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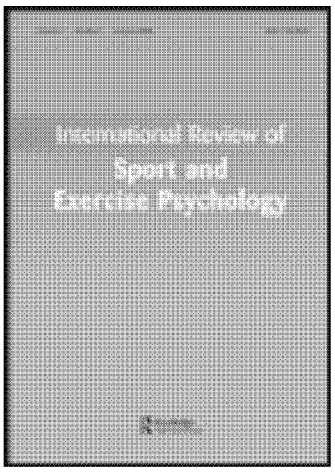

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Social physique anxiety experiences in physical activity: a comprehensive synthesis of research studies focused on measurement, theory, and predictors and outcomes

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Social physique anxiety experiences in physical activity: a comprehensive synthesis of research studies focused on measurement, theory, and predictors and outcomes

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Physical activity (PA) settings such as sport, exercise, and physical education are inherently social and evaluative in nature, with much attention directed at how the body looks and performs. As such, these settings foster a host of positive and negative emotional experiences. Social physique anxiety (SPA) is a commonly studied emotion that emanates from, or motivates, PA behaviors. In this synthesis of the 126 identified research papers focused on SPA and related experiences in sport, exercise, and physical education, we summarize the theoretical roots and measurement of SPA, present research evidence on predictors and outcomes of SPA experiences, explore links between SPA and PA behaviors, and offer insight on the future directions of SPA research. Specifically, researchers in sport and exercise psychology are encouraged to broaden the study of SPA to conduct longitudinal and experimental studies, develop quality intervention strategies aimed at reducing SPA experiences, and expand on the theoretical and operational understandings of SPA experiences across the lifespan.

Keywords: social physique anxiety; physical activity; review

Introduction

Physical activity (PA) settings such as sport, exercise, and physical education are inherently social and evaluative in nature, and much emphasis is placed on the body form and function. As such, these settings foster a host of positive and negative emotional experiences. With roots in social anxiety, self-presentation, and body image affect, social physique anxiety (SPA) is a commonly studied emotion that emanates from, or motivates, PA behaviors. SPA is defined as the anxiety that an individual experiences when he or she perceives that others could be negatively evaluating his or her physique (Hart, Leary, & Rejeski, 1989). Crawford and Eklund (1994) further describe SPA as self-presentational anxiety associated with the physique (e.g., body fat, muscularity, tone, body proportions). Given these operationalizations, it is not surprising that SPA experiences have been related to PA participation motives, attitudes, preferences, perceptions of self and ability, and engagement in or avoidance of PA. Nonetheless, one of the challenges in this area of research is to understand how SPA predictors and outcomes are interconnected and whether frameworks can be developed to better understand SPA experiences.

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SPA has theoretical roots in both body image and body esteem literatures and bridges one's image of his/her physique with the satisfaction or dissatisfaction of this image (Hart et al., 1989). With body image defined as a multidimensional construct consisting of perceptual, cognitive, affective, and behavioral domains (Cash & Smolak, 2011), SPA is often studied as one aspect of the affective dimension (Bane & McAuley, 1998). Furthermore, SPA introduces an interpersonal aspect of body esteem since it concerns how individuals feel about others' perceptions of their bodies. This latter perspective is rooted in self-presentation theory whereby individuals are motivated to make good impressions on others for social and material gains (Schlenker & Leary, 1982). Specifically, self-presentation is a goal-directed attempt to control how the self is perceived by an actual or perceived audience (Schlenker, 1980) and is a complex process involving both an individual's motivation to make a desirable impression and perceived ability to construct a desirable impression for others (Leary & Kowalski, 1990; Martin Ginis & Leary, 2004). Particularly in Western cultures, these 'desirable' impressions are often focused on attractive appearance and physical characteristics such as a thin and toned body shape for females and a muscular toned physique for males (Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999). When positive or favorable impressions are not possible or likely, this leads to affective experiences of social anxiety (Schlenker & Leary, 1982). Social *physique* anxiety experiences are a result of individuals being (or perceiving themselves to be) unable to make favorable impressions targeting their physical attributes such as body size and appearance (Hart et al., 1989). Based on self-presentation perspectives, individuals may choose to either engage in or avoid PA in order to improve their chances of making positive impressions; or perhaps to avoid circumstances in which the physique could potentially be evaluated negatively by others (Crawford & Eklund, 1994; Hart et al., 1989). This is the argument that is often made when researchers find a positive *or* negative association between SPA and PA. In fact, SPA is often used as a proxy of self-presentational processes (see Martin Ginis & Mack, 2012) or body image affect (Bane & McAuley, 1998).

Aside from the theoretical roots within self-presentation, social anxiety, and body esteem research, there are no specific conceptual or theoretical models related to SPA experiences in sport and exercise psychology. Nonetheless, SPA has been studied with concepts of motivation, personality, self-esteem, social relationships, emotion, and/or health behaviors (i.e. Anshel & Seipel, 2007; Cox, Ullrich-French, Madonia, & Witty 2011; Cumming & Duda, 2012; Frederick & Morrison, 1996; Haase, Mountford, & Waller, 2007; Hagger, Hein, & Chatzisarantis, 2011; Hagger & Stevenson, 2010; Koyuncu, Tok, Canpolat, & Catikkas, 2010; Magnus, Kowlaksi, & McHugh, 2010; Smith, Wright, & Winrow, 2010; Yin & Ryska, 1999). As such, it may be helpful to understand nomological networks or interactions between these related constructs. A nomological network is defined as a system of related constructs, their observable manifestations, and the interrelationships among these constructs (Cronbach & Meehl, 1955). To date, there are no comprehensive reviews that can be used to understand the complex interrelationships between predictors and outcomes of SPA experiences for advancing the field of sport and exercise psychology.

The purpose of the current paper was to comprehensively synthesize the research on SPA in PA contexts including exercise, sport, and physical education. Specifically, the objectives included: (1) examining measurement issues and construct properties associated with SPA; (2) identifying predictors and outcomes of SPA experiences; and (3) exploring nomological networks that have integrated SPA and PA.

To provide some context for the current synthesis, there is currently only one published review specific to SPA experiences (Mack, Wilson, Waddell, & Gasparotto, 2008). This meta-analysis consists of an overview of 16 studies published before 2007 that examined the empirical effect of SPA in PA contexts. Due to the specific inclusion criteria and requirements for a meta-analysis, this existing review offers a limited insight on the complexity of SPA experiences in sport and exercise psychology. As such, the present review focuses on providing a much broader, comprehensive and integrated synthesis of SPA research across a variety of contexts that are important in sport and exercise psychology (see Supplemental Table 1). Specifically, this comprehensive review incorporates all located original research examining theoretical roots and measurement of SPA, as well as evidence on predictors and outcomes of SPA experiences from 126 studies that have been published up to the summer of 2013. All research studies included in this comprehensive review are identified in Supplemental Table 2 and organized generally by PA (exercise, sport, physical education), health (social relationships, body image, eating/dieting), or measurement contexts.

Methods

Information retrieval

In this comprehensive review, White's (1994) guidelines were followed such that inclusion and search criteria were established, and multiple methods were used for information retrieval. Studies had to be (1) published in English; (2) qualitative or quantitative original studies published in a peer-reviewed journal (i.e., not a review, meta-analysis, commentary, book chapter, or supplement abstract), (3) involve a sport, exercise, physical education, or health context; (4) if quantitative design, the use of a version of the Social Physique Anxiety Scale (SPAS) (Hart et al., 1989) was essential and if qualitative design, the definition of SPA as reflective of Hart et al. (1989) and/or Crawford and Eklund (1994)' s operationalization was needed. Studies also had to be focused on human subjects, with a sample size of one or greater. Studies that examined a similar construct to SPA (i.e. self-presentation, body image), and not SPA directly, were excluded from the current review. Computer literature searches included an extensive exploration of various online databases spanning the year the SPA construct was operationalized (1989) until March 2013: ERIC, MEDLINE, PsycINFO, PubMed, Scopus, SPORTDISCUS, and Web of Knowledge. Key search terms were 'social physique anxiety', 'social physique', 'SPA', 'physique anxiety' AND 'PA', 'physical education', 'exercise', 'sport', and/or 'health'. An ancestry analysis was also conducted manually in which references were obtained from the bibliographies of articles retrieved through computerized literature searches and book chapters. Finally, some articles were retrieved by informal consultation with expert colleagues in the field and contacts with authors of primary studies identified in the computer search. After final article retrieval, the second author organized the appropriate articles by the research design, context, and measurement scale reported in each article. The number of articles and percentages per category are summarized in Supplemental Table 1. Brief summaries of each article were written to highlight the purpose, design, targeted sample and size, SPA measure utilized, correlates tested, and main study findings. The first author then confirmed this classification of articles by reviewing all articles, summaries, and coded information. Based on the general domain of focus and sample descriptives, each article/summary was then classified in one of the following contexts: (1) exercise, (2) sport, (3) physical education, (4) measurement, (5)

physique-related and health (Supplemental Table 2). For example, studies were classified in a measurement context if they tested the properties of any version of the SPAS. Similarly, studies were classified in a physique-related and health context if they focused on main health-related correlates such as disordered eating or depression or if the research was conceptualized in a physique-related domain that was not exercise, sport, or physical education. Classification of articles in Supplemental Table 2 underwent the same review process by the first author as outlined above.

