapists noted that they manipulate aspects of the rehabilitation programme on an individual primarily to facilitate adherence (Babatunde et al., 2017). For example, individualised regimens would reflect how exercises could be incorporated into a patient's daily routine, reduce the frequency or complexity of exercises, and be based on patient preferences (Babatunde et al., 2017; Peek et al., 2017).

The tailoring of rehabilitation programmes to individuals provides the opportunity to support all three of the fundamental basic needs described within SDT. Rehabilitation programmes with significant patient input and mutually agreed upon exercises and goals are likely to promote a strong working alliance between the patient and physiotherapist (and hence support the need relatedness), and increase the patient's perception of autonomy. Further, by tailoring sessions based on patient ability, preferences, and lifestyle, patients are more likely to: (a) complete their prescribed rehabilitation programmes, and (b) master the specific exercise, and thus satisfy the basic need of competence.

Adopting a highly individualised approach can help patient's perception that their needs are front and centre of decisions regarding specific support. Tailoring exercises and designing bespoke programmes has been associated with improved rehabilitation adherence (Babatunde et al., 2017; Peek et al., 2017, Niven, 2007). Furthermore, the wider benefit in terms of performance and wellbeing can be realised as tailoring exercises to suit patients' requirements can simultaneously satisfy all three basic psychological needs.

Providing Practical and Emotional Support

In the context of rehabilitation, the physiotherapist is ideally placed to provide support to the patient (Koudriavtseva et al., 2014). Following injury, an athlete may experience a range of feelings such as anxiety, frustration, anger and/or isolation (Johnston & Carroll, 1998), which may be alleviated or suppressed through physiotherapists direct support or by increasing a patient's sense of support (Arvinen-Barrow et al., 2010; Jevon & Johnston, 2003; Niven, 2007). Physiotherapists can support and influence rehabilitation adherence positively in a number of ways by building a positive rapport and communicating effectively with patients (Granquist & Brewer, 2013). Moreover, providing patients with a rationale for exercises without jargon or overly technical language, and recognising individuals needs for informational and emotional support, are examples of how a physiotherapists' can promote an environment which encourages rehabilitation adherence (Granquist & Brewer, 2013). Interviews with physiotherapists indicate that they see it as their role to provide support to patients, as they are more likely to adhere if they are comfortable in the environment (Anderson, 2007). It is also important to note that physiotherapists understand that, if patients are insufficiently supported by significant others, it can have a negative impact on adherence (Niven, 2007; Nindek & Kolt, 2000). Consequently, any methods to help patients' sense of direct and indirect support can help support adherence through fulfilling the basic psychological need of relatedness. This relatedness-enhancing support can take many forms, such as listening to concerns, helping individuals control emotions, providing positive feedback, providing education about the injury, and providing steps to overcome the injury (Podlog & Eklund, 2010). It is also important to recognise that support should be consistent, and active. Being too hands off in an attempt to give autonomy, or perceiving that the patient requires less support as they progress through the rehabilitation, may inadvertently undermine basic need satisfaction, which can have a consequential impact on rehabilitation outcomes and patient wellbeing (Podlog et al., 2011).

Implications

This chapter has provided an overview of the research surrounding rehabilitation adherence with specific reference to some of the factors that underpin engagement with rehabilitation. The BPNT has been used extensively to examine optimal growth, motivation, and wellbeing (Hodge & Gucciardi, 2015), and research suggests that environments supportive of the three basic psychological needs of autonomy, competence, and relatedness promote positive health behaviours and wellbeing (Baard, et al., 2004; Gunnell et al., 2013; Molix & Nichols, 2013). One such adaptive behaviour that results from need satisfaction, and in the context of injury rehabilitation, is adherence (Gunnell et al., 2013). In practice, physiotherapists are integral in providing both physical and psychological support to patients (Jevan & Johnson, 2003), and therefore it is important for physiotherapists to develop a clear understanding of strategies to increase adherence and their potential wider implications (e.g., working alliance, emotional support, and wellbeing).

Broadly speaking, to support the needs of autonomy, relatedness, and competence, physiotherapists should aim to create environments which satisfy these needs (Podlog et al., 2010). Whilst it is recognised that physiotherapists currently use several strategies that effectively support adherence, a more formalised, direct approach may help to optimise adherence and satisfy basic psychological needs. Although much of the empirical support for the value of basic need satisfaction has focused on need satisfaction, frustration of these needs even inadvertently may undermine adherence and wellbeing. This type of strategic approach has the potential to help patients assimilate motives and facilitate wellbeing throughout the rehabilitation process.

