

## Social cognitive theory and physical activity: Mechanisms of behavior change, critique, and legacy

Mark R. Beauchamp<sup>a,\*</sup>, Kaitlin L. Crawford<sup>a</sup>, Ben Jackson<sup>b</sup>

<sup>a</sup> School of Kinesiology, The University of British Columbia, Canada

<sup>b</sup> School of Human Sciences (Exercise and Sports Science), The University of Western Australia, Australia

### ABSTRACT

**Objectives:** With a view to understanding and explaining human behavior, Bandura developed social cognitive theory (SCT; 1986, 2001). This theory articulates the causal mechanisms through which efficacy beliefs, outcome expectations, sociostructural factors, and goals influence behavior. The purpose of this review is to critically appraise the current state of knowledge in the physical activity domain, as it relates to the core tenets of Bandura's SCT, and in particular those aspects of the theory that have received less attention.

**Method:** A state-of-the-art review.

**Results and conclusions:** The review highlights five major critiques and contentions related to SCT, and also provides an overview of the legacy of this framework within the physical activity domain. Implications for theory refinement, future research, and knowledge mobilization are discussed.

Albert Bandura's (1986, 2001) social cognitive theory (SCT) represents one of the most studied theories in the field of psychology, with applications in contexts as diverse as education, healthcare, rehabilitation, the legal system, business, and indeed sport and exercise. It is positioned as a theory of human behavior with integrative principles of broad applicability (Bandura, 1998). Based on his work on SCT, Bandura is generally considered one of the most eminent psychologists of the modern era (Diener, Oishi, & Park, 2014). His seminal book 'Social Foundations of Thought and Action' (1986), in which he mapped out the central tenets of SCT, represents one of the most cited works in psychology (Diener et al., 2014). At the time of writing this article, Bandura's 1986 book had received over 75,000 citations (Google Scholar, September 2018). Bandura's (1986) SCT evolved out of what he had earlier labelled social learning theory (Bandura, 1977b; Bandura & Walters, 1963); with time, however, he considered the 'learning' label to be too narrow and took the position that it in fact did not capture several aspects of his theory (1986). By way of framing SCT, Bandura (1986) noted that "the social portion of the terminology acknowledges the social origins of much human thought and action; the cognitive portion recognizes the influential causal contribution of human thought processes to human motivation, affect, and action." (p. xii).

As a core contention of SCT, Bandura (1986) suggested that human behavior, personal factors (including cognition), and environmental factors both influence and are influenced by each other, within a framework of reciprocal determinism that he termed *triadic reciprocal causation*. Within SCT, self-efficacy, which represents a person's beliefs

in their capabilities to perform given behaviors (Bandura, 1997), is considered to be the focal determinant of task-oriented behavior (Bandura, 2004). The vast majority of research in the physical activity domain (sport, exercise, rehabilitation) that has utilized SCT has focused on the determinants and effects of efficacy beliefs in their various forms (Feltz, Short, & Sullivan, 2008). In this paper we provide a state-of-the-art review (see Grant & Booth, 2009) of SCT as it relates to research on physical activity, by examining recent advances (and contentious issues) as they relate to self-efficacy, but also other aspects of the broader theory that have received less attention. We also examine the various contributions of SCT to the field of sport and exercise psychology, both in terms of understanding the various causal mechanisms (i.e., mediators) of physical activity behavior, as well as implications for application and intervention.

### 1. Social cognitive theory: a brief synopsis of core tenets

SCT has been used to understand the etiology of a diverse range of human behaviors in a variety of settings that include risk taking (Roberts & Fillmore, 2017), phobias (Williams, 1995), leadership (Dominick, Squires, & Cervone, 2010), group behavior (Tasa, Taggar, & Seijts, 2007), parenting (Merrifield, Gamble, & Yu, 2015), and societal violence (Card, 2011), to name but a few. In this paper we focus on physical activity behavior from the perspective of SCT, which includes both achievement-striving in sport settings, as well as health-striving behavior in terms of exercise pursuits. It is beyond the scope of this

\* Corresponding author.

E-mail address: [mark.beauchamp@ubc.ca](mailto:mark.beauchamp@ubc.ca) (M.R. Beauchamp).

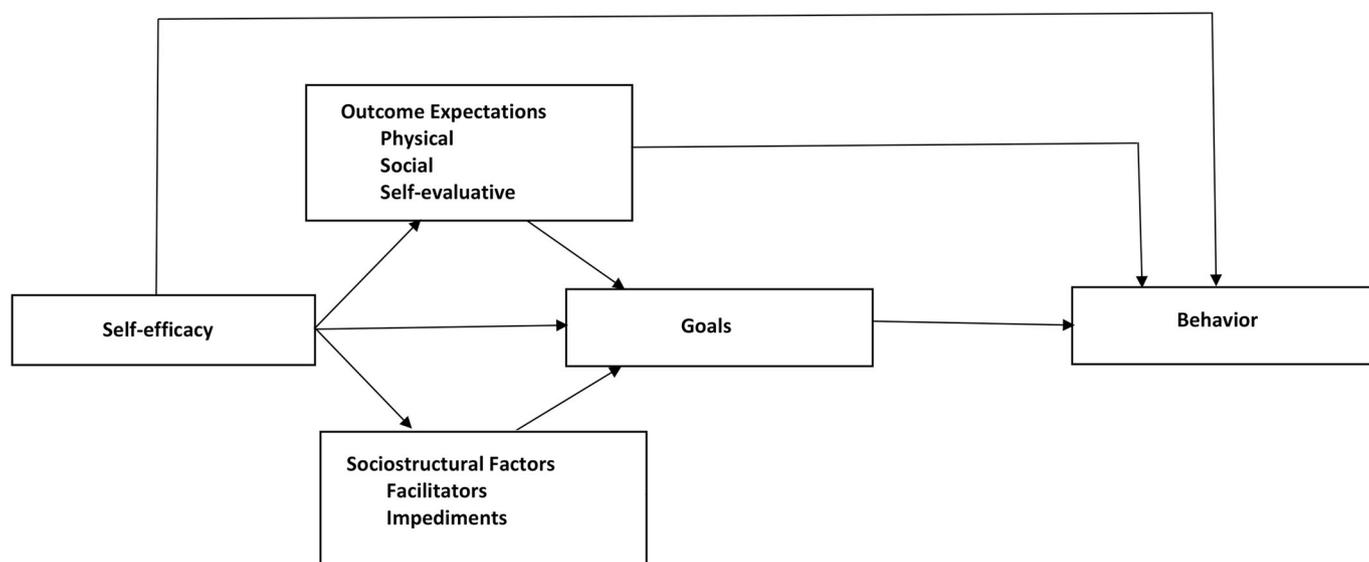


Fig. 1. Structural paths of influence articulated within social cognitive theory. Source: Bandura, A. (2004). Health promotion by social cognitive means. *Health Education & Behavior*, 31, 143–164. Reproduced with permission by Sage Publishing.

paper to review the entirety of SCT (this is done extensively elsewhere; see Bandura, 1986, 1997, 2001); however, below we provide a brief synopsis of the key tenets of this framework as they provide important frames of reference when considering recent tests and critiques of this theory, as well as contentious issues and contemporary debates.