Results

One hundred and twenty-six articles were identified, of which n = 123 (97.6%) were of quantitative design and n = 3 (2.4%) described using qualitative methodologies. The majority of the 126 articles (n = 89; 70%) were cross-sectional designs compared to seven (6%) longitudinal and 27 (21%) experimental or intervention designs. Of interest, only one review article (Mack et al., 2008) and one commentary (Eklund, 1998) were located and used to inform the literature search but not included in the overall synthesis. Among the identified and incorporated articles, there were 64 (51%) that examined SPA in an exercise context, 17 (13.5%) framed within a sport context, 5 (4%) in a physical education context, and 27 (21.4%) in other health-related contexts such as body image and eating/dieting, and 13 (10%) in measurement studies. Supplemental Table 1 provides an overview of studies focused on SPA. All articles in this synthesis of SPA research are presented in Supplemental Table 2, organized by the general context of focus and with information on the purpose, study design, target sample and size, SPA measure used, tested correlates, and main findings provided for each article. In a provisional effort to illustrate the nomological networks relating to SPA, Figure 1 synthesizes the findings from this review. The main findings that emanate from the research on SPA are summarized in reference to the main study objectives: (1) to examine the main measure of SPA and state versus trait properties of the construct, (2) to identify predictors and outcomes of SPA experiences across the lifespan and (3) to explore the nomological networks that integrate SPA within PA behavior.

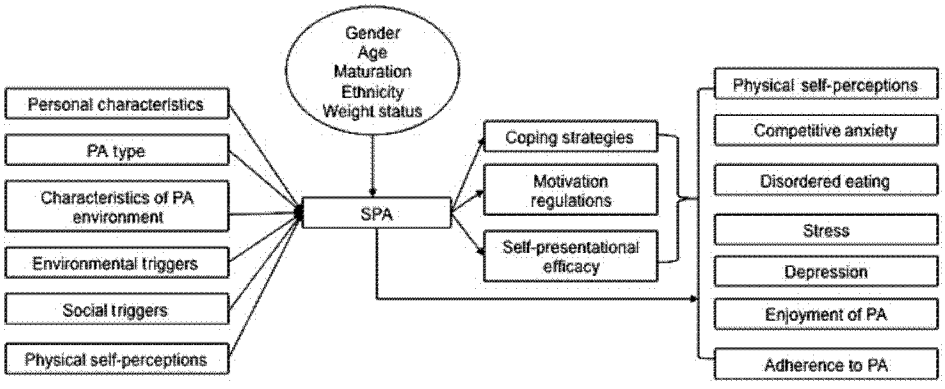

Figure 1. A synthesis of factors associated with experiences of social physique anxiety.

Measurement of SPA

Scale development and properties

The Social Physique Anxiety Scale (SPAS) was developed as a 12-item scale and tested for internal consistency, test-retest reliability, and both construct and criterion validity (Hart et al., 1989). SPA scores were moderately to highly correlated with a range of personality traits, anxiety, self-presentation processes, and body image dimensions. Early research exploring the measurement properties of the SPAS supported the use of the original 12-item scale, and offered insight into a two-factor scale comprised of physique presentation comfort (sample item 8: 'I am comfortable with how fit my body appears to others') and expectations of negative physique evaluation (sample item 9: 'I am uncomfortable to know others were evaluating my physique/figure'; Eklund, Kelley, & Wilson, 1997; Eklund, Mack, & Hart, 1996; Petrie, Diehl, Rogers, & Johnson, 1996). Further research argued for a reduced 9-item scale deleting three of the five positively worded items and maintaining a unidimensional structure (Martin, Rejeski, Leary, McAuley, & Bane, 1997). Of the three deleted items, item 2 ('I would never worry about wearing clothes that might make me look too thin or overweight') was deleted due to overall participant confusion. Items 1 ('I am comfortable with the appearance of my physique/figure') and 5 ('When I look in the mirror I feel good about my physique/figure') were removed and justified because they did not involve a social evaluative component (Martin et al., 1997).

Additional testing of the measurement scale has provided evidence for the 9-item or an 8-item unidimensional scale with the additional deletion of the item 12 (i.e., 'When in a bathing suit, I often feel nervous about the shape of my body'; Motl & Conroy, 2000). For younger adolescents, researchers have also advocated for a 7-item scale essentially removing all positively-worded items from the scale (Motl & Conroy, 2001; Smith, 2004). Even with reverse-coding protocols in place, most of the problems with the factor structure of the SPAS have emanated from the item valence, whereby high correlations among similarly valenced items (positive or negative) and weak correlations between positive and negative items are reported. Nonetheless, the majority (97%) of researchers report using the 9- or 12- item scale (Supplemental Table 1), with high internal consistency coefficients for the SPAS items (e.g., Cronbach's alpha coefficients are consistently reported to be higher than 0.85) across diverse samples.

Furthermore, there are a number of accounts of the SPAS being translated into different languages and tested for invariance across cultures, gender, and age (Hagger et al., 2007, 2010; Lindwall, 2004; Maïano et al., 2010). Generally, the underlying concept of SPA has been demonstrated as an important body image dimension across cultures.

In addition to the trait-SPA measure (SPAS), and based on supporting evidence and growing research interest in understanding experiences of state-SPA, Martin Ginis et al. (2011) developed a short (N_{items} = 9) state-SPA scale. Scores on the state-SPA scale provided evidence of construct validity (i.e., significant positive correlations with scores of trait and state measures of body image affect, and negative correlations with self-presentational efficacy and body satisfaction). Furthermore, state-SPA scores discriminated between females who exercised in a mixed-sex environment versus a same-sex environment whereas trait-SPA scores did not.

In summary, there are both trait and state measures of SPA available to researchers who are interested in understanding SPA experiences. It is imperative that the chosen

measure fits the research objectives and target sample in studies focused on developing this area of sport and exercise psychology science.

The trait versus state nature of SPA

The original conceptualization of SPA was as a stable disposition or trait (Hart et al., 1989). However, there are few longitudinal studies that have looked at the stability of SPA scores over time. One of these longitudinal studies provides strong evidence of SPA as a stable trait in a sample of women during a vulnerable time of fluctuating body concerns and social interactions. Specifically, Crocker et al. (2006) conducted a prospective longitudinal study with 501 adolescent girls aged 14 to 17 years, and demonstrated that scores on the SPAS were quite stable over three time waves one year apart (e.g., interclass correlation coefficients of $_{time1\_time2}$ = .69, r_{time2_time3} = .69, and r_{time1_time3} = .58). The stability of SPA experiences is consistent with findings from a systematic review of longitudinal body image research, suggesting that body image concerns remain fairly stable in individuals between 18 and 80 years old (Davis, 1997). While these studies provide limited evidence, the trait-like features of SPA are supported.

Alternatively, several researchers have provided evidence of state-like properties of SPA scores both using the original scale and modified items to target situation-specific physique anxiety. Generally, SPA has demonstrated malleable features in physical, interpersonal, and intrapersonal contexts. Several researchers have explored differences in SPA based on the physical or intrapersonal contexts (Brunet & Sabiston, 2011; Carron, Burke, & Prapavessis, 2004; Chu, Bushman, & Woodard, 2008; Diehl et al., 2001; Focht & Hausenblas, 2001, 2003, 2006; Kruisselbrink, Dodge, Swanburg, & MacLeod, 2004; Lamarche & Gammage, 2010; Martin Ginis, Jung, & Gauvin, 2003; Sabiston, Sedgwick, Crocker, Kowalski, & Mack, 2007; Sinden, Martin Ginis, & Angove, 2003; Van Raalte, Cunningham, Cornelius, & Brewer, 2004). For example, Van Raalte et al. (2004) reported that SPAS scores were higher among college students reading hypothetical scenarios placing them in a fitness center when compared to a dining hall or library. These findings suggested that physical environments where the body may be on display and evaluated (e.g., fitness center) fostered the highest SPA experiences compared to more private settings such as the library. Similarly, exercising in front of a mirror – an environment that highlights that the body is on display – has been linked to higher reports of SPA (e.g., Gammage, Hall, & Martin Ginis, 2004; Martin Ginis, Jung, & Gauvin, 2003). In addition, women who exercised to a physique-salient exercise video (compared to a group who exercised to a non-physique salient video) reported higher state-SPA (Martin Ginis, Prapavessis, & Haase, 2008). Taken together, the noted differences in SPA scores resulting from hypothetical or actual manipulations to the physical environment may allude to state-like properties of SPA experiences. These findings also highlight important environmental factors that affect SPA experiences.

Taking an interpersonal context approach, Brunet and Sabiston (2011) reported higher SPA scores among older adolescents when they were in the company of peers compared to being around their parents. Furthermore, female fitness club members reported higher situational-specific SPA in all-male (i.e., opposite sex) exercise environments compared to mixed-sex and all-female settings in hypothetical scenarios (Kruisselbrink et al., 2004). Contrary to these findings, Lamarche, Gammage, and Strong (2009) reported no difference in SPA scores for individuals engaged in a male-led or female-led exercise class. Also, Lamarche, Gammage, and Gabriel (2011) reported that state-SPA did not

differ for men and women when randomly assigned to complete a fitness task with a same-sex or opposite-sex experimenter. Features of the social environment may therefore induce SPA experiences differently, giving merit to researching state-specific experiences of SPA. As such, state-SPA needs to be addressed both in sport and exercise psychology research and practice – for example, in counseling and mental training, coaching, and physical education.

In summary, the results provide evidence that SPA experiences can be conceptualized as either a stable or situation-specific variable. Researchers need to employ the dispositional conceptualization of SPA that best matches their sport and exercise psychology research goals.

