Effective learning tasks in physical education (PE) commonly call for students to simultaneously engage physically, cognitively, and psychosocially. Therefore, student-learning outcomes of quality PE programs generally focus on a variety of advancements physically (e.g., motor skill execution; physical activity participation), cognitively (e.g., application of health-related fitness knowledge; sport tactics), psychologically (e.g., self-efficacy; self-concept), and socially (e.g., interpersonal skills; social responsibility). Physical self-concept beliefs represent an individual’s subjective sense of self physically (Fox & Wilson, 2008; Harter, 2012; Marsh, Martin, & Jackson, 2010). Physical self-concept is a key indicator of mental health (Fox, 1997) and promotes students’ motivation (Garn & Wallhead, 2015) and physical activity behavior (Marsh, Papaioannou, & Theodorakis, 2006). Standage, Gillison, Ntoumanis, and Treasure (2012) argue that physical self-concept is an important outcome of quality PE and the physically challenging and interactive nature of PE makes it an optimal setting to investigate this construct (Barnes & Spray, 2013).

Self-concept plays a central role in physical perceptions of self. Although it is beyond the scope of this review to compare and contrast self-concept to other cognitive constructs (see Bong & Skaalvik, 2003 for an excellent review), it is important to note that self-concept is the more encompassing construct, while both self-efficacy and perceived competence are key components of the self-concept belief construct. In other words, self-efficacy focuses on individuals’ beliefs about what they can accomplish in a specific situation based on their abilities, whereas self-concept focuses on how one defines and evaluates personal abilities (Bong & Skaalvik, 2003). Bong and Skaalvik also point out notable differences such as time orientation (i.e., self-efficacy = future-oriented; self-concept = past-oriented), specificity (self-efficacy = situational-specific; self-concept = domain-specific), and frame of reference (i.e., self-efficacy = performance-based; self-concept = personal, performance, and normative-based). Perceived competence is viewed as the core component of self-concept (Harter, 2012) and as such it reflects the cognitive component of self-concept beliefs. The inclusion of emotional reactions to competencies, considered an important aspect of the evaluative process, is one substantive difference between the two constructs. For example, students in PE with similar competence beliefs may have varying emotional reactions to those beliefs, which can cause differences in self-concept. In summary, self-efficacy and perceived competence are important components of a broader set of self-concept beliefs.
In this chapter I review PE research on student physical self-concept beliefs. I will explore the historical roots of self-concept research and the evolution of physical self-concept in the initial part of the chapter followed by detailed accounts of prominent physical self-concept theories commonly used to investigate PE students and settings. Themes focus on physical self-concept measurement, personal characteristics, and contextual factors that enhance and undermine physical self-concept development, and consequences associated with individual differences in physical self-concept. I also underscore substantive issues in need of greater exploration and conclude the chapter with recommendations on how physical self-concept research translates to PE best practices in teaching and learning. I emphasize the role of cognition in physical self-concept beliefs throughout the chapter.

The theoretical scope of this chapter is limited to multidimensional models of self-concept because they provide an authentic and useful perspective for understanding the construct (Fox & Wilson, 2008; Marsh, 1997; Shavelson, Hubner, & Stanton, 1976). Grounded in social cognitive principles of personality and individual difference, multidimensional models of self-concept assume that self-concept is organized in a complex hierarchical and domain-specific structure (Marsh et al., 2010). The superordinate level of multidimensional models of self-concept is global self-esteem, which represents an individual's overall sense of self (Fox & Wilson, 2008; Harter, 2012). Global self-esteem is the most stable and trait-like aspect of self-concept and is influenced by domain-specific self-concept beliefs (Shavelson et al., 1976).

Much of the current multidimensional self-concept research is based on the seminal work of Shavelson and colleagues (1976) who theorized that global self-esteem is derived from four main domain specific self-concepts: (a) academic/intellectual, (b) social, (c) emotional, and (d) physical. Within each self-concept domain resides more specific subdomains of self-concept. Shavelson et al. (1976) considered the subdomains of physical self-concept to be grounded in perceptions of physical ability and appearance. The common premise across frameworks is that individuals use self-concept subdomains to define and evaluate their respective domain-level self-concept. For example, a student may have favorable views of strength and sport self-concepts and unfavorable views of flexibility and endurance self-concepts (subdomain level), which impacts how she views her physical self (domain level). Self-concept also can be broken down further into facets (e.g., tennis ability) and subfacets (e.g., serving ability in tennis). The lowest and most specific levels of multidimensional self-concept models are characterized by interpretations of situational and contextual interactions with the environment. Students often use social comparison strategies in PE contexts to make judgments about their strength, endurance, sport competence, etc. (Barnes & Spray, 2013).