As a key proposition within SCT, Bandura (1986) posited that while people are influenced by, and react to, their social and built environment, they are also capable of, and regularly engage in forethought, self-regulation, self-reflection, vicarious learning, and innovation through generative imagination and communication. As we illustrate later in this paper, these advanced human capabilities shape downstream psychological processes and represent viable targets for intervention, which in the context of this paper involves promoting the adoption and maintenance of health-enhancing physical activity as well as performance-oriented behavior in sport. SCT represents a *causal model*, in which self-efficacy is posited to affect human behavior both directly and indirectly via other mediating processes (see Fig. 1), that include outcome expectations, sociostructural factors, and goals (Bandura, 1997, 1998, 2004). According to Bandura (1997) efficacy beliefs are key to human agency, with self-efficacy theory (Bandura, 1977a, 1997) representing the primary sub-theory of SCT, that itself explicates both the structure and causal sources of those efficacy beliefs. With regard to structure, self-efficacy beliefs vary according to their ‘level’, ‘strength’, and ‘generality’ (Bandura, 1997). People are often required to perform tasks of varying *levels* of difficulty (from easy to hard) or complexity (from simple to complex), and in so doing they form beliefs in their capabilities to perform these tasks at these different levels. Strength of belief corresponds to the certainty of one’s capabilities to perform at a given level, which may range from being highly confident to very low in confidence. Finally, generality refers to the extent to which efficacy beliefs generalize from one context or domain to another. For example, some types of efficacy belief might transfer well from one setting to another (e.g., confidence to windsurf transferring to confidence to kiteboard), whereas for others, especially where the skill-sets or competencies are highly incongruent, a person’s beliefs about given capabilities might not transfer so readily (e.g., confidence playing chess to playing a musical instrument).

Self-efficacy beliefs are bolstered or undermined as a result of the presence or absence of several sources that include past mastery experiences, modeling (or vicarious experiences), verbal persuasion, mental imagery, as well as perceptions of one’s emotional and physiological states (Bandura, 1977a, 1997; Maddux, 1995). An extensive

body of both observational and experimental research has provided evidence for these six theoretical sources acting as substantive contributors to one’s perceived capabilities in both sport and exercise settings (for a review see Jackson, Beauchamp, & Dimmock, in press). In sport and exercise, several forms of efficacy belief are relevant to fostering motivational and behavioral outcomes. Much of the early work in the physical activity domain focused on examining the predictive effects of *task self-efficacy*, which typically involved examining beliefs in one’s capabilities to perform the motor tasks or sports skills required for successful sport performance (Moritz, Feltz, Fahrback, & Mack, 2000). Subsequent work, however, especially in the exercise domain examined the importance of efficacy beliefs associated with self-regulation. The importance of *self-regulatory efficacy* (also referred to as coping efficacy; Schwarzer & Renner, 2000) was highlighted by Bandura (1997) who contended that for many health-enhancing behaviors (e.g., exercise), the key issue is not whether one can perform the behavior occasionally, but whether one can regularly maintain those behaviors over time in the face of various barriers, obstacles, and other competing demands.

With recognition that people rarely perform their daily tasks and activities in isolation, but in social and interdependent settings, self-efficacy theory also explicates a range of efficacy beliefs that emerge and exert influence within relational and indeed group settings. For example, work by Feltz and her colleagues (Feltz, Chase, Moritz, & Sullivan, 1999; Myers, Vargas-Tonsing, & Feltz, 2005) highlights the salience of coaching efficacy, which involves coaches’ confidence in their capabilities to support the training and development of their athletes (see also Boardley, 2018). Similarly, in many walks of life, people are reliant on other proxy agents to help them achieve their goals or objectives. In the physical activity domain, this might involve having a personal trainer or exercise instructor creating the conditions necessary to enable regular and enjoyable exercise, or a coach facilitating the development of a young aspiring athlete. In such settings, confidence that exercisers and athletes hold in these proxy agents to help them achieve their goals, otherwise known as *proxy efficacy*, enables them to accomplish their goals (Bray, Shields, Jackson, & Saville, 2014). Finally, when people are engaged in conjoint/group activities such as those that exist within sport teams, their beliefs in their collective capabilities, or *collective efficacy*, enable them to harness their collective resources for optimal conjoint functioning and team performance (Feltz & Lirgg, 1998).

As Fig. 1 illustrates, a strong sense of efficacy influences the outcomes people envision, the goals they set, and indeed behavioral

engagement (Bandura, 2004), which in sport and exercise settings corresponds to improvements in exercise adherence behaviors (Bauman et al., 2012) and sport performance (Moritz et al., 2000). With regard to outcome expectations, Bandura (1997) posited that when people display a strong sense of personal efficacy (e.g., confidence to complete five bouts of health-enhancing activity per week for 10 weeks) they subsequently envision positive outcomes for themselves, which can be physical (e.g., improvements in fitness anticipated to derive from regular physical activity), social (e.g., anticipated social interactions with others derived from improved personal fitness), and self-evaluative (e.g., expectation that being regularly active will improve one's abilities to deal with job stress) in nature. With regard to goals, Bandura (1997) contended that when people are more efficacious in their own capabilities they set more challenging goals, are more committed to those goals, and exert greater efforts in pursuit of those goals. With respect to sociostructural factors, Bandura (2004) contended that those with a strong sense of self-efficacy appraise obstacles and barriers, as well as the self-management facilitators available to them, differently to those with a depleted sense of self-efficacy. Specifically, they persist in the face of adversity and utilize self-management skills to a greater extent than those with low self-efficacy who yield to the challenge at hand (Bandura, 2004).

As a final point on the tenets of SCT, and consistent with Bandura's (1997) concept of reciprocal determinism, the relations between the focal variable (i.e., self-efficacy) in the theory and human behavior are posited to be bi-directional (and recursive) in nature. That is, while self-efficacy is considered a causal determinant of subsequent behavior, those achievement behaviors are themselves subsequently positioned to drive enhancement in efficacy beliefs (as a form or mastery enactment), and so on and so forth. This recursive pattern can result in efficacy-performance spirals, which can operate both upwards or downwards (Lindsley, Brass, & Thomas, 1995). That is, increases in self-efficacy can bolster human achievement which in turn can bolster self-efficacy (i.e., in an upward spiral). Similarly, depletion of personal efficacy beliefs can hinder performance which thereafter can deplete self-efficacy, and so on (in a downward spiral).

## 2. Social cognitive theory and physical activity: critiques and contentions

Over the past four decades the sheer volume of research that has taken a social cognitive perspective to understand and investigate the determinants of physical activity behavior has been vast (for reviews see Beauchamp, Jackson, & Morton, 2012; Feltz et al., 2008; Jackson et al., in press). While much of this work has utilized correlational designs, an increasing body of experimental evidence has accumulated to provide good support for many of the theoretical postulates embedded within SCT. Perhaps one of the greatest contributions of SCT, when considered alongside the research applied to test its key principles, is that it provides several practical guides for application, intervention, and even policy mandates. In order to fully appraise these contributions, and to ascertain the validity and utility of SCT, it is also important to examine some of the recent (and historical) critiques of this framework alongside empirical evidence that challenges some of the theory's main tenets. We address some of these issues below.

### 2.1. Self-efficacy beliefs and goal pursuits

A key theoretical mediator within SCT that links self-efficacy beliefs to behavioral accomplishment corresponds to goal setting (see Fig. 1; Bandura, 1986, 1997, 2004). Research across life settings provides support for this contention, such that people who are more efficacious tend to set more challenging goals and persist to a greater extent in the face of adversity (Latham & Locke, 1991; Locke & Latham, 2002, 2006). From the perspective of SCT, Bandura (1997) contended that in the ongoing regulation of behavior the primary direction of causality involves

goals deriving from self-efficacy beliefs. Specifically, he stated that "to judge personal efficacy from the goals one happens to select would not only be a peculiar causal ordering but would carry heavy costs. People do not chose the goal of swimming a treacherous body of water and then wonder whether they have the swimming capabilities to reach the opposite shore." (p. 136).