It is important to acknowledge that whilst it seems that innate psychological need satisfaction in the rehabilitation environment would produce positive outcomes, there are a number of factors which have the potential to moderate its relationship with adherence and subsequently the effectiveness of treatment (Brewer, 2001). Whilst those that have been highlighted within the research to date have been discussed, there are any number of other personal and situational factors which may impact the ability of a patient to adhere to recommended treatment. It is important that future research systematically examines *in situ* the personal and situational factors which predict rehabilitation adherence, the direct and indirect effects of psychological need satisfaction (or thwarting), and the consequences for psychological wellbeing and clinical outcomes. Such work has the potential to provide a more holistic picture for physiotherapists of the factors influencing rehabilitation adherence and outcomes. It is also important to consider and further explore physiotherapists' views, knowledge, and perceptions of adherence; it is clear from the research to date that they have a rich insight into factors influencing adherence, and that they utilise a number of strategies that also enable basic psychological need satisfaction.

Post-injury behaviour changes are influenced by cognitive appraisals of personal and situational factors, and these in turn influence perceptions of the injury state and associated behavioural and emotional responses (Brewer, 2001; Brewer at al., 2003; Wiese-Bjornstal et al., 1995; Wiese-Bjornstal et al., 1998). It is therefore important that differences and changes in wellbeing and need satisfaction are monitored through the different stages of injury (i.e., onset, rehabilitation and return to play). Future research should therefore utilise a longitudinal approach to understanding how needs may be satisfied or frustrated throughout the course of the injury (Podlog et al., 2010).

Finally, although we have demonstrated physiotherapists are using many strategies which inadvertently (and simultaneously) support adherence and basic psychological need satisfaction, more work is required on educating practitioners through targeted continued professional development.

Conclusion

The objective of the physiotherapist is primarily to facilitate recovery from injury through movement and exercise, manual therapy, education and advice. It is apparent that, within their advice and support particularly around self-administered rehabilitation they simultaneously meet and nurture the basic psychological needs of their patients. Consequently, in accordance with Deci and Ryan's (1985; 2000) SDT, the benefit to patients of, for example, shared decision-making, feedback, resource support, and ongoing communication, is that in addition to directly facilitating recovery, there are wider and simultaneous benefits for patient psychological wellbeing. This chapter has sought to illustrate these benefits and provide some guidance on how these widely used strategies may be more effectively framed to satisfy the basic needs. We have also discussed a number of moderating factors that may influence the relationship between physiotherapy support and adherence to rehabilitation.

Developing a consistent and strategic-based approach to supporting rehabilitation adherence explicitly grounded in motivational theory, empiricism, and descriptions of strategy use by physiotherapists can go a considerable way to help to facilitate patient adherence, promote adaptive behaviours and cognitions, and more broadly enhance patient wellbeing.

Learning Exercises

1. Why is an understanding of self-determination theory, and in particular it's sub-theory of basic needs potentially so helpful for the practicing physiotherapist?
2. Physiotherapists can have both a direct and indirect influence on patient wellbeing; please explain how and why?
3. What are the primary factors that influence adherence to rehabilitation guidance?
4. Why is personal and collaborative goal setting viewed as such a fundamental skill in supporting adherence of the injured athlete?
5. In what ways can the physiotherapist directly support the injured athletes three basic psychological needs?
6. How can the knowledge gleaned from this chapter enhance the applied practice of physiotherapists and patient outcomes?

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Chapter 33
Working in Sport, Exercise, and Performance Psychology

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Chapter Overview

The field of sport, exercise, and performance psychology (SEPP) presents a multitude of opportunities to work across different sectors and with unique populations. Whilst a primary area of career focus for students undertaking studies is sport and exercise, the application of SEPP has been observed within performing arts, creative industries, business, health, education, and military settings. Consideration of tailoring placement and internship experiences, in addition to research topics, during undergraduate and postgraduate training is helpful in providing early career practitioners with experience to not only better position their entry into the profession, but also to provide them with an understanding of the various applications of SEPP out in industry. Investigating what type of role and job options are available in the field and what they entail, additionally assists in shaping decision-making about future career opportunities. The following chapter explores the author's experience and observations regarding working as a sport, exercise, and performance psychologist across a range of sectors, including suggestions regarding how to best prepare for and develop a career in the field for future practitioners. Whilst grounded in the author's professional career based in Australia, it additionally covers international aspects related to training, accreditation, professional networks, and career pathways.

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How Do You Become a SEPP Practitioner?

Depending upon the country in which students undertake training and the timing of pursuing psychology studies during an individual's career, some will identify early that they wish to become a sport, exercise, and performance psychologist, whilst others will not make such a decision until choosing the area in which postgraduate psychology studies is required. Given the field of SEPP is diverse and varied in the type of work that a psychologist can do, whilst presenting more opportunities, it can often also be challenging to those looking to enter the field to gain understanding exactly what they want to do in the field (Eubank & Tod, 2019).

My decision to become a sport and exercise psychologist (i.e., performance psychologist) occurred early on, when contemplating life after a career as a professional ballet dancer. Experiencing a significant injury leading into my final year of pre-professional training led me to seek professional assistance, which in the early 1990s was sparse in terms of practitioners with an understanding of the context of performing arts. This led to exploring the types of psychology training that were available in Australia at the time, and I discovered sport and exercise psychology, which appeared to be the closest thing I could find regarding the application of psychology to performance outcomes (see Moyle, 2019a).

