

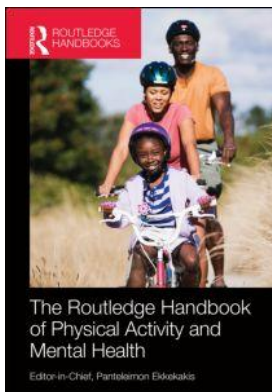
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Peter R. E. Crocker, Carolyn E. McEwen, Amber D. Mosewich

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PHYSICAL ACTIVITY AND SELF-PERCEPTIONS AMONG ADULTS

Peter R. E. Crocker, Carolyn E. McEwen, and Amber D. Mosewich

For over a century, theorists have recognized that self-processes are central in understanding human adaptation (Bandura, 1997; Baumeister, 1987; Harter, 1999; James, 1890). Self-processes are involved in guiding and motivating behavior, attention and self-regulation, influencing appraisals and emotion, as well as helping individuals buffer the effects of negative events (see Guindon, 2010; Leary & Tangney, 2003). The self develops through feedback, and person and social comparison processes, processes which are heavily influenced by the person's interactions with the world and by social relationships, shared cultural experiences, and self-reflexivity (our ability to think about and attend to our self; Harter, 1999; Stets & Burke, 2003). Aspects of self, such as self-esteem, are thought to be key markers of well-being. Therefore, it is hardly surprising that researchers are intrigued by the potential causal relationship between physical activity and self-processes (see Crocker, Kowalski, & Hadd, 2008; Fox, 2000).

This chapter will review the theoretical and empirical literature on self-representations and physical activity in adults. We begin with defining key self-constructs, as well as identifying the conceptual boundaries of the chapter. Since several other chapters in this book are related to self-processes, we will attempt to highlight unique topics while avoiding any unnecessary overlap. We then discuss how global self is multidimensional, the relevance of the physical self and associated subdomains, and the issue of domain identification. We briefly review measurement issues and how researchers have attempted to model physical activity and self-representations before reviewing the research literature linking physical activity and self. We pay special attention to gender and cultural differences. In the final section, we address the implications for practitioners as well as identify research challenges.

Conceptions of the self and definitions

A review of the sport and exercise psychology literature in the last 20 years would reveal the use of many self-related terms including self-identity, self-efficacy, self-esteem, self-worth, self-concept, self-compassion, self-perceptions, physical self, self-image, and self-representations. Leary and Tangney (2003) found over 60 self-related terms in the general psychology literature. Unfortunately these terms have not been used or measured consistently (Harter, 1999), making comparisons and developing theoretical and practical generalizations difficult.

This chapter will focus on self-representations and related constructs, such as self-esteem and

self-concept. Self-representations are defined as “attributes or characteristics of the self that are consciously acknowledged by the individual through language – that is, how one describes oneself” (Harter, 1999, p. 3). Self-representations can vary in terms of globalism (i.e., self-evaluation of the person as a whole versus parts), domain specificity (i.e., social, physical, and intellectual self-representations), as well as stability across time and contexts. To clarify key terms used in this chapter, the following descriptions are provided:

- **Self-concept** refers to self-evaluations of personal attributes, such as abilities and characteristics, within discrete domains such as physical, social, and intellectual areas (Harter, 1999; Hattie, 1992). Some theorists believe self-concepts can vary in importance, valence (positive and negative), stability, and can change over the lifespan (see Kernis & Goldman, 2003).
- **Self-esteem** or **self-worth** is an emotionally laden self-evaluation reflecting how a person feels about him/herself: it captures a sense of worth (Leary & MacDonald, 2003). It can be conceptualized at both global and domain levels and can vary across the lifespan.
- **Self-efficacy** refers to beliefs in one’s capabilities to organize and execute the courses of action required to produce given attainments (Bandura, 1997). Self-efficacy is influenced by self-concept but also other cognitive appraisals and situational demands. Self-efficacy is described in greater detail in Chapter 14 (McAuley, Mailey, Szabo, & Gothe, this volume).
- **Identity** is commonly used interchangeably with self-constructs. Identity often includes group affiliations, self-representations, and social roles (see Hogg, 2003) and frequently comprises goals, values, and beliefs a person is strongly committed to (Waterman, 1985). An individual may have multiple identities, which can include physical activity, sport, and exercise. Identity and physical activity are discussed in greater detail in Chapter 13 (Strachan & Whaley, this volume).