When considering a person's confidence to perform a task at an elevated level of difficulty (i.e., task self-efficacy), such as in the above example of swimming in treacherous waters, such directionality makes sense. However, if one also considers typical health behaviors, such as regular exercise or maintaining a healthy diet, that require self-regulation, goals can provide structure, personal feedback, and incentives to bolster self-regulatory efficacy. As an explanation, Bandura (1997) contended that if/when goals are socially assigned (i.e., prescribed by significant others), these assigned goals can raise people's sense of efficacy by virtue of conveying a sense of confidence (via verbal persuasion) in the other person's capabilities. Such theoretical postulates linking assigned goals to subsequent self-efficacy beliefs are also in line with those of goal setting theory (Latham & Locke, 1991). However, it should also be noted that when people set their own goals (i.e., self-set) for physical activity they tend to increase their physical activity behavior (McEwan, et al., 2016). This would suggest that, contrary to Bandura's (1986) contention, goal setting is able to derive effects on physical activity behavior that are independent of the persuasory effects derived from others prescribing those goals. It should be noted that some evidence points to the limited capacity of goal setting to bolster self-efficacy beliefs and physical activity behavior (Williams & French, 2011), with one review with older adults even suggesting that goal setting may have negative effects for this population (French, Olander, Chisholm, & McSharry, 2014). However, most reviews point to the capacity of goal setting interventions to enhance self-efficacy and physical activity behavior with different populations and across the age spectrum (McEwan et al., 2016; Miller & Bauman, 2014; Samdal, Eide, Barth, Williams, & Meland, 2017; Shilts, Horowitz, & Townsend, 2004).

Beyond the issue of ascertaining directionality between goal pursuits and self-efficacy beliefs, another of the core propositions articulated within SCT (as well as within goal setting theory; Locke & Latham, 2002) for what effective goal setting entails has come under some scrutiny in the physical activity domain. According to SCT, effective goal setting necessitates the provision of goal specificity (Bandura, 1986; Latham & Locke, 1991), whereby "specific goals serve to motivate the unmotivated" (Bandura, 1997, p. 133). In workplace settings the effects of goal specificity appear well supported (Locke & Latham, 2002). Although such recommendations appear intuitively appealing for the promotion of health-enhancing physical activity, with widely used guidelines (including SMART goals) for physical activity promotion embracing the importance of specific goals (e.g., Tinetti, Aanand, & Dodson, 2016), recent evidence challenges this contention (McEwan et al., 2016). In fact, in a recent meta-analysis of multi-component goal setting intervention studies, McEwan et al. (2016) found that while goal setting interventions were found to support improvements in physical activity behavior ( $d = 0.55$ ), those medium-sized effects were observed regardless of whether people set specific or vague goals (i.e., to just be more active). That is, when people set vague goals they were subsequently no less active than when people set specific goals (either in relation to absolute levels of physical activity or relative to their own current physical activity levels).

While this finding appears at odds with Bandura's (1986, 1997) theorizing regarding goal specificity, this result does align with some of Latham and Locke's (1991) writing, in which they suggested that in some circumstances, such as during the learning and pursuit of a new activity, specific and challenging goals may be unhelpful and impair behavioral accomplishment. McEwan et al. noted that the majority of samples in their meta-analysis were insufficiently active (i.e., not meeting current physical activity guidelines) at baseline, and so would have been at the early stages of self-regulated learning at the beginning

of their respective physical activity interventions/programs. Regardless, what these findings highlight, at a minimum, is the need to question commonly held assumptions for ‘best practice’ that specific physical activity goals are superior to vague ones in promoting health-enhancing physical activity, especially for those who are inactive/sedentary and thus in most need of intervention (McEwan et al., 2016; Swann & Rosenbaum, 2018). They also suggest that the mechanisms of setting effective goals in the physical activity domain (at least with previously inactive people) may operate somewhat differently to that in workplace settings.

Nevertheless, what remains to be understood at this point, is why vague goals result in comparable physical activity effects/benefits to specific goals. It may simply be that the act of setting a goal (specific or vague) provides a sufficient ‘cue to act’, and that increased levels of specificity do not, among inactive people in particular, necessarily augment (or bolster) that initial cue to act. McEwan et al. (2016) found that goals were more effective when they included rewards, feedback, or planning as supplemental behavior change techniques (Michie et al., 2013), when compared to goals set without these behavior change techniques. They also found that goal setting intervention effects were observed regardless of whether goals were self-set, assigned by someone else such as an interventionist, or if they were collaboratively set.

## 2.2. Self-efficacy beliefs and outcome expectations: issues of directionality

The utility of a given theory is predicated on the extent to which (high quality) data support its key tenets. As several authors have emphasized, psychological theories should not be considered absolute or unchallenged if empirical evidence suggests the need for theoretical amendment (Rothman, 2004; Sniehotka, Presseau, & Araújo-Soares, 2014). It is with this in mind that this section is concerned with the recent debate concerning the relationships between self-efficacy beliefs and outcome expectations (Williams, 2010; Williams & Rhodes, 2016).

In both SCT and self-efficacy theory, Bandura (1977a, 1997) contended (as illustrated in Fig. 1) that self-efficacy beliefs temporally precede outcome expectations, but that a bidirectional relationship does *not* exist (i.e., outcome expectations do not act as sources of self-efficacy). According to Bandura (1977a, 1997) people envision certain positive outcomes emanating from their behaviors only if they have the perceived capabilities to perform those behaviors in the first instance. Conversely, if they do not believe they have the very capabilities needed to perform a certain behavior they will not subsequently envision positive outcomes deriving from that behavior. Support for this contention, demonstrating self-efficacy as an antecedent of outcome expectations (and thereafter physical activity behavior), is well documented (e.g., Gellert, Ziegelmann, & Schwarzer, 2012). However, as the recent review and critique provided by Williams and Rhodes (2016) highlights, some empirical evidence also points to expectations about future outcomes as being a causal determinant of self-efficacy beliefs. For example, in experimental studies when people are provided with monetary incentives (to cease smoking or engage in basketball shooting; Corcoran & Rutledge, 1989) or asked to envision the negative consequences of a health-compromising behavior (i.e., smoking, McDonald, O’Brien, Farr, & Haaga, 2010), their self-efficacy beliefs tend to improve. In both examples, the manipulation involved targeting outcome expectations (via incentives tied to the behavior and envisioned health consequences, respectively) to achieve certain outcomes and none of the theoretical sources of self-efficacy (as per Bandura, 1977a, 1997), and yet self-efficacy beliefs improved. These findings suggest a potential need to re-conceptualize self-efficacy theory, with outcome expectations positioned as an additional ‘source’ of self-efficacy beliefs. In sum, it is plausible to suggest, based on emergent empirical evidence, that SCT could/should be re-conceptualized to position outcome expectancies as both a source and consequence of self-efficacy beliefs.

## 2.3. The role of sociostructural factors in SCT

Within SCT, Bandura (1998, 2004) theorized that in order to achieve meaningful behavioral change people need to overcome various personal, social, economic, and environmental impediments. Using the context of maintaining health-enhancing physical activity as an example, he explained that in order maintain an exercise routine one needs to be efficacious in overcoming the various impediments such as being fatigued, under pressure at work, and so forth (Bandura, 2004). In addition to overcoming such personal and situational challenges, he also suggested that people often need to overcome broader economic and social impediments that derive from various ‘health systems’ and lack of ‘health resources’. In the context of achieving an active lifestyle, this might include the lack of opportunities from living in socially deprived neighborhoods or the absence of physical activity promoting schools, families, and/or communities.