The role of cognition in self-concept
Fox and Wilson (2008) highlight the important role of cognition in self-concept development with their “self-director” metaphor. The self-director represents an individual’s cognitive processes that organize, monitor, integrate, and protect her/his self-concept. Interactions with the environment are filtered through the self-director whereby experiences that generate enhancements to the self are emphasized while experiences that erode the self are minimized. The impact that appraisals of environmental interactions have on self-concept beliefs is embedded in culturally relevant norms and value systems. The self-director guides individuals toward culturally relevant contexts that facilitate a positive sense of self and away from contexts that detract from a positive sense of self. Similarly, appraisals of success are typically attributed to internal characteristics (e.g., ability; effort) to bolster one’s sense of self while appraisals of failure often are attributed to external factors (e.g., luck; weather) to preserve one’s sense of self (Weiner,
Student physical self-concept beliefs

2000). In culturally relevant contexts where negative feedback is imminent, the self-director is likely to implement protective strategies such as self-handicapping (Rhodewalt & Vohs, 2005) or devaluing the context (Harter, 2012) to limit self-concept damage.

Initially physical self-concept research conducted in K-12 PE (Beasley & Garn, 2013) is emphasized. Studies focused on after-school physical activity programs (Martin, Garn, Shen, McCaughtry, & Nash, 2014) and school-based interventions (Annesi et al., 2007) also are reviewed.

Historical overview

Most current multidimensional theories of self-concept trace origins back to William James’s (1890) Principles of Psychology (see Harter, 2003 for a concise historical overview). James differentiated between two interrelated aspects of the self, the “stream of thought” (James, 1890, p. 224) also known as the I-self and the “the consciousness of self” (James, 1890, p. 291) also known as the Me-self. The I-self consists of multiple psychological constructs including self-awareness, self-agency, self-continuity, and self-coherence. The Me-self is also multidimensional and constitutes the material-Self, social-Self, spiritual-Self, and pure-Ego. James denotes that the body is at the core of one’s material-Self with specific body parts being more intimately involved in shaping the material-Self. The Me-self and its components set the stage for investigating multidimensional self-concept.

Contributions from social psychologists such as Cooley’s (1922) theory of the looking glass self build on James’ work, advancing understanding about self-concept development. However, the strong influence of behaviorism on psychology during the first part of the twentieth century in the United States diminished the study of self-concept (Harter, 2003). The role of cognition in personality development was more progressive during this time period in Europe (e.g., Freud’s notions of ego development in psychoanalysis – see Freud, 2005; Binet’s measures of intelligence – see Binet & Simon, 1916), contributing to greater acceptance of self-concept research worldwide. For example, Martin (1926) advocated for the study of multidimensional self-concept in Australia based on philosophy and critique of James, Binet, and Freud among others.

The emergence of humanistic psychology based on the work of Carl Rogers in the mid-twentieth century is another important historical juncture in the study of self-concept (Wylie, 1974). Rogers’ (1951) work emphasized the active role of the individual in personality development, purporting a natural human inclination to pursue personal growth, self-actualization, and self-awareness. Rogers theorized that self-concept is an organized configuration of beliefs pertaining to personal characteristics, abilities, and interactions with the environment. Self-concept is strongest when individuals fully accept who they are and feel others do the same in what Rogers terms unconditional positive regard.

In the later part of the twentieth century, cognitive, social, and social-cognitive paradigms advanced to the forefront of psychological and educational research (Dweck & Leggett, 1988) as well as systematic investigation of multidimensional self-concept in exercise science (e.g., Sonstroem, 1978). In fact, Sonstroem’s research often is credited as facilitating in-depth investigations of multidimensional self-concept in the physical domain (Fox, 1997). Sonstroem (1978) initially developed the psychological model for physical activity participation (PMPAP). The PMPAP followed the skill development hypothesis that presumed external behaviors and experiences of success lead to increases in internal development of self-esteem. However, Sonstroem proposed in the PMPAP that perceptions of physical ability and physical estimation of physical and sport skills mediated the relationship between physical activity behavior and self-esteem. For
example, students’ physical activity engagement in PE increases their ability beliefs and expectations for success, leading to self-esteem enhancements. The self-enhancement hypothesis also is included in the PMPAP whereby individuals actively seek to enhance self-esteem by engaging in external behaviors and environments that facilitate success. In the PMPAP, the relationship between self-esteem and physical estimation is considered reciprocal. Furthermore, physical estimation also is hypothesized to directly impact attraction to physical activity (i.e., personal interest), which directly influences physical activity. In other words, in the self-enhancement hypothesis aspect of the PMPAP, the relationship between self-esteem and physical activity behavior is mediated sequentially by physical estimation and attraction to physical activity. In simple terms, students actively engage in behaviors or seek out opportunities in PE they believe can increase self-esteem and avoid behaviors or situations that potentially decrease self-esteem. Taken together, the PMPAP represents a foundational multidimensional model of self-concept in the physical domain.