To a large extent, this chapter will focus on self-representations associated with the constructs of self-concept and self-esteem, and how they influence and are influenced by physical activity. We will also only briefly touch on the area of body image and body appearance because this area is covered in more detail in Chapter 15 (Martin Ginis, McEwan, & Bassett-Gunter, this volume). However, it is impossible to completely exclude this area since body appearance is an important aspect of self-concept and a strong correlate of self-worth (Fox, 2000; Harter, 1999). This becomes more apparent when we consider the multidimensional structure of self.

Multidimensional self

Both self-concept and self-esteem are implicated in the organization of motivated behaviors including physical activity, and are markers of mental health and well-being. There are literally thousands of studies on self-esteem and self-concept and their associations to psychological functioning, health, stress management, emotions, academic achievement, and sport and exercise involvement (see Fox, 1998; Kernis & Goldman, 2003; Kort-Butler & Hagewen, 2011; Leary & MacDonald, 2003). Clearly, these are important topics from both empirical and theoretical perspectives.

To appreciate the effects of physical activity and self-processes one must acknowledge that the structure of self is multidimensional. This view proposes that global self can consist of different levels or specific domains including such dimensions as physical, social, and academic (Harter, 1999; Shavelson, Hubner, & Stanton, 1976). Subdomains can be nested under the domains, with possible increasing differentiation. For example, the physical self can consist of subdomains like perceptions of physical conditioning, sport skills, flexibility, body fat, body appearance, and

strength (see Fox & Corbin, 1989; Marsh, Richards, Johnson, Roche, & Tremayne, 1994). A subdomain like strength might be further divided into facets like arm strength, leg strength, core strength, and the like. This multidimensional perspective of self becomes critical when considering whether (a) self-processes motivate physical activity behavior, (b) physical activity enhances self-processes, or (c) whether there is a reciprocal effect between physical activity and self-processes (Marsh & Craven, 2006).

When physical activity researchers are interested in the global level, they typically look at global self-esteem or global self-worth. At the domain or subdomain level there is greater attention on self-concept, although there are measures of domain self-worth like physical self-worth (Fox & Corbin, 1989). There is strong evidence that the physical self is strongly linked to an individual's perception of global self-esteem (e.g., Fox, 2000; Sonstroem & Morgan, 1989). As Fox (1997) stated, "For many theorists, the physical self has become the *major* component of our self-expression and interaction with the world, and it is seen to hold a key to our understanding of the total self" (p. v).

Domain identification and self-esteem enhancement

Given that so many dimensions can be nested under global self, what is the potential contribution of the physical self and the influence of physical activity interventions on enhancing self-esteem? Although it seems intuitive that lower levels of the multidimensional (sometimes referred to as hierarchical) structure should contribute to global self, the influence of various levels of the structure on other levels is much less clear (Hattie & Fletcher, 2005). A popular notion is that people may value or identify with particular domains and these valued domains should have a greater impact on higher self-structures like global self-esteem. Therefore, some researchers study domain identification, which is the extent that a person defines his or her higher level self through performance in a particular domain like school, sport, or exercise (see Marsh & Sonstroem, 1995; Osborne & Jones, 2011).

Based on the notion of domain identification, physical activity interventions could be directed towards increasing the value attached to physical activity (sport, exercise, dance, or lifestyle activity), as well as increasing competence in the particular physical self-subdomain. However, there is not strong evidence for domain identification process in enhancing self-esteem. Many researchers have found that the importance attached to a domain seems to have little influence on global self (Donnellan, Tzesniewski, Conger, & Conger, 2007; Hattie & Fletcher, 2005). However, others still hold that it is necessary to consider the perceived importance of specific domains in understanding global self-constructs (see Harter, 2003; Osborne & Jones, 2011). The contribution of domain identification to understanding global self is clearly a source of contention.