Regardless of when interest in the area of SEPP arises, it is important for those wanting to become a sport and exercise psychologist to clearly understand the training and accreditation requirements of the respective country they plan to study and/or work in. Ill-informed decisions regarding courses and training pathways can mean that accreditation and/or registration requirements are not met, which can be a costly exercise in both time and money.

Training and Accreditation

In Australia, those interested in the SEPP area have to undertake a specific training pathway of at least six years to achieve general registration as a Psychologist, and a further two years of supervised practice within a Registrar program to achieve "endorsement" as a Sport and Exercise Psychologist. The Australian Health Practitioner Regulation Agency (AHPRA) implements the National Registration and Accreditation Scheme, which regulates 15 health professions within Australia. Each health profession is represented by a national board and respective regional (i.e., State) boards, with the Psychology Board of Australia (PsyBA) being responsible for Psychology.

To meet general registration requirements, individuals have to undertake a four-year sequence of study in psychology within an accredited training program. This is followed by one of three pathways: (a) Either a fifth- and sixth-year Master's degree or combined PhD/Masters or Doctorate; (b) Fifth year degree plus one-year internship; or (c) Two-year internship program[1]. Upon acceptance into an accredited program, individuals can then apply to obtain provisional registration which allows them to practice under supervision during their upcoming training pathway. If option two or three is selected, applicants must also pass the National Psychology Exam to obtain general registration (see Figure 33.1).

[1] The 4+2 internship pathway closes on 30th June 2022.