Although the role of social and environmental factors in supporting both achievement and health-oriented behaviors is well established, their role (and positioning) in the context of SCT requires critical re-examination. Although people who are efficacious may well *appraise* potential and situational impediments differently to those who are less efficacious, in the manner articulated by Bandura (1998, 2004), there is ample evidence that sociostructural factors affect physical activity and other behaviors in a manner quite differently to that articulated within SCT (see Fig. 1 and models presented in Bandura, 1998, 2004). Such an analysis has implications not only for understating the causal antecedents of human behavior, but also has important implications for intervention. The theoretical positioning of sociostructural impediments as mediators that link self-efficacy to goal pursuits and behavior change implies that the superordinate means of changing behavior relies on fostering a sense of efficacy that *thereafter* cascades into changes in (appraisals of) impediments and thereafter the achievement of the target behavior. In doing so it diminishes the importance of (a) social and environmental factors in causally influencing self-efficacy beliefs in the first instance, (b) the direct effects of the social environment on human behavior (unmediated by self-efficacy), as well as (c) factors other than self-efficacy (e.g., autonomous motivation) that might explain the effects of the social environment on behavior.

Take for example Bandura’s (2004) writing where he suggests that “some of the impediments to healthful living reside in health systems rather than in personal or situational impediments. These impediments are rooted in how health services are structured socially and economically.” (p. 145). In this case, it would not matter how confident a person is in their ability to be healthy; it is highly unlikely that this belief would change which health services are available or not to that person. Rather, it is more logical that impaired health services (and/or perceptions of those services) would causally affect that person’s confidence to be healthy. Indeed, it is well established that the provision of new health services in clinical settings results in improvements in patients’ self-efficacy beliefs (e.g., Cook et al., 2015). In such instances, with the provision of new health services resulting in *changes* in self-efficacy beliefs, this would suggest that sociostructural factors causally precede self-efficacy. Indeed, recent work from the field of implementation science points to the provision of physical and social opportunities (akin to sociostructural factors in SCT) as having both a direct effect on behavior as well as an indirect effect that is mediated via people’s perceived and actual capabilities (Michie, van Stralen, & West, 2011). In support of this, research from sport and exercise psychology points to the role of various sociostructural factors as antecedents of self-efficacy beliefs. These include neighborhood factors (Voorhees, Yan, Clifton, & Wang, 2011), socio-economic status (Clark, Patrick, Grembowski, & Durham, 1995), and teacher behaviors (Bourne et al., 2015), to name but a few. When taken together, the extant evidence would suggest that (perceptions of) sociostructural factors be considered a consequence of elevated self-efficacy beliefs, as per the tenets of SCT (in the form of appraisal processes), but also as notable

antecedents within a social cognitive conceptual framework.

#### 2.4. Within-person effects of self-efficacy: evidence of performance buffering?

Within the field of preventive medicine, there has been a particular increased recognition in recent years of the importance of examining within-person effects and not just between-person effects in relation to specific psychological events (Dunton, 2018). To illustrate, when a collection of variables are measured across a group of individuals at a single point in time, researchers are able to make (only) between-person inferences regarding the phenomena under scrutiny (e.g., ‘relative to the rest of the sample, people who score higher on self-efficacy also appear to score higher on optimism’). When a group of variables is measured over multiple time points, however, researchers can also make inferences about within-person effects regarding these phenomena (e.g., ‘when someone scores highly—relative to his/her own mean score—on self-efficacy at a given point in time, s/he also scores highly—relative to his/her own mean score—on optimism at that point in time; an excellent review of these multi-level considerations is provided by Curran & Bauer, 2011).

With regard to understanding the effects of self-efficacy beliefs, some evidence has emerged suggesting that the relations between self-efficacy and performance outcomes might differ depending on whether those relations are examined at the within-person or between-person levels. At the between-person level, there is a robust argument—and strong empirical evidence—that self-efficacy and performance are positively related to one another (see Feltz et al., 2008; Yeo & Neal, 2006). It is highly likely, for instance, that a soccer player who scores 30 + goals in a season as an attacker for Manchester United will be more self-efficacious (with respect to his offensive ability) than his attacking teammate who scores no goals in the same number of appearances. Similarly, a car salesperson who sells 60 cars in a month would be expected to be more confident in their ability than a colleague who sells only 3. To the extent that those examples hold true, one would reasonably conclude that, across people, there is a positive association between self-efficacy and performance. At the within-person level, however, it has been argued, and now demonstrated repeatedly, that the relationship between self-efficacy and performance over time may actually be negative in nature. That is, if as a result of performance accomplishments, a person comes to overestimate his or her efficacy beliefs (or progress) relative to his or her own actual capabilities (or progress), such within-person self-efficacy inflation might have a detrimental effect on subsequent performance.

The principle behind the potential negative within-person effects of self-efficacy is grounded in control theory (Powers, 1973, 1991), in which it is articulated that personal ‘resources’—such as effort and motivation—are driven by the discrepancy between one’s current and one’s desired state. As such, resource allocation is said to be at its greatest when the discrepancy between current and desired states is large. In instances where individuals overestimate their progress toward their desired state (i.e., report an inflated or ‘overestimated’ self-efficacy belief), this leads to a narrowing of the current–desired discrepancy, and accordingly, results in the allocation of fewer ‘resources’ (e.g., reduced effort) toward reaching the desired state. To illustrate, consider the hypothetical example of an athlete, who having performed well one season (or on a prior team) receives considerable accolades, from the media or influential others, and as a result, begins to overestimate their capabilities. In such an instance that overestimation of capability may engender some degree of complacency in the player, and result in (or align with) a downturn in performance effectiveness due to the principle of diminished ‘resource allocation’.

In a series of well-conducted experiments, both within (Beattie, Dempsey, Roberts, Woodman, & Cooke, 2017; Beattie, Lief, Adamoulas, & Oliver, 2011; Beattie, Woodman, Fakehy, & Dempsey, 2016; Halper & Vancouver, 2016; Woodman, Akehurst, Hardy, & Beattie, 2010) and

outside (e.g., Vancouver, More, & Yoder, 2008; Vancouver, Thompson, Tischner, & Putka, 2002; Vancouver, Thompson, & Williams, 2001) of athletic settings, this notion—and the ‘resource allocation’ principle upon which it is founded—has now received relatively consistent support (see also interesting work on this issue by Schmidt & DeShon, 2010; Sitzmann & Yeo, 2013; Yeo & Neal, 2006). Moreover, it appears that the negative within-person effects of self-efficacy may be most likely when individuals perform within an ambiguous situation, such as when there is little (clear) feedback regarding ongoing performance (see, for example, Beattie et al., 2016; Halper & Vancouver, 2016; Vancouver & Purl, 2017).

These findings appear to run contrary to SCT principles, and as a result, Bandura has presented cogent arguments regarding the applicability and theoretical robustness of these studies (see Bandura, 2012, 2015; Bandura & Locke, 2003; and for a more detailed overview of this topic see Jackson et al., in press). First, it is important to note that the premise upon which these findings are built may not be wholly inconsistent with SCT. Bandura (1997), for example, advocated that a degree of self-doubt may indeed be desirable for catalyzing effort and practice specifically during learning or preparation in advance of an activity (see, for example, Ede, Sullivan, & Feltz, 2017). In that sense, Bandura (1997) has argued that SCT does in fact recognize that the relationship between self-efficacy and performance may not always be linear and positive in nature. Additionally, Bandura (1997) also identified important ‘qualifiers’ that, when present, may disrupt the theorized (positive) association between self-efficacy and performance. With particular relevance for the issues described above, Bandura noted that self-efficacy may not drive performance achievements when performance demands are ambiguous or not well understood and/or when respondents have insufficient incentive to act in a given domain. Accordingly, a pervasive criticism of much of the work that has yielded conclusions regarding the negative within-person (performance) effects for self-efficacy is that the tasks used in those studies have been relatively artificial or arbitrary in nature. It is interesting, therefore, that when researchers have deliberately employed tasks that are meaningful to—and encourage incentive to act among—participants, positive between- and within-person effects have been demonstrated for self-efficacy in relation to performance (e.g., for squat performance among collegiate American football players; Gilson, Chow, & Feltz, 2012).