Measurement of global and physical self

Many instruments have been developed to measure self-concept and self-esteem, including the physical self (see Fox, 1997; Marsh, 1992). In the sport and exercise psychology literature, popular measures of global self-esteem include Rosenberg's global self-esteem measure (Rosenberg, 1965), Harter's General Self-worth subscale from the Adult Self-Perception Profile (Messer & Harter, 1986), as well as Marsh's self-worth subscale from the Self-Description Questionnaire (Marsh, 1992). All of these scales have strong psychometric properties, although Leary and MacDonald (2003) believe most measures of global self-esteem and self-worth are heavily weighted by self-concept items and do not primarily assess the affective reactions central to this construct.

Many different instruments have been used to assess the physical self, including measures of physical self-esteem and physical self-concept. Harter has developed measures for across the lifespan that compartmentalize physical self-perceptions into two primary domains: physical/athletic competence and physical appearance (Harter, 1988; Messer & Harter, 1986). Fox and Corbin (1989) developed the Physical Self-perception Profile (PSPP), which assesses four subdomains of physical self-concept (sport competence, attractive body, physical strength, and physical conditioning) and a global domain of physical self-worth. Marsh and colleagues' Physical Self-description Questionnaire (PSDQ; Marsh et al., 1994) assesses 10 physical self-concepts, in addition to including a global self-esteem dimension (strength, body fat, activity, endurance/fitness, sport competence, coordination, health, appearance, flexibility, and general physical self-concept). There are also physical self-concept measures for elite athletes (Elite Athlete Self-description Questionnaire; Marsh, Hey, Johnson, & Perry, 1997). All of these measures have demonstrated sound psychometric properties.

Modeling physical activity and the self

There has been a long debate about the nature of the relationship between self-representations and motivated behavior like physical activity (see Crocker et al., 2008; Fox, 2000). At a basic level, most researchers believe that physical self-representations are correlated more strongly, compared to global self-constructs, with physical activity (Fox, 1997). A more complex question, however, concerns the direction of causality. There are three potential directions of causality models to consider: bottom-up, top-down, and reciprocal. These causal models require the use of experimental and longitudinal designs, combined with more sophisticated data analysis strategies such as latent growth modeling and structural equation modeling (see Kort-Bulter & Hagewen, 2011; Marsh & Craven, 2006).

Many sport and exercise researchers have argued for a bottom-up causality model in that physical activity can enhance global self-esteem (Folkins & Sims, 1981; Opdenacker, Delecluse, & Boen, 2009). A bottom-up model holds that changes in a situation-specific experience (e.g., lifting weights) causes changes in a physical domain (e.g., strength), which produces modifications in physical self-worth, ultimately causing change in global self-esteem. An example of a specific bottom-up model is Sonstroem and Morgan's (1989) Exercise and Self-esteem Model (EXSEM). This model holds that interventions in physical activity cause changes in self-efficacy, which in turn influences change in physical self-perceptions and upwards to enhancing global self-esteem. Although the specific components in the EXSEM have been modified over the years, it has been a popular bottom-up model to examine exercise interventions, as well as the effects of sport participation on self-representations across the lifespan (see McAuley, Blissmer, Katula, Duncan, & Mihalko, 2000; Opdenacker et al., 2009; Sonstroem, 1997).

A top-down causal model holds that the flow of change is from global self-esteem to lower order domains like the physical self and then down to specific types of subdomains, which would then impact specific physical activity behavior (see Harter, 1999). Some sport and exercise researchers have examined how variables such as perceived physical competence or exercise identity influence engagement in physical activity (Whaley & Ebbeck, 2002). There are few systematic evaluations of the top-down model in the sport and exercise psychology literature (see Kowalski, Crocker, Kowalski, Chad, & Humbert, 2003).

Reciprocal effects causal models hold that prior self-concept influences subsequent motivated behavior and prior motivated behavior influences subsequent self-concept (Marsh & Craven, 2006). Evaluating this model requires the researcher to evaluate both self-concept and physical behavior across multiple time points. It is also critical to evaluate self-concept at the

multidimensional level, since the evidence for reciprocal effects model is most prominent when the domain self-concept matches the achievement domain (Marsh & Craven, 2006). There are, however, only a limited number of studies that have examined this model in physical activity contexts, with none focusing on exercise behavior in adults (see Marsh, Gerlach, Trautwein, Lüdtke, & Brettschneider, 2007; Marsh & Perry, 2005).