Systematic investigation of multidimensional physical self-concept in PE and school-based physical activity received increased attention in the late 1980s (e.g., Fox & Corbin, 1989; Marsh & Peart, 1988). For example, Marsh and Peart (1988) examined the impact of a 6-week, 14-session school-based physical fitness intervention on physical fitness and multidimensional self-concept in a sample of grade eight Australian girls. The three conditions of the intervention included: (a) emphasis on cooperative fitness activities and feedback; (b) emphasis on competitive fitness activities and feedback; and (c) control. Results indicated there was a large intervention effect on fitness for both the cooperative and competitive groups compared to the control. Students in the cooperative group, however, reported more positive physical ability and physical appearance self-concepts at the end of the intervention compared to other groups. Students in the competitive group reported the lowest levels of physical ability self-concept. Marsh and Peart noted that physical activity environments that stress competition and social comparison create few winners and many losers, which likely erodes physical ability self-concept.

While Sonstroem's work set the stage for preliminary investigations of multidimensional self-concept in the physical domain, it is the separate but notable accomplishments of Kenneth Fox and Herbert Marsh that have produced systematic investigation of multidimensional physical self-concepts with children and adolescents in PE settings. For both Fox and Marsh, a key factor in their physical self-concept theory development is the production and continued popularity of rigorous self-report measures. Specifically, the Physical Self-Perception Profile (PSPP; Fox & Corbin, 1989) and the Physical Self-Description Questionnaire (PSDQ; Marsh, Richards, Johnson, Roche, & Tremayne, 1994) are instruments with tightly interwoven theoretical and measurement alignment. These two theoretical frameworks are discussed in the next section.

**Theoretical frameworks**

Multidimensional physical self-concept theories share numerous theoretical assumptions. As noted earlier (see Table 34.1), theorists posit a hierarchical and domain-specific structure (Fox & Wilson, 2008; Marsh et al., 2010). The top of the hierarchy consists of the most general and stable form of self-concept, self-esteem. Facets become more domain-specific and contextually formed moving down the hierarchy. Interpretations of experiences and interactions in one's environment reside at the bottom of the hierarchy. Therefore, self-concept interventions are typically focused using a bottom-up approach. In other words, self-concept interventions are considered most effective when they target logical domain-specific, contextually driven facets of self-concept. For example, physical fitness-based interventions in PE would be most
successful targeting self-concepts related to physical endurance, muscular strength, flexibility, and body composition (e.g., Marsh, 1993; Marsh & Peart, 1988).

Physical self-concept is theorized as a core element in facilitating motivation, psychological well-being, and health-related behavior (Fox, 1997; Harter, 2012; Marsh Papaionannou, & Theodorakis, 2006). Craven and Marsh (2008) note that people who feel good about their appearance and physical capabilities are more likely to maximize physical potential, fitness, and mental health compared to those who do not. Physical self-concept is theorized as an important health outcome in and of itself as well as an antecedent, mediator, and moderator of health-related outcomes.

The skill development and self-enhancement hypotheses also are key theoretical assumptions in multidimensional self-concept theory. Applied to PE settings, students who experience success and receive positive behavioral feedback should increase multidimensional physical self-concepts while students exposed to failure and negative feedback will likely decrease self-concepts. Furthermore, students who view PE as an environment to enhance facets of physical self-concepts will likely be attracted to the context while students with the opposing perspective of PE will likely be indifferent. From a measurement standpoint, minor differences are present between Fox’s and Marsh’s notions of the specific facets of physical self-concept.