Figure 33.1
AHPRA Pathways to Registration

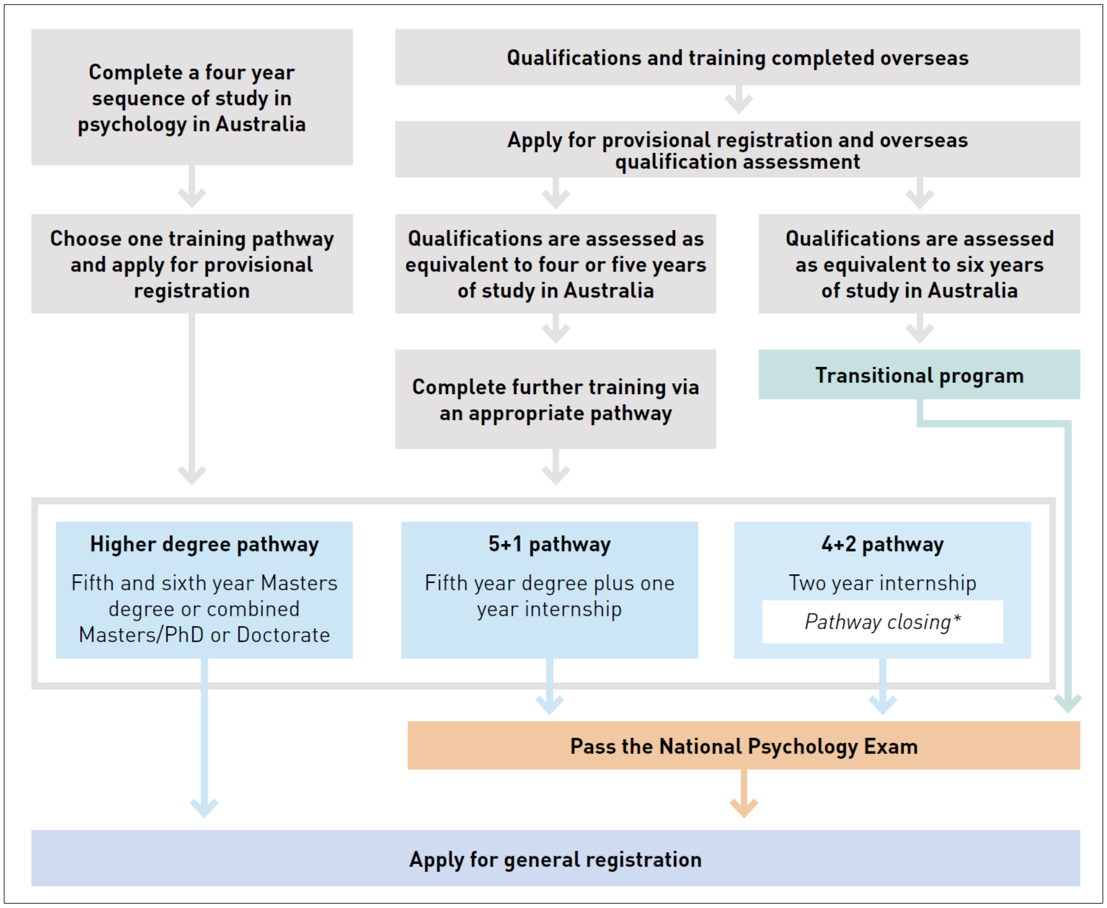

Image credit: www.psychologyboard.gov.au/Registration/General

Post-general registration, psychologists can apply for endorsement in one of the nine recognised psychology disciplines in Australia (i.e., clinical neuropsychology, clinical, community, counseling, educational and developmental, forensic, health, organisational, and sport and exercise). This involves completion of an accredited discipline-specific postgraduate program (i.e., Masters, Masters/PhD, or Doctorate), plus approximately two years of postgraduation supervision in the area of endorsement by an approved and endorsed supervisor within a Registrar Program (see Figure 33.2). Once completed, psychologists then qualify to become ”endorsed” in that area of practice (i.e., sport and exercise psychology) and are entitled to use the legally protected titles associated with the discipline (e.g., Sport and Exercise Psychologist, Sport and Exercise Psychology).

Figure 33.2
AHPRA Pathways to Endorsement

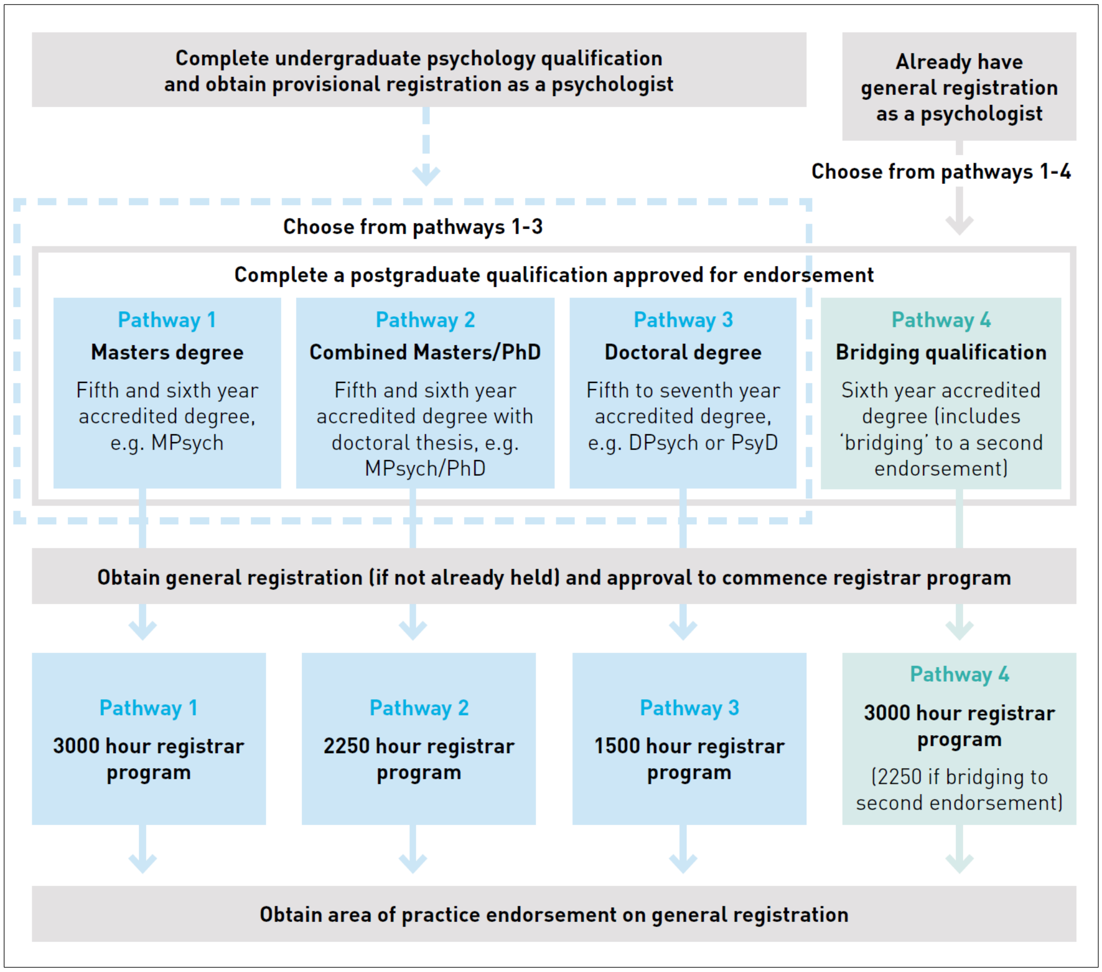

Image credit: www.psychologyboard.gov.au/Endorsement/Pathways-to-endorsement

Within the Australian context, practitioners are trained in general psychological skills and knowledge first, and as psychologists with expertise in working within sport, exercise, and performance settings second (Sebbens et al., 2012). This provides a broader education and training base, and focuses upon working with individuals as whole people, not "just" athletes or performing artists—that is, it is more than performance enhancement or mental skills training alone. Aligned with this approach is the accreditation of postgraduate programs, whereby the course approvals and accreditation processes ensure that courses incorporate achievement of general competencies that are consistent across all psychologists (see Australian Psychology Accreditation Council, 2019), plus the additional competencies that uniquely distinguish each of the nine endorsement areas from one another (see Psychology Board of Australia, 2019).