Empirical evidence for physical activity and the self

There are numerous studies with emerging, young, middle-aged, and older adult populations that demonstrate a weak to moderate relationship between physical activity behavior and global and physical self-esteem/self-concept. But what is the evidence that physical activity interventions can enhance self-representations? Also, what is the evidence for various bottom-down, top-down, or reciprocal models? This section will review the empirical evidence about the relationship between physical activity involvement and aspects of global and physical self.

The literature indicates that global self-esteem and physical self-concepts like conditioning, sport skills, and strength are correlated with participation in physical activity contexts like exercise, sport, dance, and physical activity lifestyles (see Fox, 2000; Spence, McGannon, & Poon, 2005). However, many research studies have used cross-sectional correlational or simple non-experimental group comparison designs. These designs, although informative, make it difficult to determine the causal relationship between physical activity behaviors and self-representations. It is far more informative, however, to investigate the effectiveness of physical activity interventions. These studies are more common in exercise or lifestyle physical activity contexts.

Several authors have provided narrative or meta-analytic reviews of the effectiveness of physical activity interventions in adults (Fox, 2000; Leith, 2009; McDonald & Hodgdon, 1991; Spence et al., 2005; Sonstroem, 1984). These reviews reveal a number of challenges. First, the measurement of self-esteem or self-concept is problematic, with many studies using unidimensional measures of self, or using psychometrically weak measures. Thus, it is difficult for the reviews to clearly establish relationships between physical activity intervention and the effects on specific components of the self. Second, some reviews have included both children and adults and integrated both populations in their summary conclusions. Third, some reviews have focused on only global self-representations. Fourth, interventions vary widely in terms of the type of activity, program duration, intensity, and frequency (in many cases not reporting some of this key information). Given some of these challenges, we will highlight some key findings in regard to the effects of physical activity interventions on both global and multi-dimensional self-representations. This will be complemented with recent research on these relationships using various research designs.

Physical activity and global self-esteem

The majority of intervention studies have focused on global self-esteem or self-concept in all populations (see Crocker et al., 2008; Spence et al., 2005). Leith (2009) argued that exercise programs result in significant changes in global self-concept and self-esteem, with over 50% of intervention studies reporting significant intervention effects. Leith, Kerr, and Faulkner (2011) suggest that the greatest effects are found with running and weight-training activities. Fox (2000) also argued that about 50% of intervention studies reported between 1970 and 1995 found positive effects on some indicator of global self.

Meta-analytic procedures represent a more powerful means to evaluate the effects of interventions on global self-representations. An excellent example is the work of Spence et al.

(2005) who analyzed the effects of exercise interventions on global self and considered a number of potential moderating effects including age, sex, treatment (type of intervention and fitness measure, and mode of exercise), changes in fitness, initial level of global self, initial level of fitness, exercise mode, and exercise dose (frequency, duration, and intensity). They selected 113 studies, of which 42 were published, with adult populations. However, only 54 studies had random assignment. The dependent measure was an indicator of global self-concept ($n = 83$) or global self-esteem ($n = 44$). Their results indicated that the average weighted effect size was $d = 0.23$, suggesting a weak but significant effect of exercise on global self. The only significant moderators were fitness change and type of program (exercise and lifestyle versus skill development). The former effect suggests that changes in actual physical fitness are required for significant changes in either global self-esteem or global self-concept. There were, however, a number of limitations in the study. Many studies failed to report key information (e.g., intensity, fitness change), intervention duration widely varied, and only 21 studies were considered to be good quality. Nevertheless, the results suggested that exercise interventions have only a small impact on global self.

Sport involvement appears to be a strong medium to enhance self-esteem and self-concept because it not only involves physical activity but is also associated with social value and social support. However, intervention studies with sport are difficult, especially with adult populations. One interesting way to examine the effect of previous sport involvement on self is to use longitudinal designs. An interesting study by Kort-Butler and Hageman (2011) examined changes in initial levels and growth of global self-esteem as a function of involvement in extracurricular school activities in sport and school clubs from youth to young adulthood. Their longitudinal findings with over 5300 participants were somewhat surprising. As expected, participants in sport-only, school club-only, and multiple involvement had higher initial global self-esteem compared to non-participants. However, although all participants increased in self-esteem over time, initial levels did not contribute to long-term differences. There were no sex or ethnicity effects for self-esteem trajectories. Thus, involvement in activities like sport in high school seems to have only a short-term effect during the school years. Although this study did have limitations (e.g., did not measure physical activity involvement on repeated waves), the growth curve methodology points to a promising way to examine self-processes over time in physical activity contexts where intervention designs are difficult.