### Fox’s PSPP

Fox’s theoretical framework (see Table 34.1) of physical self-concept is easily recognized by the use of the PSPP (Fox & Corbin, 1989) or the Children and Youth Physical Self-Perception Profile (CY-PSPP; Welk & Eklund, 2005), the measure typically used in K-12 PE settings. Global self-esteem resides at the top of Fox’s framework but unidimensional measures are added to the PSPP to measure the apex of the model. Physical self-worth represents the global measure of physical self-concept on the PSPP, with four main dimensions of beliefs nested beneath physical self-worth: (a) physical conditioning, (b) sport competence, (c) body attractiveness, and (d) strength. The PSPP constructs are based on content analysis of qualitative interviews of undergraduate students involved in PE courses (Fox, 1997). The PSPP consists of 30 items presented in a structured alternative format (Harter, 2012) and answered using a four-point Likert
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scale. An example item for sport competence on the CY-PSPP is: “Some kids do very well at all kinds of sports BUT other kids don’t feel that they are very good when it comes to sports” (Welk & Eklund, 2005). Students choose one of the two statements and decide if it is “really true for me” or “sort of true for me.”

The CY-PSPP consistently demonstrates valid and reliable measurement characteristics with PE students in 3rd–6th grade (Welk, Corbin, Dowell, & Harris, 1997; Welk & Eklund, 2005). In validation studies by Welk and colleagues, the four dimensions of the CY-PSPP produce stable correlations with the strongest relationship occurring between physical conditioning and sport competence beliefs (range of \( r' = .64-.72 \)) and the weakest relationship between strength beliefs and body attractiveness (range of \( r' = .44-.53 \)). Body attractiveness was most closely associated with physical self-worth (range of \( r' = .76-.78 \)) and the relationship between physical self-worth and global self-esteem (range of \( r' = .74-.75 \)) was robust. In fact, the strength of relationships can be critiqued as a possible method effect based on the use of the structured alternative format (Marsh et al., 1994).

### Marsh’s PSDQ

Marsh’s development of the PSDQ and a subsequent short version of the PSDQ (PSDQ-S; Marsh et al., 2010) is grounded in classic measurement theory and factor analysis. The PSDQ is a product of rigorous within-network and between-network empirical testing (see Marsh, 1997). Within-network testing involved validity (e.g., construct, discriminant; convergent via factor analysis) and reliability (e.g., internal consistency; test-retest) analysis of the hierarchical and multidimensional structure of the PSDQ. Once within-network support was achieved, between-network evidence was gathered, consisting of establishing a stable pattern of theoretically grounded relationships of PSDQ variables to other constructs (e.g., dimensions of fitness; physical activity; motivation).

A visual representation of the hierarchy and domains of Marsh’s PSDQ (70 items) is provided in Table 34.1. Global self-esteem is located at the top of the hierarchy of the PSDQ with global physical self-concept located below. There are nine subdomains of physical self-concept beliefs including: (a) appearance, (b) body fat, (c) coordination, (d) endurance, (e) flexibility, (f) health, (g) physical activity, (h) sport competence, and (i) strength. The PSDQ uses short declarative statements (e.g., Physically, I am happy with myself) that are measured on a six-point false-to-true scale. These subdomains reflect appearance, health, and physical fitness components (Marsh, 1997).

### The PSDQ-S

More recently, Marsh and colleagues developed a shorter form, PSDQ-S (40 items), to reduce participant burden (Marsh et al., 2010). In an exemplary validation investigation, Marsh et al. (2010) used six different samples across the lifespan including adolescent students (ages 12–18) with a total of 4,803 participants to establish within-network and between-network support for the PSDQ-S. Furthermore, multi-group confirmatory factor analysis of factorial invariance provided support for invariance across age, gender, and time for the PSDQ-S.

The correlation between global self-esteem and global physical constructs as measured by the PSDQ-S is robust (range of \( r' = .77-.84 \); Marsh et al., 2010). Global physical self-concept has the strongest relationships with appearance (\( r = .69 \)) and coordination (\( r = .61 \)) and lowest with health self-concept (\( r = .13 \)). Flexibility self-concept and coordination share the strongest association among dimensions (\( r = .80 \)) while sport competence
and health self-concept share the weakest association ($r = .10$). In general, most of the nine dimensions of the PSDQ-S share a moderate, positive association. Marsh et al. (2010) recommend the use of the PSDQ-S with youth around the age of 12 years old (~ middle school students): however; testing the suitability of the PSDQ-S with younger children such as elementary PE students is needed. As individuals get older, it is theorized that the hierarchical nature of self-concept becomes more differentiated, which is demonstrated by smaller correlations among domain-related self-concepts.