Notwithstanding the debate that exists in this area, what is clear from this work is that there exists a worthwhile avenue for further inquiry on this topic—to, at the very least, determine more accurately under what conditions, and for whom, strong self-efficacy beliefs may come at a cost. In addition, it would be particularly interesting, having determined the situations in which these negative within-person processes may be most pronounced, to develop and test interventions designed to prevent and/or reverse such detrimental effects.

#### 2.5. Assessment: are typical self-efficacy measures confounded?

As a complement to the critique that anticipated outcomes might act as a source of self-efficacy beliefs (Williams, 2010; Williams & Rhodes, 2016), it has also been suggested that typical measures of self-efficacy, especially those constructed in relation to self-regulatory behaviors (e.g., exercising regularly, maintaining a healthy diet, smoking cessation, abstinence from alcohol), inadvertently assess motivation rather than perceived capability (Kirsch, 1995; Williams, 2010; Williams & Rhodes, 2016). Broadly conceived, motivation includes a person’s wanting, desire, or intention to perform a given behavior; which from a SCT perspective is based, in part, on expected outcomes (Williams, 2010). Bandura’s (2006) suggested methodology for assessing self-efficacy beliefs typically involves asking people about their confidence that they “can” perform a specific behavior. According to Kirsch (1995) and others, potential problems arise based on how people interpret measures that ask them about the extent to which they ‘can’ or ‘cannot do’ a particular behavior. This is nicely illustrated in the example

provided by Williams (2010) related to a hypothetical single mother who “may say that she “cannot” exercise 5 days per week because she must care for her children, complete household chores, and work long hours to have enough money for food and housing. Although most would agree that these are good reasons for not exercising, they, nonetheless, reflect a lack of motivation to exercise based on expected consequences, including expectations that her children would be neglected, her home would be in disarray, and she would ultimately lose her job”. (p. 423).

In the context of appraising the physical activity literature, Williams and Rhodes (2016) suggest that for behaviors that require certain physical competencies or skills (e.g., completing a challenging gymnastics routine or completing a diving maneuver), such as those often examined in sport, typical self-efficacy measures do assess perceptions of a person’s actual capabilities, as intended. The (potential) problem of self-efficacy items being confounded with motivation, however, is particularly pertinent when assessing self-efficacy beliefs in relation to behaviors that most/all people physically can do (i.e., they are under volitional control) but require self-regulation to perform them repeatedly. That is, they tend to interpret the word ‘can’ (based on lay-interpretations of the word ‘can’ rather than a literal interpretation) with conceptions of willingness to perform the behavior based on prevailing incentives and disincentives to act and not their capabilities that they physically can perform the target behavior.

The results of a recent cognitive interviewing study that used a ‘think aloud protocol’ provided some evidence that some self-efficacy items that were intended to assess self-efficacy tended to tap into willingness (i.e., motivation) to some extent (Burrell, Allan, Williams, & Johnson, 2018). In an experimental test of whether self-efficacy items unintentionally tap into motivation in the context of assessing physical activity behavior, Williams et al. (2017) examined whether placing items that assess self-efficacy (“I can exercise ...”) beside behavioral intention items (“I will exercise ...”) elicits different responses compared to when participants are simply provided typical self-efficacy items alone (i.e., without the side-by-side priming). The basis for this contention was that if participants were provided with this side-by-side presentation of efficacy and intention items this would lead participants to more carefully consider the contrast between capability (as reflected in the self-efficacy items) and motivation (as reflected in the intention items). As hypothesized, participants reported higher levels of self-efficacy when items were provided in the side-by-side priming condition than when self-efficacy measures were presented on their own, and this effect held when controlling for baseline measures of intention. Of note, the side-by-side priming only affected ratings of self-efficacy, but did not have any effect on ratings of physical activity behavior or intentions.

In a separate series of psychometric studies, Rhodes and colleagues (Rhodes & Blanchard, 2007; Rhodes & Courneya, 2003, 2004), examined what happened to self-efficacy responses when motivation was ‘held constant’ by including the qualifier ‘if you really wanted to’ at the end of those self-efficacy items. In the context of examining exercise self-efficacy this might entail asking a question such as, “how confident are you that you can exercise despite bad weather [if you really wanted to]?” The results revealed that when self-efficacy measures controlled for motivation, participants’ self-efficacy ratings increased and also the correlations with intention measures became smaller. When these results are considered alongside the side-by-side priming results by Williams et al. (2017), this suggests that typical self-efficacy measures of self-regulated behavior (especially in relation to health-enhancing physical activity behavior) unintentionally assess motivation, at least to some extent. The consequences of this methodological artefact are not trivial. As highlighted by Beauchamp (2016), if responses to self-efficacy assessments are conflated with motivation, those concerned with developing effective interventions might be impeded from fully understanding whether deficits in perceived capability or motivation are responsible for a person’s failure to engage in the targeted health-

promotion behavior. At a minimum, research in this area points to the importance of ensuring better precision in the development of self-efficacy measures, and that concerted efforts (e.g., using cognitive interviewing in instrument development/refinement, controlling for motivation within self-efficacy items) are implemented to ensure that self-efficacy instruments purely assess perceptions of capability and not conceptions of willingness.

### 3. Legacy of SCT in the physical activity domain

Balanced against some of the critiques highlighted above, it is without question that SCT has left an indelible mark and considerable legacy on the broad field of psychology in general, and sport and exercise psychology in particular. While the critiques highlighted above point to the potential for theory refinement and methodological enhancement, many of the conceptual, empirical, and applied contributions of SCT have been quite pervasive, especially within the physical activity domain. First of all, it should be emphasized that many prominent theories of human achievement and health behavior that have been utilized in sport and exercise psychology include an efficacy or an efficacy-related component (Bandura, 1998). These include the theory of planned behavior (Ajzen, 1991), health action process approach (Schwarzer, 2008), goal setting theory (Locke & Latham, 2002), and protection motivation theory (Rogers, 1983), to name but a few. Furthermore, research conducted within the physical activity domain (and beyond) highlights that efficacy beliefs matter. As one example, in a prominent systematic review of review papers, Bauman et al. (2012) found that self-efficacy was among the most consistent correlates and determinants of physical activity behavior across the age span.

A major contribution of SCT is that it provides a parsimonious conceptual model of human behavior that includes testable hypotheses. For example, on the basis of consistent effects linking self-efficacy beliefs to sport performance (Moritz et al., 2000) and exercise adherence behavior (Bauman et al., 2012), extensive research attention in sport and exercise has been directed towards studying the extent to which the six theoretical determinants of self-efficacy beliefs (Bandura, 1977a, 1997; Maddux, 1995) predict, and causally influence, self-efficacy. With a vast body of observational and experimental research supporting those a priori relations (see Jackson et al., *in press*, for an extended review), it is notable that this work has been extensively translated to informing various practical applications. In the physical activity domain, these knowledge mobilization contributions range from informing globally pervasive coaching and teaching practices in physical activity settings (e.g., creating opportunities for early success/mastery, use of role modeling), through to an extensive number of population-level health-promotion campaigns (Craig et al., 2015; Leavy, Bauman, Rosenberg, & Bull, 2014; World Health Organization, 2009). In sum, SCT represents a theoretical framework that has received empirical support for many of its tenets (notwithstanding those caveats highlighted earlier), and represents a practically useful basis for supporting cognitive and behavioral *change* on a broad basis.