Overall, research indicates that physical activity has relatively weak effects on improving global self-esteem. Conclusions about the strength of relationships must be tempered since there are several limitations in research, including a lack of systematic investigation of dose response and instrumentation problems. Nevertheless, the weak effect of physical activity interventions on improving global self-esteem is not surprising given the multidimensional nature of self. There are numerous self-representation domains that can contribute to global self. Models of multidimensional self strongly suggest that physical activity is more likely to have robust effects on the physical self-domain and its associated subdomains (see Fox, 2000).

Physical activity and the multidimensional self

The development of multidimensional models and associated measurement tools since the late 1980s allowed researchers to examine various causal models concerning self-representations and physical activity. A review of the literature indicates there are many studies that have now included multidimensional measures of the physical self in adult populations. Unfortunately, many of these investigations used research designs or explored specific research questions that do not allow us to determine causal relationships. Systematic reviews are also rare (see Fox, 2000).

Nevertheless, there are enough quality studies that suggest it is critical to consider domain-level effects in the link between physical activity and self-representations.

Fox (2000) noted that a majority of intervention studies (78%) indicated positive changes in some aspect of physical self-representations across various populations. On the surface, it appears that physical activity interventions have a more powerful effect on the physical self compared to the global self. However, Fox's conclusion needs to be tempered by the fact that few studies used psychometrically sound measures of the physical self; some measured only specific aspects of the physical self. In addition, many studies were underpowered, and treatment modality and dose varied widely. Since Fox's review, however, there have been several studies using relatively strong methodologies and statistical analysis procedures that do shed light on the effectiveness of interventions to change the physical, and sometimes global, self. Four of these studies are reviewed below.

Li and colleagues provided evidence that a low-intensity physical activity intervention like Tai Chi can produce changes in physical and global self (Li, Harmer, Chaumeton, Duncan, & Duncan, 2002). Using a randomized control trial design, they examined the effects of a 6-month Tai Chi intervention on physical self-dimensions and global self-esteem in older adults (> 64 yrs). The intervention consisted of 60-minute sessions (30 minutes of active Tai Chi) twice a week focusing on balance, postural alignment, and concentration. The authors used growth curve analysis to compare group differences, as well as within-person slope scores to calculate correlations among self-representation scores. The results indicated a significant increase in all physical self-concept scores (conditioning, body appearance, and strength), physical self-worth (PSW), and global self-esteem (GSE) scores in the intervention group compared to the control group. The strongest effect was for conditioning and the weakest effect was for physical appearance, with no difference between PSW and GSE. All physical self-domain slope scores were positively related to changes in PSW. Although the authors argued that PSW mediated the effects of subdomains on GSE (slope scores between PSW and GSE were statistically significant in the intervention group), there were no relationships between subdomains and GSE. Thus, although the Tai Chi intervention had similar effects on PSW and GSE, there did not seem to be a causal pathway between changes in subdomains and GSE. This indicated that the mechanisms of change may be dissimilar at the different levels of the self.

McAuley and colleagues (2000) demonstrated that various forms of physical activity can enhance aspects of the physical self in older adults (60–75 years). Comparing a walking group ($n = 85$) to a stretch and tone group ($n = 89$) in a randomized design, they examined aspects of Sonstroem's model (EXSEM) over 12 months (6-month intervention and 6-month follow-up). Unfortunately, they did not include a non-exercising control group. Nevertheless, their data did provide support for the EXSEM. Using growth modeling statistical techniques, the results indicated that both exercise groups improved at the end of the 6-month intervention in all aspects of physical self-concept (strength, body appearance, and conditioning), as well as physical self-worth. However, both exercise groups also showed significant decreases at follow-up in all self-representations. The modeling appeared to demonstrate that changes in physical fitness, body composition, and physical self-efficacy were related to changes in specific physical self-concepts and increased physical self-worth. Overall, the results indicated that various forms of activity can change physical self-representations.