Predictors of SPA

Research on SPA experiences in sport and exercise psychology has focused on identifying and classifying predictors of SPA. Predictors of SPA have included personal characteristics such as age, sex/gender, culture, and weight status, PA type, social triggers, and a range of self-perceptions. Unfortunately, the majority of the evidence is based on cross-sectional research designs, ultimately precluding directionality of effects.

Personal characteristics

The characteristics that have been predominantly examined as reflecting SPA score differences and moderator effects include age, sex/gender, weight status, and culture/ethnicity. There is cross-sectional evidence predominantly in the exercise context that SPA scores are lower among older adults compared to younger and middle-aged adults (Hausenblas & Martin, 2000; Lantz, Hardy, & Ainsworth, 1997; McAuley, Bane, Rudolph, & Lox, 1995; Ransdell, Wells, Manore, Swan, & Corbin, 1998; Treasure, Lox, & Lawton, 1998). This trend is true for males and females (Thøgersen-Ntoumani & Ntoumanis, 2006). On the contrary, some studies with older adults (Lanning, Bowden, Owens, & Massey-Stokes, 2004; Woodgate, Martin Ginis, & Sinden, 2003) and post-menopausal women (Ransdell et al., 1998) have found no association between age and SPA. Focusing specifically on adolescence, one longitudinal study within the exercise context focused on stages of maturation among girls. Findings indicated that SPA was positively correlated with maturation in adolescent girls such that girls in early stages of maturation reported significantly lower SPA than girls in middle or late stages of maturation (Niven, Fawkner, Knowles, Henretty, & Stephenson, 2009). The trend of increasing SPA with maturation in adolescence combined with research of higher SPA in young adult females compared to pre-adolescents (Monsma, Pfeiffer, & Malina, 2008; Thompson & Chad, 2002) suggests an important role of maturation and age in SPA experiences, especially in adolescence. Further research is needed to better understand the developmental features of the experience of SPA, in particular among males and during critical times of physical, emotional, and social change such as puberty.

Sex differences are commonplace among SPA research evidence in all contexts related to PA (i.e., 30.2% of the studies identified in Supplemental Table 2 are focused on sex differences). Specifically, there is consistent evidence that females score higher on the SPAS than males (e.g., Berry & Howe, 2004; Eklund et al., 1997; Mack, Strong, Kowalski, & Crocker, 2007) and these differences are reported across the lifespan (Melbye, Tenenbaum, & Eklund, 2008; Smith, 2004). Nonetheless, males are not protected from

experiencing SPA and related emotions (i.e., Crozier, 2012; Davis, Brewer, & Weinstein, 1993; Grieve et al., 2008). Furthermore, there is evidence that reported mean differences reflect true sex differences in SPA scores since multiple studies have demonstrated sex invariance in the measurement properties of the SPAS (i.e., Motl & Conroy, 2000, 2001; Smith, 2004).

Weight status has also been studied extensively as a correlate of SPAS scores predominantly within exercise and other health-related contexts such as eating/dieting behaviors and body image. Body mass index (BMI) has been consistently used as a measure of weight status when examining SPA (Crocker, Snyder, Kowalski, & Hoar, 2000; Krane, Stiles-Shipley, Waldron, & Michalenok, 2001). High BMI has been associated with higher SPA scores in adolescents (Crocker et al., 2003; Mack et al., 2007) and adults (Brewer, Diehl, Cornelius, Joshua, & Van Raalte, 2004; Russell, 2002). Overweight men and women tend to report higher SPAS scores compared to age and gender-matched healthy weight counterparts (Hart et al., 1989; Lantz et al., 1997; McAuley et al., 1995). Similar to BMI, body fat percentage (Cox, Lantz, & Mayhew, 1997; Martin, Kliber, Kulinna, & Fahlman, 2006; Ransdell et al., 1998), skinfold measurement (Monsma et al., 2008; Thompson & Chad, 2002), and dual-energy X-ray absorptiometry (DEXA; Martin Ginis, McEwan, Josse, & Phillips, 2012) have also been positively correlated with SPA. However, reports from a sample of male professionals in India suggest no significant association between anthropometrics and SPA (Mookerjee, Singh, & Cash, 2002). This inconsistent finding may be explained by cultural differences in weight perceptions and body image ideals. Researchers are encouraged to explore mechanisms such as cultural attitudes and beliefs about weight that explain the association between weight status and SPA experiences to help tease apart the inconsistent findings. Also related to weight status, perceptions of weight and muscle-related body comparisons are significantly tied to higher SPA scores among males and females (i.e., Martin Ginis et al., 2005; McCreary & Saucier, 2009).

There is limited research evidence exploring cultural differences in SPA experiences ($n_{studies}$ = 5; 3.9%). Consistent with body image research more generally (Cash & Smolak, 2011), Caucasian/White participants have reported significantly higher SPAS scores compared to age-matched Black participants (Jordan, Smisson, Burke, Joyner, & Czech, 2005; Russell, 2002; Russell & Cox, 2003). In two studies exploring cross-cultural invariance, Hagger et al. (2007, 2010) reported some SPA measurement differences across participants from Spain, Portugal, Britain, Estonia, Sweden, and Turkey. For example, the 8-item SPAS exhibited good fit with British, Estonian, and Swedish samples while the 7-item version was a good fit with Spanish and Turkish samples (Hagger et al., 2007). They also reported that British and Spanish participants reported the highest SPA. Both the cultural differences and the measurement differences are preliminary evidence that requires further testing along with considerations for mechanisms explaining the relationship between culture/ethnicity and SPA experiences.

PA type and characteristics

Exercisers tend to report lower SPA experiences compared to inactive and non-exercising individuals (Crocker et al., 2000; Haase & Prapavessis, 2001; Hausenblas & Mack, 1999; Ransdell et al., 1998). Athletes in competitive aesthetic and subjectively rated sports such as figure skating, gymnastics, cheerleading, and some martial arts tend to report higher SPAS scores compared to athletes in non-aesthetic sports such as basketball and soccer.

This difference in SPAS scores is likely due to the high importance of aesthetics, lean body types, and the evaluative judging component of certain sports (Greenleaf, 2004; Hausenblas & Carron, 1999; Reel & Gill, 1996, 2001; Schwerin et al., 1996; Van Raalte, Schmelzer, Smith, & Brewer, 1998). Evidence is also less clear when comparing significant differences in SPAS scores among athletes compared to exercisers, or competitive versus recreational athletes. In one study of Turkish male and female adults, competitive athletes and exercisers had lower SPAS scores than non-exercisers, independent of gender (Mülazimoglu-Balli, Koca, & Aşçi, 2010). Haase and Prapavessis (2001) found no significant differences in SPAS scores comparing females with varying levels of sport experiences – including physique-salient sport athletes, weight-restricted sport athletes, non-physique-salient sport athletes and non-athletes. Significant differences on SPAS scores were reported among experienced and inexperienced bodybuilders and weightlifters, with the former reporting the lowest scores (Hurst, Hale, Smith, & Collins, 2000). Drawing from a meta-analytical review of SPA literature, there is a small overall consensus that exercisers report lower SPAS scores compared to non-exercisers, and SPAS scores may be higher among athletes compared to exercisers (Mack et al., 2008).

There have also been a few experimental studies providing evidence on the effects of PA type on SPAS scores. In a pre-post study design without controlling for body composition indicators, Bartlewski et al. (1996) found that SPAS scores were not different between women assigned to an aerobic exercise condition compared to a control condition. Bowden et al. (2005) reported an investigation of 315 undergraduate students enrolled in either a 16-week course for PA or an emergency care course. Participants enrolled in a PA course reported higher SPAS scores at baseline and greater improvements in SPA over the 16-week observation period. Changes in SPA scores did not appear halfway through the course, at eight weeks, suggesting that SPA can be attributed to dispositional beliefs that may take time to change. However, the researchers did not control for body composition or related measures that may help to explain the findings. Furthermore, Lindwall and Lindgren (2005) found that an exercise intervention significantly reduced SPA experiences among adolescent females compared to a control group, and these differences were not attributed to changes in physiological factors. In longer intervention studies, McAuley et al. (1995, 2002) reported significant reductions in SPAS scores over 20 and 52 weeks among older sedentary adults. In one of the aforementioned studies (McAuley et al., 1995), reductions in SPAS scores were more dominant for women than men and for younger (45–54 years) rather than older (55–64 years) participants following the exercise intervention. Finally, Martin Ginis and colleagues found that change in SPA was different for men and women following a strength training intervention (Martin Ginis, Eng, Arbour, Hartman, & Phillips, 2005). SPA was negatively correlated with perceptions of strength, muscularity, and body fat for men but only perception of body fat for women. In another 16-week diet and PA intervention study, Martin Ginis and colleagues reported that change in SPA was related to change in percentage of fat among overweight women (Martin Ginis et al., 2012). Taken together, it is important to tease out the relative (and cumulative) effects of PA type and characteristics of sport and exercise contexts on fostering or protecting from SPA experiences.