The jingle-jangle fallacy

The jingle-jangle fallacy occurs when researchers assume that measures with the same labels measure the same constructs while the jangle fallacy occurs when researchers assume that measures with different labels measure different constructs (Marsh, 1994). Marsh and colleagues tested the jingle-jangle and the jangle fallacies using a multi-trait, multi-method design and analysis (Marsh, Asci, & Tomás, 2002). Marsh et al. (2002) tested the jingle-jangle and jangle fallacies with the PSDQ and PPSP in a large sample of Turkish university students enrolled in elective PE classes. Results yielded clear convergent validity for three factors across the PSDQ and PSPP: (a) global physical self-concept – global physical self-worth; (b) strength on both scales; and (c) sport competence on both scales. In other words, these subscales of the PSDQ and PSPP measure the same construct. Evidence also supported commonality on the appearance subscale of the PSDQ and the body attractiveness subscale of the PSPP; and the endurance subscale of the PSDQ and physical condition subscale of the PSPP. Therefore, of the 16 subscales of the PSDQ and PSPP (global self-esteem of PSPP was not included), there is both theoretical and empirical evidence for the overlap of five subscales. These results provided important information for making interpretations and generalizations across studies that use the PSDQ and PSPP in PE and other physical activity settings.

Current trends and issues

This section is a synthesis of physical self-concept research in PE settings focused on: (a) PE-related antecedents of student physical self-concept; and (b) physical self-concept as an antecedent of student engagement.

PE-related antecedents of physical self-concept

A crucial line of inquiry examines antecedents that maximize or inhibit the growth of physical self-concept in PE. Antecedents of multidimensional physical self-concept are covered within two models of multidimensional self-concept theory. First, the internal/external frames of references model (Barnes & Spray, 2013; Chanal & Sarrazin, 2007), which highlights the role of personal and social comparisons in physical self-concept development, is outlined. Next, findings pertaining to the skill development hypothesis model (Annesi et al., 2007; Fox, 1997), which explores the impact of physical activity behavior and engagement in PE on physical self-concept, are presented.

Internal/external frames of reference

Interpretations of environmental interactions present the foundation of hierarchical models of multidimensional self-concept. Internal/external frames of reference represent the personal and
social comparison standards that individuals use in the environment to make appraisals of their self-concept (Barnes & Spray, 2013). An internal frame of reference occurs when individuals compare their achievements to previous achievements within the same environment (i.e., PE) as well as to their achievements in other environments (e.g., mathematics achievement; science achievement; etc.). If current achievement is determined to be lower than previous achievement and/or an individual believes she/he achieves at a higher level in other environments, self-concept is posited to diminish (Möller, Pohlmann, Köller, & Marsh, 2009). On the other hand, if current achievement is viewed as higher than previous achievement and/or the individual believes she/he achieves at a lower level in other environments, self-concept is posited to increase. With an internal frame of reference, self-concept can change regardless of normative standing. In other words, self-concept can decrease despite good normative standing.

An external frame of reference occurs when students use social comparisons from others as a frame of reference for their own achievements (Barnes & Spray, 2013; Chanal & Sarrazin, 2007; Möller et al., 2009). In general, positive social comparisons generate higher levels of self-concept while negative social comparisons produce lower levels of self-concept. There are, however, theoretical nuances associated with an external frame of reference. First, social comparison targets play a key role in the process of evaluation (Barnes & Spray, 2013). When the social comparison target(s) is/are believed to possess greater ability, it is considered an upward comparison. When the social comparison target(s) is/are believed to possess similar ability, it is considered a lateral comparison while social comparison target(s) considered to have lower ability is/are termed a downward comparison. Upward, lateral, and downward comparisons are defined as the direction of comparison for an external frame of reference (Chanal & Sarrazin, 2007).

External frames of reference can also be explicit and implicit. An explicit external frame of reference occurs when external comparisons of ability and achievement are consciously made toward specific individuals or small groups. For example, in PE a student may identify a friend or group of friends with whom to make social comparisons of ability. An implicit external frame of reference occurs when social comparisons are made unconsciously toward naturally occurring groups. In school settings such as PE, implicit frames of reference are typically measured as class-levels and/or school-levels of ability/achievement. A general theoretical prediction of implicit external frames of reference is termed the big-fish-little-pond effect (BFLPE; Marsh & Hau, 2003). The BFLPE denotes the hypothesis that students with similar ability will have lower self-concepts when they are in classes or schools with higher ability students (Möller et al., 2009). Higher self-concepts are possessed when students are in classes or schools with lower ability students. In statistical terms, the BFLPE represents a negative relationship between class-average/school-average of ability/achievement and self-concept.