Becoming a Psychologist and/or Working in Other Countries

Whether exploring local requirements or considering working in another country, it is important for future practitioners to understand the varying accreditation, registration, licensed and/or chartered status requirements of training and practicing as a psychologist. In most countries, psychology is a regulated health profession which means that it is protected by law, and therefore operating or calling oneself a Psychologist and/or Sport and Exercise Psychologist when previous training might not meet the statutory requirements could result in formal notifications, legal charges, or significant fines. Whilst there are similarities between some countries regarding training, practicum, or internship requirements to meet accreditation or registration standards, many pathways possess nuances that can vary in their occurrence whether at undergraduate, postgraduate, or internship stages within the training process. Therefore, it is essential that when investigating options, that individuals obtain the correct advice.

Further Information:

- Canada - https://cpa.ca/students/career/becomingapsychologist/
- Europe - www.europsy.eu/quality-and-standards/europsy-basic/national-requirements
- South Africa - www.hpcsa.co.za
- UK - https://careers.bps.org.uk/area/sport-exercise/how-do-i-become-one
- USA - www.apa.org/support/us
- Asia & South America – Various pathways dependent upon country and regulatory frameworks (see Schinke, McGannon, & Smith, 2016).

Tailoring Your Training Experience

Whilst many aspects of the training pathway—including units within courses and programs—will be pre-determined to ensure they meet accreditation requirements for registration, there are a range of components that individuals have the opportunity to tailor to their own specific interests and/or to increase their employability upon finishing their studies. Thinking strategically about such options from Day 1 of the journey towards becoming a psychologist might not come naturally, however is highly encouraged. Whilst such considerations will be dependent upon the type of undergraduate course (e.g., psychology, sports science) or training pathway that is undertaken, the following section outlines key topics for further reflection in terms of their relevance for tailoring training experiences.

Placements and Internships

A key component of all psychology training programs are practicums, placements, and/or internships. Within some courses, these might be mandatory in terms of what organisational context, professional setting, or even the type of practice focus (e.g., sport, clinical, counselling). However, where there is scope to shape the type of experience it is helpful to consider what competencies, skills, and experiences you are aiming to build. When considering SEPP, undertaking a sport placement is obviously vital. Whether that is working with individual athletes or is team focused, becoming more familiar with a sporting environment and the complexities that are often involved is essential (e.g., multiple stakeholders [coaches, sports program managers, support staff]; training vs. competition; level of sport [developmental, amateur, elite, professional]; type of sport [individual, team]).

Complementing a sport placement, other performance settings (e.g., performing arts) also provide similar opportunities to work with individuals striving for performance excellence. Similar to the need to understand and learn about the varying similarities and differences when working across sports, shifting the application of psychological practice to a performing arts setting (e.g., dance, music, acting, circus) also involves increasing awareness regarding the social, cultural, and artistic considerations embedded within these performance contexts (Moyle, 2019b).

Outside of sport and performance settings, planning to obtain experience in clinical or counselling settings is critical to the development of more general psychological skills that assist in effectively supporting the whole person, not just the ”athlete” or ”performer”. Mental health and well-being are inextricably linked to performance: without positive mental health and well-being, it is highly unlikely they can perform to the best of their ability. Therefore, experience dealing with clinical issues assists in broadening the scope of practice for a sport and exercise psychologist-in-training. This consequently enables them to better support their clients through an integrated holistic approach, whilst also increasing awareness related to ethical practice in not stepping outside their area of expertise and knowing when to make a referral to a clinical psychologist.

A final placement area that has been observed to complement SEPP training is that of business and corporate settings. Organisational psychology shares many similarities to SEPP in that leaders and teams are typically working towards shared performance goals and objectives that are measured and tracked, with team, leadership, and organisational culture playing a large role in achieving success. Whilst ”performance” may not be through a physical modality, individuals working in business can benefit from utilising the same strategies and skills employed within SEPP settings.

SEPP practitioners-in-training would benefit from strategically considering how they can shape the types of placements, and therefore, the types of skills and experiences they obtain from them. When considering the field of SEPP, there is such a broad range of sports (i.e., individual vs. teams; winter vs. summer; amateur vs. professional; leisure vs. extreme sports), exercise settings (i.e., pain clinics, physiotherapy practices, occupational rehabilitation centres) and performance contexts (i.e., dance companies; orchestras; film/TV sets; circus troupes) that SEPP practitioners can work in, that ensuring a spread of opportunities will not only assist in strengthening their knowledge and skill sets, but increase their level of employability for their future career.