Environmental triggers

As reported in the section on state-SPA, there are a number of environmental predictors of SPA related to the characteristics of the environment (e.g., mirrors, same versus mixed

sex, attire restrictions). Exercising in front of mirrors has been shown to exacerbate SPA experiences in some research studies (Focht & Hausenblas, 2003; Katula, McAuley, Mihalko, & Bane, 1998; Martin Ginis et al., 2003) but not others (e.g., Raedeke, Focht, & Scales, 2007). Exercise attire may also exacerbate SPA experiences. In one of the original studies on this topic, Crawford and Eklund (1994) found women's SPA scores were negatively correlated with a preference for a physique-enhancing exercise environment (i.e., all exercisers in the video manipulation were wearing thong leotards and tights) and positively associated with favorable attitudes for exercising in an environment de-emphasizing the physique (i.e., all exercisers were wearing t-shirts and shorts). In sport settings, wearing physique-enhancing uniforms may draw attention to body shape, size, and musculature and increase chances of evaluation by coaches, teammates, athletic competitors, or spectators. Cheerleaders and swimmers have reported their revealing uniforms are a large source of pressure to maintain low body weight and exacerbate SPAS scores (Martin, 1999; Reel & Gill, 1996, 2001). However, in an examination of female aerobic exercisers and female varsity athletes whose uniforms ranged in level of revealing physique, Krane et al. (2001) found no difference in SPAS scores. Mandatory uniforms in physical education classes are also described as highly relevant sources of SPA among adolescents (Sabiston et al., 2007). A final environmental trigger of SPA experiences may be the gender make-up (i.e., mixed, same sex) of the PA environment (Kruisselbrink et al., 2004), although the evidence is mixed since SPAS scores were not significantly different among women attending same-gender or mixed-gender fitness facilities (Walton & Finkenberg, 2002) or when exercising with a same-sex or opposite-sex experimenter/trainer (Lamarche, Gammage, & Gabriel, 2011).

Social triggers

In addition to the personal and environmental characteristics that can influence experiences of SPA, there are numerous social contexts and related perceptions that appear to predict or distinguish SPAS scores. For example, peer group influences (Carron & Prapavessis, 1997) and the presence of others (Brunet & Sabiston, 2011; Spink, 1992) may perpetuate feelings of SPA. In a study by Mack et al. (2007), male and female adolescents who received encouragement from friends in their peer groups to alter their physiques, and who identified themselves as less attractive than their peers, reported higher SPAS scores. Cox et al. (2011) investigated several social relationship variables to determine which ones held the most relevance to students' SPA experiences in physical education. These included the presence of one's best friend in class, the number of close friends they had in class, perceived peer acceptance, and perceived teacher support. Of these relationship variables, only feelings of belonging or acceptance among one's peers were significant negative predictors of SPA in physical education. This suggests that having a good network of relationships with the broader peer group in class may attenuate SPA in the physical education setting, though not necessarily by having a few close friends or a supportive teacher.

Other interpersonal sources of SPA may include parents, teachers, coaches, fitness leaders, and the media. For example, mothers of adolescent girls may trigger SPA through indirect commentary and controlling actions such as guiding PA and managing their daughters' diets (i.e., Sabiston et al., 2007). Teachers and coaches who place an emphasis on appearance and weight are perceived to foster more threatening physique-salient and evaluative environments (Krane et al., 2001). Additionally, the media may heighten

experiences of SPA. In particular, there is evidence (predominantly studies involving women) that SPAS scores increase when individuals are exposed to appearance-salient advertising and decrease when individuals are exposed to health-based advertising (Berry & Howe, 2004). Similarly, Sabiston and Chandler (2009) found that SPA scores were higher for women exposed to model-focused athletic shoe advertising compared to women exposed to product-focused advertisements. These findings are consistent when the exposure includes fitness videos, television commercials, or print media such as photos and posters (Eklund & Crawford, 1994; Martin Ginis et al., 2008; Monro & Huon, 2005).

Self-perceptions

Body dissatisfaction and negative body image indicators have been consistent correlates of SPA experiences. For example, Thompson and Chad (2002) reported significant associations between body dissatisfaction, body weight and shape concerns, and SPAS scores. Negative correlations between appearance perceptions and SPAS scores have been reported (Amorose & Hollembeak, 2005; Crocker, Sabiston, Kowalski, McDonough, & Kowalski, 2006). A three-year longitudinal analysis reported decreases in physical self-perceptions (including sport, conditioning, and strength) associated with increases in SPA (Crocker et al., 2006). In a sample of female undergraduate students, Atalay and Gençöz (2008) reported that participants high on body dissatisfaction had higher SPA experiences. Self-esteem is also a significant predictor of SPAS scores among adolescents (Brunet, Sabiston, Dorsch, & McCreary, 2010) and undergraduate students (Lox, Osborn, & Pellett, 1998). Self-objectification has also been positively associated with SPAS scores (Melbye et al., 2008). Specific self-discrepancies (i.e., actual, ideal, and ought) have been significantly associated with heightened SPA experiences (Martin Ginis et al., 2008; Sabiston, Crocker, & Munroe-Chandler, 2005; Woodman & Steer, 2011). The findings that SPAS scores are highly related to body-related cognitions, perceptions, and affect are not surprising given that SPA is operationalized within a multidimensional body image framework (Bane & McAuley, 1998).

Outcomes of SPA

There are a range of additional outcomes that have been studied in the context of SPA experiences, such as physical self-perceptions, commitment to PA, competitive anxiety, disordered eating behaviors, stress, and depression. For example, SPA has been linked to low perceptions of competence (Brunet & Sabiston, 2009), self-efficacy (Marquez & McAuley, 2001), and low enjoyment (Cox et al., 2011; Raedeke et al., 2007, 2009) of PA. In a sample of male and female students with a sport history, SPA was associated with high competitive anxiety among the female athletes (Martin & Mack, 1996), supporting the theory that this anxiety may be influenced by fear of both performance and appearance being negatively evaluated. SPA has also been linked to PA commitment (Finkenberg, DiNucci, McCune, Chenette, & McCoy, 1998) and factors such as percevied evaluative threat, state anxiety, and self-presentational concerns during PA (Focht & Hausenblas, 2004; Gammage & Gabriel, 2009).

Researchers have also linked SPAS scores to disturbed eating attitudes and reports of disordered eating behaviors among college women and various elite sport athletes (e.g., Aşçi et al., 2006; Baş, Aşçi, Karabudak, & Kiziltan, 2004; Baş, Karabudak, & Kiziltan,

2005; Caglar et al., 2010; Cox et al., 1997; Diehl, Johnson, Rogers, & Petrie, 1998; Frederick & Morrison, 1998; Haase & Prapavessis, 1998, 2001; Haase, Prapavessis, & Owens, 2002; Hausenblas & Mack, 1999; Reel & Gill, 1996; Thompson & Chad, 2002). In addition to simple associative effects, mechanisms have been tested to explain the association between SPAS scores and eating-related outcomes. For example, Fitzsimmons-Craft, Harney, Brownstone, Higgins, and Bardone-Cone (2012) found that social comparison, appearance-related social comparison, and body surveillance significantly moderated the relationship between SPA and disordered eating in a sample of undergraduate females. Haase & Prapavessis (1998) reported that gender and body mass index interaction moderated the association between SPAS scores and eating attitudes. Sport type was not a significant moderator when examining disordered eating attitudes (Haase & Prapavessis, 2001).

Some recent reports have also associated physique evaluative threat, which may be analogous to SPA, to higher physiological markers of stress (i.e., Martin Ginis, Strong, Arent, & Bray, 2012). Specifically, individuals in contexts manipulating physique threat had high post-manipulation levels of cortisol, which is a hormone released by the hypothalamic-pituitary-adrenal axis. This study has demonstrated initial evidence that SPA may have long-term health implications since cortisol and heightened chronic stress are associated with a host of poor health outcomes (e.g., cardiovascular disease, immune system dysregulation, depression; Dickerson & Kemeny, 2004). Future research studies should focus on the overall long-term effects of SPA on psycho-biological markers and the possible link to poor health outcomes.

To this effect, there are five studies identifying SPA as positively associated with depression (Diehl, Johnston, Rogers, & Petrie, 1998; Lantz, Hardy, & Ainsworth, 1997; Lox, Osborn, & Pellet, 1998; Martin Ginis et al., 2012; Woodman & Steer, 2011). However, due to the cross-sectional nature of the findings, it is not possible to rule out the possibility that depression also leads to increases in SPA. To better understand the directionality of this relationship, longitudinal research and a focus on clinical samples are needed to further examine the mechanisms linking SPA and depression (as well as other mental health outcomes such as anxiety, stress, and mood).

Nomological networks: SPA and PA

There is certain ambiguity in the understanding of whether higher SPAS scores are related to participation in, or avoidance of, PA. Given the self-presentation and social anxiety foundations of SPA, it is not surprising that a predominant strategy for managing physique concerns may be behavioral avoidance (i.e., avoiding the situation or event that is likely to elicit the feelings of anxiety). For example, researchers have reported negative associations between SPAS scores and PA participation (Brunet & Sabiston, 2009; Kowalski, Crocker, & Kowalski, 2001; Lantz et al., 1997), and higher SPAS scores were associated with lower exercise adherence in a study of sedentary and obese females (Treasure et al., 1998). Similar associations can be seen in contexts of physical education (Cox et al., 2011), with SPA related to lower effort exerted, and directly related to participation avoidance in a high school class. In another sample of physical education students, there were no differences in SPA among those in mixed-sex and single-sex physical education classes, although females reported a preference for single-sex physical education classes (Koca & Aşçi, 2006). There is also qualitative evidence that adolescents who experience high SPA in physical education classes are more likely to avoid classes

by skipping physical education altogether or seeking parental notes excusing them from class (e.g., Sabiston et al., 2007).

When avoidance of the sport and/or exercise situation is not feasible, there are reports that individuals high in SPA will manage the threatening context by covering up their physique to avoid potential evaluations by others. For example, adolescent girls reported wearing loose-fitting clothing in physical education classes and at the gym, and a common strategy at the beach or swimming pool is to cover a bathing suit and avoid exposing the body unless necessary (Kowalski, Mack, Crocker, Niefer, & Fleming, 2006; Sabiston et al., 2007). These behavioral avoidance and remedial actions to alter one's physique or appearance (and hence lower SPA experiences) are consistent with two prominent ways in which individuals manage their SPA experiences (Hart et al., 1989; Kowalski et al., 2006; Sabiston et al., 2007).