Chanal and Sarrazin (2007) provide interesting evidence of the contrasting results about direction of comparisons and explicit/implicit frames of reference and physical self-concept development in French high school PE students. Results indicated that students were more likely to make upward comparisons in their explicit external frames of reference and these upward comparisons to small groups of targets were positively related to physical self-concept development. However, the BFLPE also was evident and more pronounced with implicit frames of reference. Chanal and Sarrazin postulate that when students in PE actively make upward comparisons, assimilating effects occur whereby motivation and modeling facilitate increases in physical self-concept. On the other hand, when students make upward comparisons unconsciously or with a limited locus of control, deleterious effects to self-concept result. A specific PE example may be helpful to clarify this complex issue. Students in class X complete a skills test that measures performance on a scale from 0 (poor performance) to 10 (excellent performance). Jennifer scores a 7 on the skills test and identifies Lisa (8) and Rhonda (9) as explicit external frames of
Student physical self-concept beliefs

references. Jennifer’s physical self-concept may still increase because of assimilation effects and her control over the upward comparison targets. On the other hand, if the overall class average on the skills test was 9 (i.e., implicit upward comparison), Jennifer’s physical self-concept would likely suffer (i.e., BFLPE). Taken together, social comparisons in PE led to an overall decline in physical self-concept despite the positive contributions of explicit upward comparisons toward small groups of peers.

Skill development hypothesis

Exploration of the skill development hypothesis of self-concept embodies another theoretical model that contributes to understanding about PE-related factors that act as antecedents to physical self-concept. To review, the skill development hypothesis states that external behaviors and appraisals of successful engagement lead to heightened self-concepts (Sonstroem, 1978). There is correlational (Beasley & Garn, 2013), longitudinal (Marsh, Papaionannou, & Theodorakis, 2006), and intervention (Morgan, Saunders, & Lubans, 2012) evidence supporting the skill development hypothesis in K–12 PE and/or school-based physical activity programs. Physical activity is the behavior most often (and almost exclusively) examined in tests of the skill development hypothesis while different models of motivation are most commonly used to denote successful engagement (Marsh, Papaionannou, & Theodorakis, 2006; Standage et al., 2012). In many cases, researchers frame these studies in a health perspective rather than a test of the skill development hypothesis because physical self-concept is considered a key indicator of mental health and psychological well-being (Craven & Marsh, 2008; Fox & Wilson, 2008; Standage et al., 2012). Nevertheless, the tenets of the skill development hypothesis of self-concept are supported.

A brief synopsis of intervention-based research testing different aspects of the skill development hypothesis is provided because of the broader generalizations that can be made from randomized controlled and quasi-experimental research designs (Annesi et al., 2007). Specifically, three school-based intervention studies that lasted approximately three months (Annesi et al., 2007), six months (Morgan et al., 2012), and nine months (Schneider, Dunton, & Cooper, 2008) are compared and contrasted. Two of the studies (i.e., Annesi et al., 2007; Schneider et al., 2008) explicitly used PE classes as the main delivery arm of the intervention while Morgan et al. (2012) used a multicomponent school-based approach. PE teachers were involved in all three studies. Intervention sessions ranged from two-to-three 45-minute sessions per week (Annesi et al.) to five 50-minute sessions per week (Schneider et al.) with children (Annesi et al.) and adolescents (Morgan et al.; Schneider et al.). Annesi et al. and Schneider et al. used the PSDQ while Morgan et al. used the CY-PSPP.

These studies revealed that school-based exercise interventions tend to have the greatest impact (i.e., moderate-to-large effect sizes) on physical self-concept in the first three to six months. Schneider et al. reported no main effects between the intervention and control groups; however, cardiovascular fitness moderated the relationship between group assignment and physical self-concept. Specifically, only students in the intervention group who demonstrated cardiovascular fitness enhancements reported increased levels of physical self-concept. Intervention-based increases also were detected in physical condition (Morgan et al.) and appearance (Annesi et al.) self-concepts in the shorter interventions. It also should be noted that PE appeared to have a stronger effect on physical self-concept than after-school programs (Annesi et al.); however, some research suggests that student involvement in both PE and after-school physical activity programs is optimal (Martin et al., 2014). Thus, it appears that multidimensional physical self-concept stabilizes and regresses to the mean after approximately six to nine months of participation in school-based exercise interventions.
Physical self-concept as an antecedent

Physical self-concept also can act as an antecedent to PE-related engagement and behaviors. Specifically, Craven and Marsh (2008) suggest that individuals who feel good about their domain-specific self-concept are more likely to engage, achieve, and enjoy interactions and activities within that domain. This section is focused on physical self-concept as an antecedent in the physical domain. Research pertaining to the self-enhancement hypothesis in PE and PE-related contexts will initially be examined followed by a review of studies focused on the reciprocal effects model (REM; Marsh, Papaionannou, & Theodorakis, 2006). The REM is tested by investigating bidirectional effects of the self-enhancement hypothesis and skill-development hypothesis.