Research Projects

Another opportunity to tailor training pathways involves research projects undertaken as part of undergraduate, honours, and/or postgraduate degrees. Where students have an idea of the type of population they would ideally like to work with once fully qualified, it is helpful to start building a foundation of research that focuses upon investigating that area. Whilst students can be recruited to existing research projects being led by potential supervisors, this may not always align with the area of psychology and/or the population that one wants to work with. Although the pros of such a scenario mean that students will be directly guided in the topic area, research design, in addition to not having to recruit their own participants (which is helpful in time pressured situations), it may unintentionally take the focus away from developing a pipeline of research experience, publication outputs, and establishing industry networks within preferred areas of future practice. Other considerations include looking to the SEPP literature and recommendations regarding future research trends, so as to align with what might be considered ”hot topics” in the field (Meredith et al., 2018; Sanderson, 2017; see Schinke et al., 2016).

Professional Associations

In most countries, there is at least one key professional association related to the practice of psychology. Professional associations are different to regulatory bodies (e.g., the organisations that are responsible for registration), and usually focus upon advocacy for the profession, increasing awareness about psychology with the public, and advancing knowledge within the respective psychology fields it represents. It is beneficial to consider joining your relevant professional association as a student during your training pathway. Typically, each association has reduced rates for students, however, enables full access to key information, ethical standards, resources, professional development events/courses, and current news on relevant topics.

Key professional bodies in psychology (e.g., Australian Psychological Society, American Psychological Society, British Psychological Society, Canadian Psychological Association) typically have a College or Division that represents the field of SEPP. For example, the Australian Psychological Society (APS) has the College of Sport and Exercise Psychologists, as well as an APS Interest Group in Psychology and the Performing Arts and Entertainment Industry. The American Psychological Society (APA) has Division 47 – Society for Sport, Exercise and Performance Psychology, whilst the British Psychological

Society (BPS) has the Division of Sport and Exercise Psychology. Usually these sub-divisions or colleges additionally offer student membership, which provides opportunities to network with SEPP practitioners and undertake professional development activities that are focused on SEPP content.

In addition to these overarching psychology associations, there are also a range of international associations focused specifically on SEPP that are open to both international and/or localised members. For example, the Asian South Pacific Association of Sport Psychology (ASPASP), the Association of Applied Sport Psychology (AASP), the British Association of Sport and Exercise Sciences (BASES), the Canadian Sport Psychology Association (CSPA), the European Federation of Sport Psychology (FEPSAC), the International Association of Applied Psychology – Division 12 (IAAP), and the International Society of Sport Psychology (ISSP). Furthermore, depending upon the area that individuals focus their practice of SEPP, there are a range of related associations (e.g., for performing arts, Australian Society for Performing Arts Healthcare, International Association of Dance Medicine and Science, Performing Arts Medicine Association).

Professional Development and Networking

Continuing professional development is usually a requirement for most SEPP practitioners to maintain registration, accreditation, chartered and/or licensed status. Typically, professional associations provide a calendar of events and activities, with the SEPP-focused associations and organisations providing further specialised development opportunities that are tailored specifically to the SEPP area. Joining professional associations will also assist in having access to member fees for professional development events, including conferences and congresses. Since the onset of COVID-19 in 2020 and having to shift events online, a range of organisations have developed a suite of webinars and resources that are often available freely to the public alongside member-only access items.

Once psychologists-in-training have joined an association for a period of time and experienced them as a student member, it is helpful to consider nominating for volunteer positions that may be available as part of Executive Committees within SEPP specific Colleges or Divisions. Most associations have student committees and/or specific student related positions that form part of State or National executive committees, which provide invaluable opportunities to understand key issues in the SEPP area across applied practice, research, education, training, and policy areas. Furthermore, such involvement presents excellent opportunities to network with not only other students, but highly experienced professionals both locally and internationally.

Volunteer Work and Work Experience

Opportunities to undertake volunteer work and/or work experience in SEPP settings is usually limited, given the practice of psychology is regulated. Students who are at the pre-registration stage of their psychology training are often very interested in ”seeing” what a sport and exercise psychologist actually does, so whilst there may be some opportunities for observation of applied practice, the bulk of this experience tends to come only when they are provisionally registered and able to undertake placements, practicum and/or internships under supervision.

Other opportunities that can be undertaken often fall within a research projects, where undergraduate students can apply to Vacation Research Experience Schemes to assist SEPP academics with research activities commensurate with the student’s level of experience. Being involved in such research projects can provide psychologists-in-training with a first-hand understanding of some of the basic foundations of research design, methodology, and process, which enables individuals to get a sense of what research actually involves before they have to undertake their own research. Furthermore, many students identify through such experiences that they may wish to pursue a career in academia as a researcher in SEPP, versus an applied practitioner out in the field, which can inform decision-making regarding future course and training pathway choices.

