

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.

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

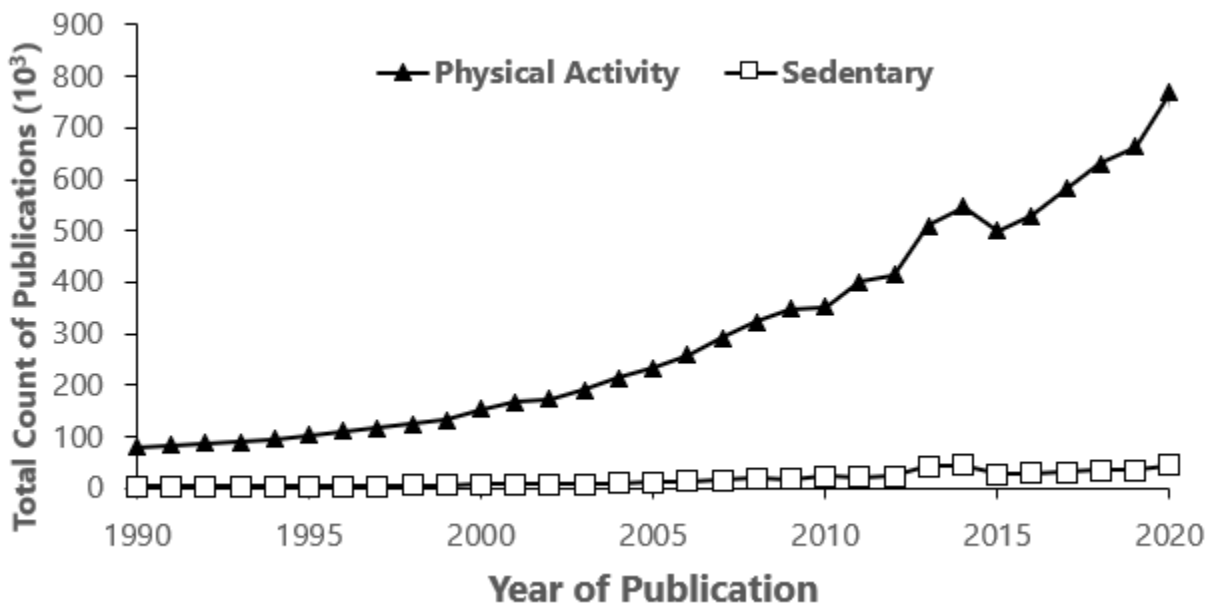
to accurately predict it. This approach may help identify what factors such as television viewing and individual characteristics are associated with sedentary behavior. From this perspective, television viewing is related to sedentary behavior, but one does not cause the other. This second approach is 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 (Ajzen, 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 (Kinnaefick 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 (Troost 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?

Further Reading

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