Another substantive contribution of SCT is that its core tenets not only provide evidence for consistent effects across different domains of human functioning, but have also proved useful in examining the social cognitive determinants of novel behaviors. For example, given the broad application of SCT across different settings, several researchers have drawn from SCT in examining the various antecedents and consequences of efficacy beliefs that exist within close relationships such as those that exist between students and teachers, athletes and coaches, or even between athletes in dyadic settings (Jackson, Knapp, & Beauchamp, 2009; 2008; Jackson, Whipp, Chua, Dimmock, & Hagger, 2013). Similarly, when Guillén and Feltz (2011) sought to examine the efficacy beliefs of referees in sport, this hitherto unstudied efficacy belief (which they referred to as ‘refficity’), was able to be guided by the core tenets of Bandura’s (1997) model. In each case, the conceptual foundations that relate to self-efficacy beliefs in general translated

readily to examining these novel forms of efficacy belief. In a similar regard, other researchers have sought to distinguish between efficacy beliefs that emerge in relation to both adoption and maintenance behaviors, both of which are particularly applicable in the exercise domain (Schwarzer & Renner, 2000). In relation to other facets of SCT, other notable extensions and tests of SCT within physical activity settings have included work that has targeted the distinct effects of affective versus instrumental types of outcome expectations (Gellert et al., 2012). Affective expectations related to the anticipated enjoyment that stems from physical activity, whereas instrumental expectations correspond to the perceived utility of the target behavior. For example, among a sample of older adults, Gellert et al. (2012) found that affective expectations (e.g., enjoyment) mediated the relations between self-efficacy beliefs and physical activity behavior but instrumental outcome expectations did not. Again, the core tenets of SCT were supported (with outcome expectations mediating the relations between efficacy beliefs and physical activity behavior) while also allowing for conceptual advancement in differentiating between affective and instrumental outcome expectations.

A particularly insightful legacy of SCT corresponds to the contention that people are able to engage in forethought and purposeful self-regulation to shape their own destinies. For example, people are able to purposefully envision alternative versions of themselves (otherwise known as ‘possible selves’) as a means to bolstering their physical activity behavior (Murru & Martin Ginis, 2010). Interestingly, Murru and Martin Ginis found that changes in physical activity behavior were explained (mediated) by adults’ self-regulatory efficacy beliefs. In a similar regard, the results of a recent meta-analysis provided evidence that purposeful use of mental imagery, as a cognitive strategy, was related to significant (albeit in the small effect size range) changes physical activity behavior (Conroy & Hagger, 2018). Finally, a growing body of work has highlighted that when people both envision their desired goals for behavioral achievement against the barriers they need to overcome, in a process known as ‘mental contrasting’ (Oettingen, 2012), this self-regulatory strategy has been found to be particularly effective. This includes exercise settings, whereby the enactment of mental contrasting has been found to be related to enhanced physical activity behavior, especially when one considers the affective outcomes (e.g., enjoyment) and obstacles associated with physical activity involvement and not just the anticipated health-related outcomes (e.g., improved fitness) and obstacles (Ruissen, Rhodes, Crocker, & Beauchamp, 2018).

#### 4. Summary

SCT has provided the theoretical underpinning for a considerable body of research over the past four decades. This framework has provided evidence for some of the psychological mechanisms that underpin human behavior change. Nevertheless, in light of recent evidence that challenges the directionality of some of the theoretical paths, as well as a need to differentiate within- and between-individual effects, it would seem appropriate to revisit and refine some of the tenets of the conceptual model. In the words of Rothman (2004) from 15 years ago: “although theories may fluctuate in their popularity, their properties have remained strikingly static over time. I believe greater attention must be paid to refining and, when necessary, rejecting theoretical principles. For this process to take shape, there needs to be an on-going series of exchanges between theorists and interventionists in which theory is treated as a dynamic entity whose value depends on it being not only applied and tested rigorously, but also refined based on the findings afforded by those tests.” (p. 2). Given the pervasive use of SCT, it is understandable that many scholars may be reluctant to revise this framework but, if done, such work might better serve the needs of both researchers and interventionists in the field of sport and exercise psychology, and beyond.

#### Declarations of interest

None.

#### References

- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50, 179–211.
- Bandura, A. (1977a). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review*, 84, 191–215.
- Bandura, A. (1977b). *Social learning theory*. Englewood cliffs, NJ: Prentice-Hall.
- Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman Lawrence.
- Bandura, A. (1998). Health promotion from the perspective of social cognitive theory. *Psychology and Health*, 13, 623–649.
- Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology*, 52, 1–26.
- Bandura, A. (2004). Health promotion by social cognitive means. *Health Education & Behavior*, 31, 143–164.
- Bandura, A. (2006). Guide for constructing self-efficacy scales. In F. Pajares, & T. C. Urdan (Eds.). *Self-efficacy beliefs of adolescents* (pp. 307–337). Greenwich, CT: Information Age.
- Bandura, A. (2012). On the functional properties of self-efficacy revisited. *Journal of Management*, 38, 9–44.
- Bandura, A. (2015). On deconstructing commentaries regarding alternative theories of self-regulation. *Journal of Management*, 41, 1025–1044.
- Bandura, A., & Locke, E. A. (2003). Negative self-efficacy and goal effects revisited. *Journal of Applied Psychology*, 88, 87–99.
- Bandura, A., & Walters, R. H. (1963). *Social learning and personality development*. New York: Holt, Rinehart & Winston.
- Bauman, A. E., Reis, R. S., Sallis, J. F., Wells, J. C., Loos, R. J., Martin, B. W., & Lancet Physical Activity Series Working Group (2012). Correlates of physical activity: Why are some people physically active and others not? *The Lancet*, 380, 258–271.
- Beattie, S., Dempsey, C., Roberts, R., Woodman, T., & Cooke, A. (2017). The moderating role of narcissism on the reciprocal relationship between self-efficacy and performance. *Sport, Exercise, Performance Psychology*, 6, 199–214.
- Beattie, S., Lief, D., Adamoulas, M., & Oliver, E. (2011). Investigating the possible negative effects of self-efficacy upon golf putting performance. *Psychology of Sport and Exercise*, 12, 434–441.
- Beattie, S., Woodman, T., Fakehy, M., & Dempsey, C. (2016). The role of performance feedback on the self-efficacy–performance relationship. *Sport, Exercise, Performance Psychology*, 5, 1–13.
- Beauchamp, M. R. (2016). Disentangling motivation from self-efficacy: Implications for measurement, theory-development, and intervention. *Health Psychology Review*, 10, 129–132.
- Beauchamp, M. R., Jackson, B., & Morton, K. L. (2012). Efficacy beliefs and human performance: From independent action to interpersonal functioning. In S. Murphy (Ed.). *The Oxford handbook of sport and performance psychology* (pp. 273–293). New York: Oxford University Press.
- Boardley, I. D. (2018). Coaching efficacy research: Learning from the past and looking to the future. *International Review of Sport and Exercise Psychology*, 11, 214–237.
- Bourne, J., Liu, Y., Jackson, B., Shields, C. A., Zumbo, B. D., & Beauchamp, M. R. (2015). The relationship between transformational teaching and adolescent physical activity: The mediating roles of personal and relational efficacy beliefs. *Journal of Health Psychology*, 20, 132–143.
- Bray, S. R., Shields, C. A., Jackson, B., & Saville, P. D. (2014). Proxy agency and other efficacy in physical activity contexts. In M. R. Beauchamp, & M. A. Eys (Eds.). *Group dynamics in exercise and sport psychology* (pp. 91–109). (2nd ed.). New York: Routledge.
- Burrell, A. M. G., Allan, J. L., Williams, D. M., & Johnston, M. (2018). What do self-efficacy items measure? Examining the discriminant content validity of self-efficacy items. *British Journal of Health Psychology*, 23, 597–611.
- Card, N. A. (2011). Toward a relationship perspective on aggression among school-children: Integrating social cognitive and interdependence theories. *Psychology of Violence*, 1, 188–201.
- Clark, D. O., Patrick, D. L., Grembowski, D., & Durham, M. L. (1995). Socioeconomic status and exercise self-efficacy in late life. *Journal of Behavioral Medicine*, 18, 355–376.
- Conroy, D., & Hagger, M. S. (2018). Imagery interventions in health behavior: A meta-analysis. *Health Psychology*, 37, 668–679.
- Cook, J. A., Razzano, L. A., Swarbrick, M. A., Jonikas, J. A., Yost, C., Burke, L., ... Santos, A. (2015). Health risks and changes in self-efficacy following community health screening of adults with serious mental illnesses. *PLoS One*, 10(4), e0123552.
- Corcoran, K. J., & Rutledge, M. W. (1989). Efficacy expectation changes as a function of hypothetical incentives in smokers. *Psychology of Addictive Behaviors*, 3, 22–28.
- Craig, C. L., Bauman, A., Latimer-Cheung, A., Rhodes, R. E., Faulkner, G., Berry, T. R., ... Spence, J. C. (2015). An evaluation of the my ParticipACTION campaign to increase self-efficacy for being more physically active. *Journal of Health Communication*, 20, 995–1003.
- Curran, P. J., & Bauer, D. J. (2011). The disaggregation of within-person and between-person effects in longitudinal models of change. *Annual Review of Psychology*, 62, 583–619.
- Diener, E., Oishi, S., & Park, J. (2014). An incomplete list of eminent psychologists of the modern era. *Archives of Scientific Psychology* 2014, 2, 20–32.
- Dominick, P. G., Squires, P., & Cervone, D. (2010). Back to persons: On social-cognitive Processes and products of leadership development experiences. *Industrial and Organizational Psychology*, 3, 33–37.