While some researchers have identified negative associations between SPAS scores and PA, there is also evidence that SPA experiences are unrelated to PA behaviors (e.g., Cox et al., 2011; Crawford & Eklund, 1994; Melbye et al., 2008), or positively associated with engagement in PA (Aşçi, Tüzün, & Koca, 2006; Bowden, Rust, Dunsmore, & Briggs, 2005; Frederick & Morrison, 1996; Hausenblas, Brewer, & Van Raalte, 2004). In an attempt to explain these ambiguous findings, researchers have linked SPA experiences to reasons for exercise (Sabiston et al., 2005) and specific behavioral regulations, with a predominant focus on Deci and Ryan's (2002) self-determination theory perspectives (Brunet & Sabiston, 2010; Cox et al., 2011, 2013; Frederick & Morrison, 1996; Niven et al., 2009; Sabiston et al., 2005; Thøgersen-Ntoumani & Ntoumanis, 2006). Higher scores on the SPAS have been consistently associated with more controlling reasons for exercise, such as exercising to gain some reward or to avoid feelings of guilt and shame (e.g., Sabiston et al., 2005; Thøgersen-Ntoumani & Ntoumanis, 2006). More recently, exercise motives have been tested as mediators of the association between SPA experiences and PA behavior (Brunet & Sabiston, 2009) or physical education outcomes (Cox et al., 2011). In their study with older adolescents, Brunet and Sabiston (2009) tested both psychological needs (perceptions of relatedness, competence, and autonomy) and motivation as mediators of the SPA and PA association in a structural model. Among males and females, SPAS scores were negatively related to the perceptions of competence, autonomy, and relatedness, with competence predicting self-determined motivation and PA behavior. The model provided some evidence for the mediation of the needs and motivation as an explanation for the association between SPA experiences and PA.

In physical education settings, Cox et al. (2011) tested autonomous motivation, introjected and external regulations, and amotivation as unique mediators in the relationship between SPA and behavioral outcomes such as self-reported effort and avoidance of participation in physical education. There were no significant mediation effects, although SPA correlated negatively with autonomous motivation and positively with controlling forms of motivation and amotivation. Therefore, the type of motivation students experienced in physical education did not appear to explain the association between SPA experiences and certain behavioral outcomes. Given these findings, Cox et al. (2013) proceeded to take a person-centered approach to examining SPA experiences and behavioral regulations (using cluster analysis), and associations to relevant PA outcomes specific to physical education. Difference tests showed that the 'externally controlled and anxious students' reported significantly lower enjoyment and effort in class than the other identified profiles. As such, it appears that SPA experiences are associated with more negative affective and behavioral

outcomes when paired with high external regulation and lower levels of more autonomous forms of motivation.

In addition to testing psychological needs and behavioral regulations (i.e., motivation) as possible explanatory variables in the association between SPA experiences and PA, some researchers have tested constructs such as self-presentation and related efficacy perceptions (Cumming & Thøgersen-Ntoumani, 2011; Gammage, Hall, et al., 2004; Gammage, Martin Ginis, & Hall, 2004; Grieve, Jackson, Reece, Marklin, & Delaney, 2008; Strong, Martin Ginis, Mack, & Wilson, 2006; Woodgate et al., 2003). Individuals with higher levels of SPA report exercise motives to be more self-presentational (e.g., desire or need to present positive image of self; 'look good') compared to motives for fitness or recreation (e.g., enjoyment of activity, improvement of physical function; 'feel good') (Grieve et al., 2008; Strong et al., 2006). These findings are not surprising given the theoretical foundations of SPA linked to self-presentation. Furthermore, Cumming and Thøgersen-Ntoumani (2011) reported that self-presentational efficacy expectations moderated the relationship between SPA experiences and exercise frequency among adolescent females whereby SPA was negatively related to exercise frequency when self-presentational efficacy expectations were high. Similarly, in a sample of middle-aged and older adult women, Woodgate et al. (2003) found that self-presentational efficacy and SPA predicted little variance in PA. In this study, SPAS scores were negatively correlated with PA only for women with high self-presentational efficacy and unrelated to activity for females with low self-presentational efficacy. Finally, in a sample of male undergraduate students with weight training experience, Crozier (2012) attempted a self-presentational efficacy manipulation by assigning participants to complete a 1-Repetition Maximum (RM) test with either a muscular 'expert' trainer or a lean 'novice' trainer. The results of the manipulation were not significant, but participants assigned to the muscular trainer attained higher 1-RM scores and were perceived positively on musculature and expertise.

To date, most research on SPA and PA has been limited to a few cross-sectional studies or pre-post test manipulations with small samples. Overall, findings suggest higher reports of SPA in non-exercisers versus regular exercisers, and higher reports of SPA in athletes versus exercisers (Mack et al., 2008). Based on the literature reviewed, motivation regulations and self-presentational efficacy have shown to be important mediators in the SPA to PA association in leisure PA environments. No studies have examined associations as they relate to sport outcomes, such as drop-out, enjoyment, or performance, and there is limited work in the area of physical education. To advance the understanding of the associations between SPA experiences and PA outcomes, researchers need to expand on the identification of potential mediators and moderators that can help explain the often-reported ambiguous associations.

General discussion

The focus on SPA experiences has flourished since the inception of the concept in 1989. There are 126 research articles identified in this review in which researchers examine, test, identify, and define SPA experiences.

In fulfillment of the first objective, measurement issues prevalent in SPA research were reviewed and the fundamental properties of the SPA construct were examined. SPA has been measured using derivatives of the original 12-item scale (Hart et al., 1989), with most researchers turning to the original or a 9-item version of the SPAS (Martin et al., 1996).

Additionally, researchers report robust measurement properties of the 12-item, 9-item, and 7-item SPA scales across diverse samples, recommending the 7-item scale for more appropriate use in adolescents (Motl & Conroy, 2001). There is also evidence of sufficient measurement properties for a unique measure associated with social appearance anxiety (Hart et al., 2008) and a state-SPAS (Martin Ginis et al., 2011). This measure may be useful in experimental research on SPA due to its ability to discriminate between SPA experiences across various social and environmental contexts. This being said, the need for further scrutiny on the measure of SPA is ever-present. While researchers have provided some evidence of reliability and validity, prominent validity theorists (i.e., Messick, 1995) recognize that test/score validation is an ongoing process. Specifically, there are many sources of validity evidence (test content, internal structure, response processes, relations to other variables, consequences of test use, etc.) that should be the focus of further research on the SPAS and state-SPAS. Furthermore, although it is almost impossible to collect all the validity evidence at one time when developing and testing an instrument, it is recommended that multiple sources of validity evidence be collected simultaneously and presented (Zhu, 2012).

There has also been contestation in the literature about the nature of SPA experiences being trait or state-like. In longitudinal research, the stability of SPA is demonstrated over time and offers evidence of a stable disposition. However, the state-like properties of SPA are also demonstrated in experimental research which depicts the role of social context (e.g., presence of others) and environmental factors (e.g., presence of mirrors) in influencing state-SPA experiences. Based on the existing literature, it is likely that SPA has both trait and state features and needs to be measured in a way that is consistent with the objectives of the study.

Findings from this review also suggest that feelings of SPA may not be experienced frequently – a trend that is supported both in qualitative research among adolescents (McHugh et al., 2008; Sabiston et al., 2007) and by the consistent low scores on the SPAS scale in samples across the lifespan. It is possible that SPA is not easily self-identified (Sabiston et al., 2007) and that SPA is highly associated with a desire to maintain social desirability (Haase & Prapavessis, 1998). In fact, the difficulties in measuring emotions using survey instruments are well documented (Larsen & Fredrickson, 1999). While more objective assessments would be favorable, there are no known physiological or biological functioning responses that would be associated uniquely with self-presentational, social anxiety, and/or body image. Some researchers have linked body image and SPA-like outcomes to stress hormones (e.g., cortisol; Martin Ginis et al., 2012) and immune function (Sabiston, Castonguay, Barnett, O'Loughlin, & Lambert, 2009). It is possible that SPA experiences may have unique psychobiological profiles characterized by blunted stress hormone profiles and/or active systemic inflammation, although it is extremely premature to suggest this without more research.

To address the second objective, this review identifies the various predictors and outcomes of SPA that have been identified and tested within the literature. A preliminary overview of the complex associations between various factors and SPA is presented in Figure 1. Based on the evidence, personal characteristics (e.g., age, sex, physical self-perceptions) and social and environmental context variables (e.g., type of PA, characteristics of PA environment) have been identified as predictors. Personal characteristics (e.g., gender, age, maturation, ethnicity, weight status) have also been shown to moderate associations between predictors and SPA. Additionally, SPA has been associated with behavioral (e.g., coping strategies, motivation) and health-related (e.g., disordered eating,

stress, depression) outcomes. However, the associations in Figure 1 are also premature in that they are based on predominantly cross-sectional research. As such, we urge careful use of this preliminary figure, and call for appreciation for the complex conceptualizations within the current SPA literature.