Volunteer opportunities are not only restricted to students. Sometimes sporting programs or organisations have minimal funding to support servicing by sport and exercise psychologists and may offer fully registered and experienced psychologists a role to work with their team/athletes. Whilst not as common now compared to 20 years ago given the sector recognises the significant years of training, qualifications, and experience that psychologists have to obtain to practice, this may still occur. Sometimes such offers have come from elite Olympic level programs but in sports that are not as well funded as some of their counterparts. This provides SEPP practitioners with excellent experience of working within such contexts, however if accepted, psychologists are encouraged to consider placing limits on the timeframes over which they agree to working without getting paid. Continuing to do so can ultimately do the profession a disservice, given such work is not with a volunteer organisation or charity and continues to reinforce sporting organisations to not have to pay for professional services – versus seeing the value of SEPP and the need for it to be a supported formal part of the funded program.

Finished Your Studies…What Next?

One of the most exciting yet terrifying times is once all studies, training, and placements are done, and students become fully registered psychologists. Depending upon the timing of graduation and confirmation of registration, knowing what comes next can be a daunting prospect. Many aspiring sport and exercise psychologists dream of landing a job as a full-time practitioner working out in the field with an elite sporting team or program. However, as many suggest (Eubank & Tod, 2018; Fitzpatrick et al., 2016; Sanderson, 2017), for nearly all graduates, this is not the reality they end up experiencing. Often SEPP opportunities fall into one of two categories: teaching and research roles usually in academia; or in applied work via private practice and consulting. Often it can be a combination of all three, with SEPP applied work occurring across a range of settings and organisations.

Sport and Performance

In Australia, work within sporting contexts can consist of being contracted to provide SEPP services to a range of sporting bodies and organisations. For example, National and State Sporting Institutes, otherwise known as the National Institute Network (NIN), which covers key Summer and Winter Olympic and Paralympic sports, in addition to some professional sports (i.e., Football/Soccer) across developmental through to elite level athletes. Additional services are utilised across a range of National Sporting Organisations (NSOs), which covers both amateur and professional sports such as Cricket, Swimming, Triathlon, Golf. Other professional sports such as Australian Football League (AFL), Rugby League, Rugby Union, Tennis, and V8 Supercars additionally use SEPP services through contracting providers. Contracts can vary in terms of length and scope, with full-time positions only rarely being available and often on a one-year basis only with an option to renew. Furthermore, with the increased focus on mental health and well-being within the context of sport, organisations such as the Australian Institute of Sport (AIS) and the AFL and AFL Players Association have more recently introduced well-being frameworks that include positions such as Well-being Managers and/or psychologists providing mental health support services. Many of these roles are often filled by sport and exercise psychologists.

Through private practice and consulting, SEPP practitioners can also often provide services to High School sporting programs or more general physical activity co-curricular programs. These can include both individual sessions or group/teamwork that can cover anything from performance enhancement and mental skills training, interpersonal and team dynamics, alongside supporting students cope more effectively with academic and/or personal issues. Additionally, individuals may access psychological services through referral from a General Practitioner (i.e., medical doctor) as amateur or recreational athletes.

Within performing arts settings, typically services can include individual clients accessing support via self-referral or referral from a professional company/training institution/health-care provider; the facilitation of group workshops on key performance-psychology topics or sessions that focus on collective group issues; and the provision of consulting advice to management and administration about addressing psychological issues, recommended solutions, curriculum, or the development of specific programs (see Moyle 2019a). Similar to sporting settings, being an embedded SEPP practitioner in an organisation or program has been observed to be more effective than being an external consulting psychologist. However, usually reduced funding within performing arts settings that can be allocated to SEPP services can limit the scope of practice and service provision that can be achieved. In such circumstances, prioritisation of identified servicing needs is critical.

Photo credit: James Dillon, QUT Dance

Exercise

When focusing upon the exercise side of sport and exercise psychology, there are a range of career opportunities across medical, health, and occupational related settings. SEPP practitioners often work in hospitals and clinics as part of a multidisciplinary health team dealing with such issues as pain management, weight-loss, smoking cessation, injury rehabilitation, including occupational rehabilitation regarding supporting individuals recovering from physical or psychological injury to return to employment. Additionally, many SEPP practitioners will work as the sport and exercise psychologist within a physiotherapy practice, assisting in the case management of individuals undertaking sports injury rehabilitation programs.

Other Areas of Professional Practice

Training in SEPP provides a strong foundation and set of skills that can position graduates to apply their knowledge to areas beyond sport yet related through a focus on supporting performance and enhancing human potential. For example, sport and exercise psychologists may work in career counselling, given a significant part of supporting athletes and performing artists is with transition—including entry into, during, and exiting out of their careers. Working in employment services is another sector where the specific skills that SEPP practitioners develop are very beneficial, whereby facilitating group workshops in topics like self-confidence, motivation, and goal-setting compliment individual sessions with job seekers in exploring strengths, skills, and career aspirations. Furthermore, depending upon the training pathway and the tailored experiences students undertake, SEPP practitioners are valued within business and corporate settings with their ability to support individuals, teams, and leaders obtain the best performance and outcomes possible.