Self-enhancement hypothesis

The self-enhancement hypothesis states that individuals actively seek out environments that provide opportunities to increase self-concept. An important premise of this hypothesis is the role that previous domain-specific self-concept plays as a determinant of future motivation, achievement, and behavior in that domain (Garn & Shen, 2015; Marsh, Chanal, & Sarrazin, 2006). Students with higher levels of domain-specific self-concept are more likely to engage and achieve in that setting while students with lower levels of domain-specific self-concept are less likely to engage and achieve (Ferla, Valcke, & Cai, 2009; Marsh, Trautwein, Ludtke, Köller, & Baumert, 2005). For example, in a large-scale German study, students with higher levels of mathematics self-concept were more likely to demonstrate higher levels of future interest and achievement compared to students with lower levels of mathematics self-concept (Marsh et al., 2005). There is much less investigation of the self-enhancement hypothesis in PE contexts compared to the skill development hypothesis. The few studies that have explored the self-enhancement hypothesis have done so within the REM.

Reciprocal effects model

Fox (1997), Marsh (1997), and Sonstroem (1978) all advocate for researchers to take a comprehensive approach to studying multidimensional physical self-concept by simultaneously investigating the skill development hypothesis and self-enhancement hypothesis. Marsh and colleagues termed this line of inquiry the REM (Marsh, Chanal, & Sarrazin, 2006; Marsh, Papaioannou, & Theodorakis, 2006). Marsh, Chanal, and Sarrazin (2006) investigated the REM in the context of junior high school PE (Grades 7, 8, 9; mean age = 13.50). Specifically, relationships between gymnastics self-concept and performance were examined over a ten-week PE unit. A total of three expert judges achieved excellent inter-rater reliability (α = .93) when analyzing a videotape analysis of a set performance of exercises for over 400 boys and girls. Using multi-level analysis to account for variation at class and individual levels, findings supported the REM. Specifically, gymnastics self-concept at the beginning of the unit was a positive predictor of performance at the end of the program while controlling for performance at the beginning of the unit. Likewise, gymnastics performance was a positive predictor of self-concept at the end of the program while controlling for self-concept at the beginning of the unit.

Marsh, Papaioannou, and Theodorakis (2006) also found support for the REM in primary, middle, and high school PE contexts. In a large-scale study of over 2,500 Greek students from 200 PE classes, physical self-concept, motivational variables within the theory of planned behavior, and self-reported physical activity were examined at the beginning and end of a school year.
(approximately nine months). Findings revealed strong support for reciprocal effects between physical self-concept and self-reported physical activity after controlling for age and gender effects. The strongest support for reciprocal effects between physical self-concept and motivational variables occurred between physical self-concept and intentions for physical activity as well as perceived behavioral control. The REM was not supported between physical self-concept and attitudes toward physical activity. More recently, Garn and Shen (2015) examined a REM between physical self-concept and exercise basic psychological needs (i.e., exercise-related feelings of autonomy, competence, and relatedness) in university-level PE classes over the course of a semester. Findings supported the self-enhancement hypothesis, but not the REM. Specifically, only physical self-concept at the beginning of the semester was a positive predictor of feelings of autonomy, competence, and relatedness at the end of the semester while controlling for these basic psychological needs at the beginning of the semester. Clearly, more research testing different variations of the REM in PE contexts is needed to make broad generalizations of physical self-concept as both an antecedent and outcome to PE relevant variables.

Implications for evidence-based practice

There are a number of implications from multidimensional physical self-concept research that can translate into more effective practice by physical educators. Teacher strategies are proposed based on findings related to frames of reference, the skill development hypothesis, the self-enhancement hypothesis, and REM. First, students often use internal and external frames of reference simultaneously in PE (Barnes & Spray, 2013). The major complication for teachers is that multiple frames of reference create both positive and negative effects on students’ physical self-concept (Chanal & Sarrazin, 2007). For example, ability grouping that forces implicit external comparisons of ability hinders physical self-concept. Likewise, creating “athletic PE” classes consisting of the most physically gifted students can produce a BFLPE and reduce physical self-concept whereas explicit external comparisons to individuals or small groups appears to enhance physical self-concept (Seaton, Marsh, & Craven, 2009). Therefore, physical educators must be highly aware of their students’ social comparison strategies and find ways to structure the learning environment in ways that reduce forced comparisons and diminishes BFLPE. Marsh and colleagues consistently warn of the harmful nature of using highly selective grouping strategies in classrooms (Marsh & Hau, 2003; Seaton et al., 2009). Specifically, teachers that regularly group high ability students together are likely to intensify BFLPE, lowering self-concept compared to students of similar ability grouped in mixed ability structures. Highly competitive activities that stress normative feedback and external pressure also appear to strengthen BFLPE whereas the use of cooperative activities that builds a sense of belongingness can potentially reduce BFLPE (Marsh & Peart, 1988; Seaton et al., 2009).