Finally, to address the third objective, this review aimed to explore the nomological networks that integrate SPA and PA behavior. Findings suggest that SPA has been studied most prominently as an antecedent to PA and related outcomes, and most studies report a negative association between SPAS scores and PA. Yet there is experimental evidence for a bi-directional relationship between SPA and PA, making it difficult to confidently make causal assumptions. The ambiguity of this relationship is also highlighted in a meta-analysis of SPA and PA (Mack et al., 2008). An inherent roadblock lies in the inconsistent classification of individuals by PA level and extrapolation of results based predominantly on cross-sectional data (Mack et al., 2008). The role of mechanisms such as motivation and self-presentational efficacy in the association between SPA and PA also needs to be further elucidated, as causal interpretations are still unclear. Experimental research is needed to further examine specific mechanisms explaining the association between SPA and PA.

Future directions

One of the challenges moving forward will be to determine the unique role of SPA within a comprehensive operationalization of body image affect, or body-related emotions. To better identify SPA experiences, it may be valuable to study other body-related emotions that may be more frequently experienced. One option is to turn some attention to self-conscious emotions (e.g., Sabiston et al., 2010) that are informed by theoretical frameworks such as the cognitive-motivation-relational theory of emotion (Lazarus, 1991) and the process model of self-conscious emotions (Tracy & Robins, 2004). These frameworks may help to underpin the experience of emotions such as guilt, shame, pride, embarrassment, and envy, the distinction between emotions (e.g., shame versus guilt), and a focus on both negative and positive emotions. One of the limitations of studies focused on affect and emotion in sport and exercise psychology is the predominance of negative emotional experiences at the expense of also understanding positive emotions. A framework such as the study of body-related self-conscious emotions supports the understanding of a range of affective experiences.

Furthermore, the majority of research on SPA experiences has focused on females and either adolescents or undergraduate/college students. While there are 45 studies (35.7%) exploring gender differences more broadly, there are only a few (n = 7; 5.6%) studies focused specifically on males. Also, there are limited (n = 12; 9.5%) research studies targeting potentially important samples such as individuals of diverse race/ethnicities, middle-aged women, older adults, and clinical populations. Researchers need to consider branching out to diverse samples to best understand SPA experiences, and to consider doing so in the context of longitudinal designs. Longitudinal studies will provide insights into SPA across the developmental lifespan to better understand change in SPA experiences in relation to other relevant variables, such as PA behavior.

Considering evidence that SPA is often negatively linked with PA adherence (Cox et al., 2011; Treasure et al., 1998) and participation (Brunet & Sabiston, 2009; Kowalski et al., 2001; Lantz et al., 1997), there is value in conducting clinical intervention studies to target ways of reducing SPA experiences and fostering more self-determined motivations for PA.

To date, there is virtually no clinical intervention research on SPA. Drawing from the broader domains of body image research, some intervention strategies may be valuable approaches to use in sport and exercise psychology practice. For example, interventions based on psychodynamic approaches (Krueger, 2002), experiential psychotherapy and personal growth (Rabinor & Bilich, 2002), and cognitive-behavioral therapy (Cash & Strachan, 2002) have been used with evidence of reduced body image concerns, with the latter approaches demonstrating the most effective outcomes. Specifically, cognitive-behavioral therapies include psycho-education, biofeedback, desensitization, and cognitive dissonance training, which may be successfully utilized in sport, exercise, and clinical settings. Further strategies may include targeting self-presentational efficacy.

The need for intervention research is likely targeted at specific sub-groups in which the association between SPA and PA is negative. Identifying these sub-groups is another avenue for future research. Furthermore, it would be equally imperative to better understand the contexts in which the association between SPA and PA is positive (Aşçi et al., 2006; Bowden et al., 2005; Frederick & Morrison, 1996; Hausenblas et al., 2004). While some researchers have turned to self-determination theory (Deci & Ryan, 2002) and stress and coping perspectives (Kowalski et al., 2006; Lamarche, Kerr, Faulkner, Gammage, & Klentrou, 2012; Niefer, McDonough, & Kowalski, 2010; Sabiston et al., 2007) to explain the potential positive relationship, other theoretical and conceptual models are likely of value and need to be identified and tested.

Most of the research on SPA experiences has focused on PA settings such as sport or exercise, whereas SPA experiences in physical education have received minimal attention (Cox, Ullrich-French, & Sabiston, 2013; Cox et al., 2011; Koca & Aşçi, 2006). This is surprising given the evaluative and social nature of this environment (Crombie, Brunet, & Sabiston, 2011) and the vulnerability of the adolescent participants who place significant emphasis on appearance and social relationships (Harter, 2012). Examining SPA in specific PA settings such as physical education may also lead to the development of context-specific strategies for reducing SPA experiences. For example, Cox et al. (2011) showed support for peer acceptance and autonomous motivation possibly being protective against SPA experiences in physical education contexts. In addition, Crombie et al. (2011) have suggested that increasing self-efficacy, increasing perceptions of control, and fostering acceptance within physical education may help decrease body-related concerns such as SPA. Despite these specific recommendations, there is currently no evidence on the development or implementation of intervention strategies to target these mechanisms and decrease the burden of SPA experiences.

Additionally, there are a multitude of dynamic relationships in the physical education and sport contexts that remain unexplored. For example, it may be useful for future research to examine the role of physical educators and coaches in transmitting beliefs of physical self-perceptions and performance to students and athletes, which may help us to better understand experiences of SPA. In fact, Koca and Aşçi (2006) suggest that future studies consider how variables such as curriculum content and instructional methods may influence experiences of SPA in youth in physical education contexts. Taken together, these suggestions for future research can inform intervention strategies for youth, coaches, and educators.

Finally, one of the biggest limitations in the SPA literature to date is the lack of longitudinal studies. Prospective studies are needed to provide insight on the developmental trends in SPA experiences, health outcomes, performance outcomes, and an understanding of

the mechanisms that may help explain the association between SPA and behavioral outcomes among exercisers, non-exercisers, and athletes.

Concluding remarks

This review is intended to be a broad and comprehensive summary of the research in this area to date. The purpose of this review was to present a summary of the SPA research in sport and exercise psychology. Based on the synthesis, SPA experiences show variation across PA context, sex, age, and culture. Activity motives are important mechanisms linking SPA and PA outcomes in exercise, sport, and physical education. Researchers in sport and exercise psychology are now encouraged to broaden the study of SPA to conduct longitudinal and experimental studies, develop quality intervention strategies aimed at reducing SPAS scores, and expand on the theoretical, nomological, and operational understandings of SPA experiences across the lifespan.

Supplemental data

Supplemental Tables 1 and 2 can be accessed at http://dx.doi.org/10.1080/1750984X.2014.904392. The underlying research materials for this article can be accessed at http://physical.utoronto.ca/health-and-exercise-psychology-unit/publications/peer-reviewed-research-articles.

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Table 1.
Study overview of the search criteria, number of articles, and percentage of total SPA-related publications reflected in each criteria.

Criteria	Number of Articles	Percentage of Total Articles
Quantitative studies	123	98%
Cross-sectional design	89	70%
Longitudinal design	7	6%
Quasi/Experimental design	27	21%
Qualitative studies	3	2%
Context		
Studies in exercise context	64	51%
Studies in sport context	17	13%
Studies in physical education context	5	4%
Studies in health contexts (e.g., social, body image, eating)	27	21%
Studies in SPA measurement	13	10%
Scale Used		
Studies using 9-item SPAS	57	45%
Studies using 12-item SPAS	66	52%
Other SPAS measures[a]	9	7%
8-item SPAS	1	1%
7-item SPAS	7	6%
State-SPAS	1	1%

Note: [a] Some of these studies employed multiple measures of SPA

Table 2.
Summary of all identified qualitative and quantitative research articles with a primary focus on social physique anxiety (SPA) in physical activity contexts including exercise, sport, and physical education, other health-related contexts, and measurement.

Authors (date)	Purpose	Study design	Target Sample and Size	SPA measure	Correlates tested	Main Findings
EXERCISE CONTEXT						
Anshel & Seipel (2007)	Examine relationship between SPA and perfectionism as linked to exercise behaviour	Cross-sectional survey	186 college students who exercise regularly (aerobic or resistance)	9-item SPAS	1. Perfectionism (dimensions: organization, concern over mistakes, doubts about actions, parental perceptions, personal standards 2. Gender	Small positive significant correlation between 'doubts about actions' dimension of perfectionism and SPA. No significant differences between males and females.
Asci, Tuzun & Koca (2006)	Examine eating attitudes and PA in relation to SPA	Cross-sectional survey	253 females and 229 male college students	12-item SPAS	1. Eating attitudes 2. Self-reported physical activity assessment 3. Gender	Participants in high SPA group had unfavourable eating attitudes and higher PA than participants in low SPA group. Women with high SPA scored higher on EAT-40
Atalay & Gençöz (2008)	Links between exercise and body satisfaction on SPA	Cross-sectional survey	118 female college students	Turkish version of 12-item SPAS	1. Exercise 2. Eating Attitudes test (EAT 40) 3. Liebowtz Social Anxiety scale (LSAS) 4. Diet habits	Participants who were dissatisfied with their body image and who did not exercise had higher SPA; similar findings were not noted for social anxiety; SPA positively correlated to EAT 40 and LSAS
Bartlewski, Van Raalte & Brewer (1996)	Investigate the longitudinal effects of participation in aerobic exercise	Longitudinal pre-post design	81 female college students enrolled in fitness course (n = 45) or lecture	12-item SPAS	1. Body esteem (sexual attractiveness, weight concern,	SPA did not differ between aerobic exercise and control group. Aerobic exercise