Opdenacker and colleagues (2009) provided further evidence that various types of physical activity interventions can impact multidimensional self-representations in older adults. They examined the effects of a structured exercise program, a lifestyle exercise program, and a non-randomized control group. The structured intervention consisted of 60–90 minutes, three times per week of individualized programs including endurance, strength, flexibility, and balance

training supervised by trainers in a fitness center. The lifestyle intervention had similar training components including home-based exercises adapted to the individual's lifestyle. Both programs lasted for 11 months, with a follow-up assessment at 22 months. In terms of multidimensional self-representations, both interventions improved conditioning and sport competence perceptions, with significant improvement also for physical appearance and physical self-worth in the lifestyle group. The use of the non-randomized design does create some challenges as group scores on some variables were not equivalent at baseline. Nevertheless, there were interesting data for examining the relationship between multidimensional self and activity. When examining the intervention groups and controlling for pre-test data using residualized change scores, the authors found that changes in physical self-subdomains were more strongly related to changes in PSW than GSE. At the end of the intervention, changes in physical activity were more strongly related to changes in PSW than GSE. This study does contribute to the literature by suggesting that physical activity has its greatest influence on the physical self-domain.

The three intervention studies reviewed thus far, although providing support for the effectiveness of physical activity on enhancing the physical self, assume a bottom-up causal model. Marsh and his colleagues, however, have provided evidence that self-concept and physical activity behavior might be best viewed as dynamic and reciprocal. Marsh and Perry (2005) examined the reciprocal effects of swimming performance and physical self-concept in 270 elite swimmers from 30 countries (mean age = 20.8 years; range = 14–35 years). The reciprocal model evaluated held that previous swimming achievement would influence swimming physical self-concept, which would in turn impact swimming achievement even after controlling for previous swimming achievement. Previous swimming achievement was determined by personal best performance. Swimming self-concept was assessed by adapting the Elite Athlete Self-description Questionnaire, which has five specific self-concepts (skill levels, body suitability, aerobic fitness, anaerobic fitness, and mental competence) and a global factor (overall performance). The results supported the reciprocal model in that the strongest predictor of performance was previous achievement, but self-concept did add about 10% to the overall prediction (which was a remarkable 83%).

The reciprocal effect model, which has been replicated in adolescent populations in physical activity and many academic achievement studies (see Marsh & Craven, 2006; Marsh, Chanal, & Sarrazin, 2006), has important practical and theoretical implications. First, the reciprocal model demonstrated that self-concept needs to be considered in motivated achievement behaviors. Second, it indicates that interventions need to target both self-concept and the specific achievement skills related to the domain of interest. Third, the research suggests that self-concept needs to be assessed at the logical level related to the motivated behavior. To a large extent, most of the reciprocal effects research has occurred in achievement settings, primarily in education. It will be important to replicate the reciprocal effects model in other physical activity contexts, such as exercise settings.

Culture and gender

Research has demonstrated that culture and gender influence physical activity behavior and self-representations (e.g., Çağlar & Aşçi, 2006; Hayes, Crocker, & Kowalski, 1999; Ramanathan & Crocker, 2009). This is hardly surprising since culture shapes individual and group attitudes, values, and behaviors and can impact development of both the global and physical self (Cross & Gore, 2003). Since gendered cognitions and roles are molded by social-cultural institutions, these forces will impact how males and females develop global and physical self-perceptions and engage in physical activity. The following section will discuss if there are meaningful cultural and gender differences in (a) self-representations and (b) the relationship between physical activity and self-representations.

There are a number of conceptual and measurement challenges to examining cultural differences in self-representations. First, current assumptions about global self-concept, self-esteem, and specific self-representations may not generalize across different cultural groups (Heine, Lehman, Markus, & Kitayama, 1990). Second, the same measurement tools may not generate valid scores, even if items are translated, because of differences in interpretation. Third, many researchers have used nationality as a proxy for culture. This is problematic since little knowledge is gained, because nationality differences may not reflect the influence of specific cultural values (Unger et al., 2002).