Empirical findings of the skill development hypothesis, self-enhancement hypothesis, and REM are intrinsically linked and can be strategically translated into practice. Quality learning environments in PE should facilitate actualization of the skill development hypothesis. Physical educators who consistently implement effective skill progressions, small-sided games with maximum and equitable participation, and promote health-enhancing physical activity in meaningful ways are likely to enhance students’ multidimensional physical self-concept (e.g., sport self-concept; physical condition sport-concept; strength self-concept; etc.). Likewise, PE practice can be enhanced when teachers are aware of their students’ physical self-concept because students often make engagement-related choices based on their level of domain-specific self-concept (Marsh et al., 2005). In other words, teachers in tune with their students’ varying degrees of self-concept can make modifications that create a better student–activity fit.
Future directions

There are a number of important directions that researchers investigating multidimensional physical self-concept can take to advance the current literature in PE. Despite the sophisticated instruments related to multidimensional physical self-concept, there is a continuing need to explore strengths and weaknesses of these measures. Currently, some scholars dispute the effects (i.e., increased method bias; reduced social desirability) of the structured alternative format of the PSPP (Marsh et al., 2002; Welk & Eklund, 2005), which needs to be clarified. Likewise, more within-network testing of the PSDQ and PSDQ-S in elementary PE classes is needed to determine the psychometric properties of these instruments in younger populations. Researchers also need to build on the noteworthy work of Chanal and colleagues by continuing to investigate internal/external frames of reference and the BFLPE in PE (Chanal & Sarrazin, 2007; Marsh, Chanal, & Sarrazin, 2006). Implementing field-based quasi-experimental research designs that manipulate frames of reference and ability grouping in PE could advance understanding of the relationship between social comparisons on physical self-concept. Further testing of PE-related factors that moderate BFLPE also is warranted. In terms of future testing of the skill development hypothesis and REM in PE settings, more researchers need to actually test skill development. To date, there is much more evidence associated with the role of physical activity behavior and physical self-concept within these two models than skill development.

Summary of key findings

• Judgments of positive self-concepts are vital for students to fulfill their potential and lead happy lives in and out of school (Craven & Marsh, 2008).
• Self-concept is a hierarchical and domain-specific psychological construct with global self-esteem at the apex and environmental interactions at the base.
• Multidimensional physical self-concept is the domain-specific construct closely linked to PE environments within self-concept theories (Fox, 1997; Marsh, Papaioannou, & Theodorakis, 2006).
• The self-director metaphor (Fox & Wilson, 2008) highlights the central role of cognition in physical self-concept appraisals and reflects the underlying assumptions of the self-enhancement hypothesis. Specifically, individuals actively seek out environments that promote self-concept and avoid or devalue environments that stunt self-concept growth. Therefore, physical educators must find ways to make PE an appealing context for physical self-concept development.
• Creating lessons that stress an internal frame of reference, cooperation, a sense of belonging and avoiding high levels of external pressure and homogenous ability grouping are strategies that support self-concept (Barnes & Spray, 2013; Chanal & Sarrazin, 2007; Marsh & Peart, 1988; Seaton et al., 2009).
• Skill development, motivated engagement, and physical activity participation also are avenues to enhancing students’ multidimensional physical self-concept in PE contexts (Marsh, Chanal, & Sarrazin, 2006; Marsh, Papaioannou, & Theodorakis, 2006).

Reflective questions for discussion

1. What strategies can physical educators use to capitalize on the positive effects of individual and small group upward comparisons (i.e., explicit external frame of reference) while
minimizing the negative effects of implicit group comparisons (i.e., BFLPE) on students’ physical self-concept in PE contexts?

2. Compare and contrast the theoretical tenets of Fox’s and Marsh’s theories of multidimensional physical self-concept. In what ways could these two frameworks be combined to advance understanding of multidimensional physical self-concept development in PE?

3. In what ways can physical educators’ understanding of the self-director metaphor be used to enhance their practice in PE?

References


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Student physical self-concept beliefs