	class on SPA		(n = 36)		physical condition) 2. Past PA	participants reported higher physical condition at posttest than control.
Berry & Howe (2004)	Test effects of health promotion and appearance-based exercise advertising on exercise attitudes, SPA, and self-presentation	Pre-Post design with advertising manipulation	73 female and 30 male college students; 36 participants in the health and appearance groups, respectively, and 31 in control	9-item SPAS	1. Gender 2. Exercise status 3. Television viewing	Females reported higher SPAS scores; exercisers had lower SPAS scores at post-test; SPAS scores higher among those who watched more television; exercisers in the health condition had lower SPAS scores compared to non-exercisers
Bowden, Rust, Dunsmore & Briggs (2005)	Examine relationship of SPA with different PA and assess changes in SPA after 16-week PA program	Pre-Post design with exercise program manipulation (following participants enrolled in fitness vs. non-fitness classes)	315 college students from PA course or emergency care course	12-item SPAS	1. Gender 2. PA	Participants in fitness course had higher anxiety scores at baseline and significant improvements between 8 and 16 weeks. Females had higher pre and post test SPA.
Brewer, Diehl, Cornelius, Joshua & Van Raalte (2004)	Link between BMI, SPA and protective self-presentational exercise behaviours	Cross-sectional survey	86 female college students (participants in aerobics classes)	9-item SPAS	1. BMI 2. Standing away from instructor 3. Wearing concealing attire	SPA was positively related to preferred position from instructor and concealing attire. SPA did not mediate the relationship between BMI and either self-presentational behaviour.
Brunet & Sabiston (2009)	Using self-determination theory to examine relationship between SPA, psychological needs, motivation, and PA	Cross-sectional survey	381 young adults	9-item SPAS	1. Gender 2. Psychological needs satisfaction in exercise 3. Motivation 4. PA behavior	SPA was indirectly associated with PA and directly negatively associated with psychological needs.

Burke, Carron & Eys (2006)	Determine PA contexts rated as most and least preferable and determine SPA influence on preferences	Cross-sectional survey	638 college students (403 female, 198 male)	9-item SPAS	1. Gender 2. PA context preference	Most preferred context was engaging in PA with others in structured class, exercising alone was least preferred. SPA did not influence PA context preference.
Caglar, Bilgili, Karaca, Ayaz & Asci (2010)	Examine whether SPA and gender influence psychological and health related behaviors	Cross-sectional survey	598 female; 384 male adolescents	12-item SPAS	1. Gender 2. Eating attitudes 3. Self-reported PA 4. Physical self-description 5. Perfectionism	Adolescents with high levels of SPA had more unfavorable eating attitudes, higher perfectionism, negative physical self-worth and negative body related perceptions (males had more positive outcomes). PA did not differ among SPA levels.
Chu, Bushman & Woodard (2008)	Examine relationship between SPA, obligation to exercise and exercise choices	Cross-sectional survey	337 college students	12-item SPAS	1. Gender 2. Obligatory exercise 3. Frequency and type of exercise	Females reported higher SPA, but this was not associated with obligation to exercise and exercise level across sexes.
Crawford & Eklund (1994)	Examine the association between SPA and physique self-presentational anxiety and fitness program participation	Post-manipulation design	104 college female students	12-item SPAS	1. Body size satisfaction 2. Weight satisfaction 3. Reasons for exercise 4. Attitudes toward exercise setting	SPA was associated with favorability of attitudes towards both exercise settings. SPA negatively associated with favorability of setting de-emphasizing physique
Crocker, Sabiston, Forrestor, Kowalski, Kowalski & McDonnough (2003)	Examine changes in BMI, self-esteem, physical self-perceptions, SPA, PA, dietary restraint over 12 months	Longitudinal survey (12-month)	631 female adolescents (15-16 years old)	9-item SPAS	1. BMI 2. Physical self-perceptions (general physical self-worth, sport competence, body appearance,	Small but significant group increases in BMI and SPA, and significant decreases in sport, conditioning, strength physical self-perceptions and PA. Strong

					physical conditioning, physical strength) 3. Dietary restraint 4. Self-reported PA	significant correlations between change in body appearance self-perceptions and change in SPA (r = -0.54).
Crocker, Sabiston, Kowalski, McDonough & Kowalski (2005)	Investigate changes and relationships among BMI, self-esteem, physical self-perceptions, PA, dietary restraint and SPA	Longitudinal survey (24 month)	501 adolescent females	9-item SPAS	1. BMI 2. Physical self-perceptions (general physical self-worth, sport competence, body appearance, physical conditioning, physical strength) 3. Self-reported PA 4. Dietary restraint	Very small changes in SPA and physical self-perceptions over time. Small significant increases in BMI, decreases in PA. Specific self-perceptions impact specific behaviours and SPA more than impact of behaviour/emotion on self-perceptions.
Crozier (2012)	Examine effect of self-presentational efficacy on SPA during 1-repetition maximum (RM) test.	Randomized control trial (trainer manipulation)	91 college males with minimum 6-months of weight training experience	9-item SPAS-State	1. Impression of trainer 2. Drive for muscularity 3. Maximal strength performance 4. Perceived exertion 5. Impression motivation	Self-presentational efficacy manipulation was not successful; Group with muscular trainer reported higher SPA and attained higher 1-RM score.
Cumming & Thogersen-Ntoumani (2011)	Examine role of self-presentational cognitions in relationship between SPA and exercise behavior	Cross-sectional survey	331 adolescent females	9-item SPAS	1. Impression motivation 2. Self-presentational efficacy 3. Self-presentational outcome value 4. Exercise frequency	Self-presentational efficacy expectations moderated the relationship between SPA and exercise frequency. SPA was negatively related to exercise frequency when self-presentational efficacy expectations were high.
Davis, Brewer & Weinstein	Examine the relationship between	Pre-post test and	71 college aged men	12-item SPAS	1. Trait anxiety 2. Body esteem	Appearance anxiety had a weak inverse relationship

(1993)	appearance anxiety and PA participation in males	manipulation of appearance and physique anxiety			(upper body strength, physical attractiveness, physical condition) 3. Body dissatisfaction 4. Physical evaluation stress 5. Physical activity participation 6. % body fat 7. Heart rate	to PA participation. Appearance anxiety was predictive of self-reported distress during a body composition valuation, despite results from physiological measures.
Diehl, Brewer, Van Raalte, Shaw, Fiero & Sorensen (2001)	Examine the relationship between social psychological factors and exercise partner preference	Cross-sectional survey	97 females (graduate students, faculty, health professionals, spouses)	9-item SPAS	1. Exercise partner preference 2. Social discomfort	Significant effect for SPA and perceived social discomfort, which influenced the selection of an exercise partner.
Eklund & Crawford (1994)	Investigate the relationship between SPA and exercise among women	Post manipulation design	94 college females	12-item SPAS	1. Percent body fat 2. Weight satisfaction 3. Reasons for exercise 4. Exercise behaviors and preferences 5. Attitudes toward exercise settings	Self-presentational reasons for exercise were positively associated with SPA, after controlling for body composition. SPA was not associated with favorability of attitudes toward either video presentation.
Finkenberg, DiNucci, McCune, Chenette & McCoy (1998)	Examine link between commitment to PA and SPA	Cross-sectional survey	108 college female athletes; 87 kinesiology majors; 63 control group	12-item SPAS	1. Commitment to PA	Commitment to PA in the control group was significantly lower than other groups. Means of SPA were significantly higher in control group.
Focht & Hausenblas (2001)	Examine psychological responses (ie. SPA) following episode of aerobic exercise	Pre-post exercise manipulation	50 young females	9-item SPAS	1. BMI 2. State anxiety 3. Exercise induced feelings 4. Leisure time	Aerobic exercise and quiet rest were associated with decreases in state anxiety and aerobic exercise was associated

					exercise 5. Body composition 6. Ratings of perceived exertion	with increase in positive engagement. These changes did not vary as a function of SPA.
Focht & Hausenblas (2003)	Examine state anxiety and perceived arousal response to self-selected or imposed-intensity bouts of exercise	Randomized exercise control trial	30 female college students with high SPA	9-item SPAS	1. Self-reported exercise 2. State-trait anxiety 3. Perceived arousal 4. Perceived exertion 5. Perceived evaluative threat	Perceived arousal increased during both exercise conditions, but state anxiety was elevated only during naturalistic exercise condition. No significant differences in perceived arousal and state anxiety between two groups.
Focht & Hausenblas (2004)	Examine the influence of environmentally-induced perceptions of evaluative threat on state anxiety during exercise in women with high SPA	Pre-post exercise manipulation with physique evaluative threat	30 female college students	9-item SPAS	1. Self-reported exercise 2. State anxiety 3. Perceived evaluative threat	Women reporting the lowest baseline anxiety and highest perceived evaluative threat exhibited the greatest increase in state anxiety while exercising in the naturalistic environment.
Focht & Hausenblas (2006)	Examine the influence of acute exercise performed in public and private exercise environment upon feeling states	Randomized exercise control trail	30 college female students with high SPA	9-item SPAS	1. Self-reported exercise 2. Affective states 3. State anxiety 4. Heart rate 5. Body composition 6. Perceived evaluative threat	Exercising in public environment resulted in negative feeling states and exercising in private resulted in positive feeling states in response to exercise. Perceptions of evaluative threat mediated state anxiety response to exercise
Fredrick & Morrison (1996)	Examine SPA associations with attitudes toward exercise, adherence	Cross-sectional survey	326 (n = 127 males; n = 199 females) college fitness-centre	12-item SPAS	1. Gender 2. Self-reported PA 3. Exercise adherence and	Women scored higher on SPA. Individuals with higher SPA scored higher on extrinsic motives for