Few studies have specifically examined cultural differences in the multidimensional self. Most studies are descriptive, have little theoretical base, and almost all centered on nationality differences. For example, Hagger, Lindwall, and Aşçi (2004) found higher mean physical self-perceptions scores among British participants compared to Swedish or Turkish participants. In a subsequent study of Turkish university students, mean PSPP scores were lower than in previous studies with American, British, and Canadian samples, particularly on perceived body attractiveness and physical strength (Cağlar & Aşçi, 2006). Other studies have looked at differences in German and Turkish populations, with Germans scoring higher on some scales (i.e., health, coordination, physical activity, sport competence, flexibility, strength, and self-esteem), and Turkish participants scoring higher on other subscales of the PSDQ (i.e., appearance, body fat, and global physical self-worth; Aşçi, Alfermann, Gağar, & Stiller, 2008). There are also no studies that have specifically examined if there are cultural effects on the relation between physical self and physical activity. Overall, most studies provide little understanding of why there are cultural differences and whether the differences have implications for mental health and engagement in motivated behavior, specifically physical activity.

Unlike the mixed findings from cultural investigations, consistent gender differences in both global and physical self-representations (see Cağlar, 2009; Fox, 2000; Kling, Hyde, Showers, & Buswell, 1999) might have important ramifications for physical activity interventions. There are a number of studies that show gender differences in physical activity levels and the physical self, and that physical self-subdomains are correlated with physical activity (e.g., Cağlar and Aşçi, 2006; Hayes et al., 1999). Fox (2000) argued that exercise might have a greater benefit on self for females because they report both lower physical activity levels and lower physical self-representations. Intervention or longitudinal research, however, has failed to provide compelling evidence of gender differences in the link between physical activity and self-representations. In the meta-analysis on physical activity interventions and global self-esteem discussed earlier, Spence and colleagues (2005) found no evidence of gender differences. Similarly, in the study by Opdenacker and colleagues (2009) on lifestyle physical activity and exercise interventions with older adults, there were no gender effects for self-representations. Despite Fox's claim that exercise interventions may have greater impact for women's self-esteem, there is little evidence at either the global or physical self level. However, it is hard to draw strong conclusions in this area because there are few quality studies that have systematically examined gender differences.

Conclusions and implications

Physical activity interventions can increase self-concept and self-worth, with the strongest effect on the physical self. There is emerging evidence of a reciprocal effect between physical activity and self-concept (Marsh & Perry, 2005). Although the physical self is composed of multiple subdomains, research suggests that interventions have a generalized effect on these components. Since people use multiple sources of information to develop self-representations, such as evaluative feedback, and social and self-comparison, practitioners need to incorporate these factors

into physical activity interventions. There is evidence of gender differences in the perceptions of physical self-subdomains, but no evidence that physical activity causes a differential gender effect on enhancing global or physical self. Nevertheless, practitioners need to be aware that women typically have lower perceptions of global and physical self and that these self-representations may influence their participation in physical activity. Although the cultural data is inconclusive, practitioners need to consider the complexity of a multicultural world and be sensitive to how cultural values might impact how a person sees themselves and the subsequent impact on physical activity and mental health.

There remain a number of research challenges in this area. First, the reciprocal effect model suggests that scholarly inquiry needs to scrutinize the effectiveness of simultaneous physical self-concept and physical activity interventions (Marsh & Craven, 2006). Second, investigators should consider if it is best to systematically examine dose responses in terms of frequency, intensity, and duration of physical activity. Research has found positive effects on the physical self across various levels of intensity and duration. This suggests that a dose response model might not be appropriate. Third, since self-concept and self-esteem are distinct constructs, researchers need to separate out their effects at multiple self levels (Marsh & Craven, 2006). Fourth, cultural investigations need to examine cultural values, not nationality. Finally, physical activity researchers need to be aware of ongoing work on theoretical and empirical developments on the self and related areas of motivation (see Guindon, 2010; Kernis, 2006; Leary & Tangney, 2003; Marsh & Craven, 2006). How people perceive and evaluate themselves is important for mental health and well-being. Understanding the reciprocal effects of self and physical activity and developing effective interventions should be a primary goal of researchers.

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