Further Training and Endorsement

Depending upon what type of career opportunities and experiences SEPP practitioners end up having, alongside what regulatory framework is in place, there are further training and endorsement options that can be explored. For example, SEPP practitioners interested in clinical sport psychology can look to upskill in clinical areas through short courses and professional development activities to further enhance their understanding, knowledge, and skills related to those areas. Additionally, in Australia as an example, if psychologists wish to obtain a second endorsed area of practice (e.g., clinical psychology), they can choose to undertake a bridging program that meets the registration and endorsement requirements for that additional field of practice (see Figure 33.2). Further areas of endorsement also require sport and exercise psychologists to meet continuing professional development for each specific area of practice. Another avenue for further training and development includes ongoing supervision, which can involve formal supervision from a more experienced psychologist, as well as peer supervision both individually and in groups. Ensuring that you continually reflect upon your practice or psychological work (i.e., teaching and research), is an integral part of being an effective psychologist.

Key Tips: Developing Your Career

When thinking about developing your career as a future sport and exercise psychologist, the following key tips may be helpful:

- Explore and be open to all possibilities, particularly the unexpected ones. Whilst you might have a dream of working with an Olympic sport or professional sporting team, opportunities to work as a psychologist or SEPP practitioner in a range of settings will only assist to further develop your skills, knowledge, and experience. Rounding out your experience in psychology simply makes you more employable and able to deal with, and work, in a variety of settings.
- Reach out to psychologists who are doing what you would like to do. For the most part, more experienced psychologists are only too willing to invest a bit of time answering questions from psychologists-in-training. Remember, they were once students too who were also nervous and excited about what their career might look like. Offer to take them for a coffee/virtual coffee as a thank you for their time. Be professional and make the effort to follow-up and stay in touch. One day they might end up being your colleague or friend!
- Find a mentor. A mentor might be a supervisor, or they might be someone in the profession that you admire or has the type of career you aspire too. Mentors can provide career advice, not just content advice, and can provide you with introductions to key people and networks.
- Invest in your ongoing development. Your learning does not stop with graduation or registration. Ensuring that you are an effective psychologist means that you will continually be developing your knowledge, and skills. Additionally, do not limit your life-long learning solely to psychology topics or for continuing professional development points. There are a range of areas that will be of benefit to you as a SEPP practitioner, that are not always covered in your psychology courses (e.g., leadership development, marketing, presentation skills, proposal development, business acumen, professional report writing of the nonpsychological type).

Conclusion

Being a sport, exercise, and performance psychologist is an exceptionally rewarding career. It provides variety, different challenges, and presents opportunities to work across a range of different settings to support people be the best that they can be. Investing time at the beginning of your training to be strategic in your choices and tailoring your experiences along the way, will enable you to more likely achieve the type of SEPP roles and work that you would most like to do.

Learning Exercises

1. In the country you wish to practice as a SEPP practitioner, what is the name of the regulatory body or professional organisation that is responsible for governing this process?

2. Identify what training and accreditation pathways these organisations state are available to become a qualified/licensed SEPP psychologist.

3. Check whether your current/future undergraduate and/or graduate/postgraduate program is listed as an accredited course in order to meet the training requirements to become a SEPP psychologist.

4. Review your current/future undergraduate and/or graduate/postgraduate programs to identify internship/placement opportunities. When do these occur within your training pathway (e.g., Semester 2, Year 2)? Are these internships/placements organised for you or do you have to identify/approach organisations yourself?

5. Reflect upon the type of client populations that you are most interested in/not interested in working with. Why? What would be the benefits of working with both of these populations in the context of becoming a SEPP practitioner?

6. What SEPP topics are you most interested in undertaking researching about? Who are the leading researchers (globally) within these areas?

7. What type of Vacation/Summer Semester schemes are available at your University/College regarding opportunities to be involved in research projects during the break?

8. Identify which SEPP related professional associations in your country have activities that are available in your local area or via virtual platforms. Attend at least two events and connect with at least one other SEPP practitioner and/or student per event to start forming your professional network outside of your own University/College.

Further Reading

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Further Professional Resources

Further information regarding relevant professional associations related to sport, exercise, and performance psychology (SEPP), can be found via the following websites.

- Australia
  - APS College of Sport and Exercise Psychologists - https://groups.psychology.org.au/csep/
  - Sports Medicine Australia - https://sma.org.au/
- Canada
  - CSPA - www.cspa-acps.com/
- Europe
  - FEPSAC - https://www.fepsac.com/
- UK
  - BPS Division of Sport Psychology - www.bps.org.uk/member-microsites/division-sport-exercise-psychology
  - BASES - www.bases.org.uk/
- USA
  - APA Division 47 - www.apadivisions.org/division-47/index
  - AASP - https://appliedsportpsych.org/

- Other
    - ASPASP - https://aspasp.org/
    - IAAP Division 12 - https://iaapsy.org/divisions/division12/
    - ISSP - www.issponline.org/

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Essentials of Exercise and Sport Psychology: An Open Access Textbook

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