- Dunton, G. F. (2018). Sustaining health-protective behaviors such as physical activity and healthy eating. *Journal of the American Medical Association*, 320, 639–640.
- Ede, A., Sullivan, P. J., & Feltz, D. L. (2017). Self-doubt: Uncertainty as a motivating factor on effort in an exercise endurance task. *Psychology of Sport and Exercise*, 28, 31–36.
- Feltz, D. L., Chase, M. A., Moritz, S. E., & Sullivan, P. J. (1999). A conceptual model of coaching efficacy: Preliminary investigation and instrument development. *Journal of Educational Psychology*, 91, 765–776.
- Feltz, D. L., & Lirgg, C. D. (1998). Perceived team and player efficacy in hockey. *Journal of Applied Psychology*, 83, 557–564.
- Feltz, D. L., Short, S. E., & Sullivan, P. J. (2008). *Self-efficacy in sport*. Champaign, IL: Human Kinetics.
- French, D. P., Olander, E. K., Chisholm, A., & McSharry, J. (2014). Which behaviour change techniques are most effective at increasing older adults' self-efficacy and physical activity behaviour? A systematic review. *Annals of Behavioral Medicine*, 48, 225–234.
- Gellert, P., Ziegelmann, J. P., & Schwarzer, R. (2012). Affective and health-related outcome expectancies for physical activity in older adults. *Psychology and Health*, 27, 816–828.
- Gilson, T. A., Chow, G. M., & Feltz, D. L. (2012). Self-efficacy and athletic squat performance: Positive or negative influences at the within-and between-levels of analysis. *Journal of Applied Social Psychology*, 42(6), 1467–1485.
- Grant, M. J., & Booth, A. (2009). A typology of reviews: An analysis of 14 review types and associated methodologies. *Health Information and Libraries Journal*, 26, 91–108.
- Guillén, F., & Feltz, D. L. (2011). A conceptual model of referee efficacy. *Frontiers in Psychology*, 2, 25.
- Halper, L. R., & Vancouver, J. B. (2016). Self-efficacy's influence on persistence on a physical task: Moderating effect of performance feedback ambiguity. *Psychology of Sport and Exercise*, 22, 170–177.
- Jackson, B., Beauchamp, M. R., & Dimmock, J. A. (in press). Efficacy beliefs in physical activity settings: Contemporary debate and unanswered questions. In G. Tenenbaum & R.C. Eklund, *Handbook of sport psychology* (4th ed.). Hoboken, NJ: Wiley.
- Jackson, B., Knapp, P., & Beauchamp, M. R. (2008). Origins and consequences of tripartite efficacy beliefs within elite athlete dyads. *Journal of Sport & Exercise Psychology*, 30, 512–540.
- Jackson, B., Knapp, P., & Beauchamp, M. R. (2009). The coach-athlete relationship: A tripartite efficacy perspective. *The Sport Psychologist*, 23, 203–232.
- Jackson, B., Whipp, P. R., Chua, K. P., Dimmock, J. A., & Hagger, M. S. (2013). Students' tripartite efficacy beliefs in high school physical education: Within-and cross-domain relations with motivational processes and leisure-time physical activity. *Journal of Sport & Exercise Psychology*, 35, 72–84.
- Kirsch, I. (1995). Self-efficacy and outcome expectancy: A concluding commentary. In J. E. Maddux (Ed.), *Self-efficacy, adaptation, and adjustment: Theory, research, and application* (pp. 341–345). New York, NY: Plenum Press.
- Latham, G. P., & Locke, E. A. (1991). Self-regulation through goal setting. *Organizational Behavior and Human Decision Processes*, 50, 212–247.
- Leavy, J. E., Bauman, A. E., Rosenberg, M., & Bull, F. C. (2014). Examining the communication effects of health campaigns: A case study using find thirty every day' in Western Australia. *SAGE Open*, 4, 215824401453355.
- Lindsay, D. H., Brass, D. J., & Thomas, J. B. (1995). Efficacy-performance spirals: A multi-level perspective. *Academy of Management Review*, 20, 645–678.
- Locke, E. A., & Latham, G. P. (2002). Building a practically useful theory of goal setting and task motivation: A 35-year odyssey. *American Psychologist*, 57, 705–717.
- Locke, E. A., & Latham, G. P. (2006). New directions in goal-setting theory. *Current Directions in Psychological Science*, 15, 265–268.
- Maddux, J. E. (1995). *Self-efficacy, adaptation, and adjustment: Theory, research, and application*. New York: Plenum.
- McDonald, D., O'Brien, J., Farr, E., & Haaga, D. A. F. (2010). Pilot study of inducing smoking cessation attempts by activating a sense of looming vulnerability. *Addictive Behaviors*, 35, 599–606.
- McEwan, D., Harden, S. M., Zumbo, B. D., Sylvester, B. D., Kaulius, M., Ruissen, G. R., ... Beauchamp, M. R. (2016). The effectiveness of multi-component goal setting interventions for changing physical activity behaviour: A systematic review and meta-analysis. *Health Psychology Review*, 10, 67–88.
- Merrifield, K. A., Gamble, W. C., & Yu, J. J. (2015). Using social cognitive theory to understand meta-parenting in parents of young children. *Family Science*, 6, 362.
- Michie, S., Richardson, M., Johnston, M., Abraham, C., Francis, J., Hardeman, W., ... Wood, C. E. (2013). The behavior change technique taxonomy (v1) of 93 hierarchically clustered techniques: Building an international consensus for the reporting of behavior change interventions. *Annals of Behavioral Medicine*, 46, 81–95.
- Michie, S., van Stralen, M. M., & West, R. (2011). The behaviour change wheel: A new method for characterising and designing behaviour change interventions. *Implementation Science*, 6, 42.
- Miller, C. K., & Bauman, J. (2014). Goal setting: An integral component of effective diabetes care. *Current Diabetes Reports*, 14, 1–8.
- Moritz, S. E., Feltz, D. L., Fahrbach, K. R., & Mack, D. E. (2000). The relation of self-efficacy measures to sport performance: A meta-analytic review. *Research Quarterly for Exercise & Sport*, 71, 280–294.
- Murru, E. C., & Martin Ginis, K. A. (2010). Imagining the possibilities: The effects of a possible selves intervention on self-regulatory efficacy and exercise behavior. *Journal of Sport & Exercise Psychology*, 32, 537–554.
- Myers, N. D., Vargas-Tonsing, T. M., & Feltz, D. L. (2005). Coaching efficacy in intercollegiate coaches: Sources, coaching behavior, and team variables. *Psychology of Sport and Exercise*, 6, 129–143.
- Oettingen, G. (2012). Future thought and behaviour change. *European Review of Social Psychology*, 23(1), 1–63.
- Powers, W. T. (1973). *Behavior: The control of perception*. Chicago: Aldine.
- Powers, W. T. (1991). Commentary on Bandura's "human agency". *American Psychologist*, 46, 151–153.
- Rhodes, R. E., & Blanchard, C. M. (2007). What do confidence items measure in the physical activity domain? *Journal of Applied Social Psychology*, 37, 759–774.
- Rhodes, R. E., & Courneya, K. S. (2003). Self-efficacy, controllability, and intention in the theory of planned behaviour: Measurement redundancy or causal independence? *Psychology and Health*, 18, 79–91.
- Rhodes, R. E., & Courneya, K. S. (2004). Differentiating motivation and control in the theory of planned behaviour. *Psychology Health & Medicine*, 9, 205–215.
- Roberts, W., & Fillmore, M. T. (2017). Curbing the DUI offender's self-efficacy to drink and drive: A laboratory study. *Drug and Alcohol Dependence*, 172, 73.
- Rogers, R. W. (1983). Cognitive and physiological processes in fear appeals and attitude change: A revised theory of protection motivation. In J. Cacioppo, & R. Petty (Eds.). *Social psychophysiology* (pp. 153–176). New York: Guilford Press.
- Rothman, A. J. (2004). "Is there nothing more practical than a good theory?": Why innovations and advances in health behavior change will arise if interventions are used to test and refine theory. *International Journal of Behavioral Nutrition and Physical Activity*, 1, 11.
- Ruissen, G. R., Rhodes, R. E., Crocker, P. R. E., & Beauchamp, M. R. (2018). Affective mental contrasting to enhance physical activity: A randomized controlled trial. *Health Psychology*, 37, 51–60.
- Sanddal, G. B., Eide, G. E., Barth, T., Williams, G., & Meland, E. (2017). Effective behaviour change techniques for physical activity and healthy eating in overweight and obese adults; systematic review and meta-regression analyses. *International Journal of Behavioral Nutrition and Physical Activity*, 14, 42.
- Schmidt, A. M., & DeShon, R. P. (2010). The moderating effects of performance ambiguity on the relationship between self-efficacy and performance. *Journal of Applied Psychology*, 95, 572–581.
- Schwarzer, R. (2008). Modeling health behavior change: How to predict and modify the adoption and maintenance of health behaviors. *Applied Psychology: An International Review*, 57, 1–29.
- Schwarzer, R., & Renner, B. (2000). Social-cognitive predictors of health behavior: Action self-efficacy and coping self-efficacy. *Health Psychology*, 19, 487–495.
- Shilts, M. K., Horowitz, M., & Townsend, M. S. (2004). Goal setting as a strategy for dietary and physical activity behavior change: A review of the literature. *American Journal of Health Promotion*, 19, 81–93.
- Sitzmann, T., & Yeo, G. (2013). A meta-analytic investigation of the within-person self-efficacy domain: Is self-efficacy a product of past performance or a driver of future performance? *Personnel Psychology*, 66, 531–568.
- Sniehotta, F. F., Presseau, J., & Araújo-Soares, V. (2014). Time to retire the theory of planned behaviour. *Health Psychology Review*, 8, 1–7.
- Swann, C., & Rosenbaum, S. (2018). Do we need to reconsider best practice in goal setting for physical activity promotion? *British Journal of Sports Medicine*, 52, 485–486.
- Tasa, K., Taggar, S., & Seijts, G. (2007). The development of collective efficacy in teams: A multilevel and longitudinal perspective. *Journal of Applied Psychology*, 92, 17–27.
- Tinetti, M. E., Naik, A. D., & Dodson, J. A. (2016). Moving from disease-centered to patient Goals-Directed care for patients with multiple chronic conditions: Patient value-based care. *JAMA Cardiology*, 1, 9–10.
- Vancouver, J. B., More, K. M., & Yoder, R. J. (2008). Self-efficacy and resource allocation: Support for a nonmonotonic, discontinuous model. *Journal of Applied Psychology*, 93, 35–47.
- Vancouver, J. B., & Purl, J. D. (2017). A computational model of self-efficacy's various effects on performance: Moving the debate forward. *Journal of Applied Psychology*, 102, 599–616.
- Vancouver, J. B., Thompson, C. M., Tischner, E. C., & Putka, D. J. (2002). Two studies examining the negative effect of self-efficacy on performance. *Journal of Applied Psychology*, 87, 506–516.
- Vancouver, J. B., Thompson, C. M., & Williams, A. A. (2001). The changing signs in the relationships among self-efficacy, personal goals, and performance. *Journal of Applied Psychology*, 86, 605–620.
- Voorhees, C. C., Yan, A. F., Clifton, K. J., & Wang, M. Q. (2011). Neighborhood environment, self-efficacy, and physical activity in urban adolescents. *American Journal of Health Behavior*, 35, 674.
- Williams, S. L. (1995). Self-efficacy, anxiety, and phobic disorders. In J. E. Maddux (Ed.). *Self-efficacy, adaptation, and adjustment: Theory, research, and application* (pp. 69–107). New York, NY: Plenum Press.
- Williams, D. M. (2010). Outcome expectancy and self-efficacy: Theoretical implications of an unresolved contradiction. *Personality and Social Psychology Review*, 14, 417–425.
- Williams, D. M., Dunsiger, S., Emerson, J. A., Dionne, L., Rhodes, R. E., & Beauchamp, M. R. (2017). Are self-efficacy measures confounded with motivation? An experimental test. *Annals of Behavioral Medicine*, 51(Suppl. 1), S1191–S1192.
- Williams, S. L., & French, D. P. (2011). What are the most effective intervention techniques for changing physical activity self-efficacy and physical activity behaviour—and are they the same? *Health Education Research*, 26, 308–322.
- Williams, D. M., & Rhodes, R. E. (2016). The confounded self-efficacy construct: Conceptual analysis and recommendations for future research. *Health Psychology Review*, 10, 113–128.
- Woodman, T., Akehurst, S., Hardy, L., & Beattie, S. (2010). Self-confidence and performance: A little self-doubt helps. *Psychology of Sport and Exercise*, 11, 467–470.
- World Health Organization (2009). *Interventions on diet and physical activity: What works*. Geneva, Switzerland: World Health Organization.
- Yeo, G. B., & Neal, A. (2006). An examination of the dynamic relationship between self-efficacy and performance across levels of analysis and levels of specificity. *Journal of Applied Psychology*, 91, 1088–1101.