	behaviors, motivation, and attitudes toward exercise.		participants		attitudes 4. PA motivation	exercise, higher exercise adherence. High SPA scores indicated higher public body awareness.
Gammage & Gabriel (2009)	Examine relationships between trait self-presentational concerns and performance on 1-RM test	Cross-sectional survey & physical strength test	96 physically active university students (n = 50 females, n = 46 males)	9-item SPAS	1. Gender 2. Hours PA 3. Force 4. Fear of negative evaluation 5. Weight training experience	After adjusting for weight training experience, men scored higher on force and women scored higher on SPA. For men, fear of negative evaluation significantly predicted force.
Gammage, Hall & Martin Ginis (2004)	Examine relationship between cognitive manifestations of self-presentation and exercise behavior	Cross-sectional survey	235 college female exercisers	9-item SPAS	1. Self-presentational efficacy 2. Impression motivation 3. Exercise imagery	High frequency exercisers reported higher levels of efficacy expectancy, outcome value and exercise imagery. Efficacy expectancy, outcome expectancy and appearance imagery accounted for significant variance in SPA.
Gammage, Martin Ginis & Hall (2004)	Examine influence of self-presentational efficacy on SPA in an exercise context	Post manipulation	68 college female exercisers	9-item SPAS	1. Impression motivation 2. Self-presentational efficacy 3. Aerobics experience 4. Task self-efficacy 5. State social anxiety in exercise 6. Physical appearance anxiety	Individuals in low efficacy group showed higher levels of SPA, physical appearance anxiety and social anxiety, than those in high efficacy group.
Grieve, Jackson, Reese,	Examine relationships	Cross-sectional	134 college male students	12-item SPAS	1. Reasons for exercise	Men with higher levels of SPA exercised more for

Marklin & Delaney (2008)	between SPA and reasons for exercise, symptoms of muscle dysmorphia and self-esteem among males	survey			2. Muscle dysmorphia 3. Global self-esteem	self-presentational reasons rather than fitness or recreational reasons, reported more symptoms of muscle dysmorphia and reported lower self-esteem.
Hagger, Hein & Chatzisarantis (2011)	Test relation between physical self-concept, SPA and approach and avoidance achievement goals in PA	Cross-sectional survey	243 (166 females; 77 males) college students	8-item SPAS	1. Physical self-concept 2. Self-reported PA	Physical self-concept was positively related and SPA negatively related to approach goals in PA. Relationshisp between physical self-concept, SPA and achievement goals were stronger among regular exercisers.
Hausenblas & Martin (2000)	Examine correlates of SPA among individuals who instruct in high social evaluative setting	Cross-sectional survey	286 female aerobic instructors	9-item SPAS	1. Age 2. BMI 3. Years of experience 4. Motive for instructing (leadership, affect enhancement, self-presentational)	BMI, age and motive for instructing were significant correlates of SPA. Females who instructed for self-presentational motives had significantly higher SPA compared to women who instructed for leadership and affect enhancement motives. Years of experience instructing was unrelated to SPA.
Katula, McAuley, Mihalko & Bane (1998)	Examine if exercise environments of differing evaluative potential influence exercise self-efficacy	Pre-post design with exercise environment manipulation	34 college students (16 males, 18 females)	9-item SPAS	1. Gender 2. BMI 3. % body fat 4. Hip, waist circumference 5. Physical activity 6. Exercise history 7. Physical self-efficacy	Women's efficacy expectations relative to exercise significantly declined in mirror condition compared to men. Exercise history, gender, aerobic power, SPA and self-efficacy predicted self-efficacy in

						mirrored condition but not in lab or natural conditions.
Kowalski, Crocker & Kowalski (2001)	Assess if SPA moderated relationship between physical self-perceptions and PA involvement	Cross-sectional survey	354 female college students	12-item SPAS	1. Physical self-perceptions 2. 7-day PA recall 3. Leisure-time exercise	Both PA measures were significantly negatively related to SPA and all physical self-perceptions. SPA did not add unique variance in predicting PA.
Koyuncu, Tok, Canpolat & Catikkas (2010)	Assess relationship between SPA, body image dissatisfaction, self-esteem and body fat ratio	Cross-sectional survey	290 female exercisers and non exercisers	12-item SPAS	1. Exercise status 2. Body image satisfaction 3. Self-esteem 4. Body fat	Significant negative relationships found between SPA and body image satisfaction and self-esteem. Exercising behavior had a moderating effect on SPA, body image satisfaction and self-esteem.
Kruisselbrink, Dodge, Swanburg & Macleod (2004)	Examine situational SPA and immediate exercise intentions	Cross-sectional survey	51 male, 80 female, members of coed fitness facility	9-item SPAS	1. Gender 2. Exercise intentions	Women displayed higher levels of situational SPA. For women, SPA increased significantly from an all-female, to mix sex to all-male exercise setting. Participants who shortened workouts also reported higher SPA.
Lamarche, Gammage & Gabriel (2011)	Examine influence of experimenter gender on SPA and muscle strength in lab environment	Pre-post manipulation	50 male, 50 female college students	9-item SPAS	1. Gender 2. Muscle strength 3. Social anxiety	Women scored significantly higher in SPA than men. Men had significantly higher muscle strength than women. The gender of the experimenter did not influence SPA or muscle strength.

Lamarche & Gammage (2010)	Examine the impact of the exercise leader's gender on self-presentational concerns of females in exercise class.	Pre-post exercise manipulation (sex of instructor)	87 female college non-or infrequent exercisers	9-item state SPA	1. BMI 2. PA behavior 3. Sex of instructor 4. Self-presentational efficacy 5. State social anxiety	All participants reported significantly higher self-presentation efficacy and lower state anxiety and lower state SPA post-exercise.
Lanning, Bowden, Owens, Massey-Stokes (2004)	Assess effects of PA and perceived fitness on SPA in older individuals	Cross-sectional survey	249 individuals 60 years or older	12-item SPAS	1. Gender 2. Self-reported PA 3. Perceived fitness	No significant effects of perceived fitness or age on SPA. Women had significantly higher SPA than men.
Lantz, Hardy, Ainsworth (1997)	Determine the relationship between SPA and exercise behavior	Cross-sectional survey	120 males and 180 female (18-60 years old)	12-item SPAS	1. Gender 2. Age 3. Depression 4. Self-reported PA	SPA and PA relationship was strongly positively related in males. Exercise behavior was predicted by SPA, gender, age and depression; SPA is negatively related to exercise behaviur and this relationship is moderated by gender, age and depression.
Lindwall & Lindgren (2005)	Examine the effects of 6-month exercise intervention on physical self-perceptions and SPA	Randomized control trail	27 female adolescents in intervention group, 35 in control group	12-item SPAS	1. Body composition 2. Physiological fitness 3. Physical self-perceptions	Increases in physical self-perceptions and decreases in SPA in intervention group were reported compared to control. Changes in self-perceptions and SPA were not linked to changes in physiological variables.
Magnus, Kowlaksi & McHugh (2010)	Examine role of self-compassion on women's SPA and motives to exercise	Cross-sectional survey	252 female exercisers	9-item SPAS	1. Self-esteem 2. Self-compassion 3. Exercise motivation 4. Obligatory	Self-compassion was positively related to intrinsic motivation and negatively related to external and introjected

					5. exercise behavior Goal orientation	motivation, SPA and obligatory exercise.
Martin Ginis, Eng, Arbour, Hartman & Phillips (2005)	Examine sex differences in body image change over course of 12-week strength training program	Prospective longitudinal with exercise program	42 university students (28 males, 16 females)	9-item SPAS	1. Body area satisfaction 2. Drive for muscularity 3. Body fat % 4. Muscularity and strength	Significant body image improvements across both sexes. For men, body image improvements were correlated only with subjective physical changes. For women, body image improvements were correlated with subjective and objective increases in strength.
Martin Ginis, Jung & Gauvin (2003)	Examine effects of a mirrored exercise environment and body image concerns on changes in exercise-induced feeling states and self-efficacy.	Pre-post exercise with mirror manipulation	58 sedentary females	9-item SPAS	1. Mirror 2. Feeling states 3. Self-presentational SPA 4. Self-efficacy	Regardless of level of body image concern, females in mirrored condition felt worse after exercising than women in unmirrored condition. No effects of environment or body image on self-efficacy.
Martin Ginis, Prapavessis & Haase (2008)	Examine effects of exposure to physique-salient and physique non-salient exercise videos and moderating influence of perceived physique discrepancies on body image, self-presentational concerns and exercise motivation.	Pre-post exercise condition with video instructor attire manipulation	80 inactive young adult females	9-item state SPA	1. Physique-salience in video 2. Body satisfaction 3. Body evaluations 4. Self-presentational efficacy 5. Exercise motivation 6. Perceived discrepancies with instructor	No main or moderated effects emerged for video condition. Greater perceived negative discrepancies were associated with poorer post-exercise body satisfaction and body evaluations and higher state SPA. No effects on self-presentational efficacy or motivation.
McAuley,	Examine	Pre-post	56 sedentary	12-item SPAS	1. Gender	After the exercise

Bane, Rudolph & Lox (1995)	relationships among body composition, exercise participation and SPA in middle-aged sedentary sample	exercise 20-week manipulation	males, 58 sedentary females (ages 45 – 64)		2. Age 3. Body composition 4. Exercise behavior	program, subjects reduced weight, body fat, body circumference and SPA. Reductions in SPA were higher in females and older individuals. Exercise frequency was a non-significant predictor of SPA when controlling for body composition.
McAuley, Marquez Jerome, Blissmer & Katula (2002)	Examine effect of 6-months of PA and 6-month follow-up on SPA	Longitudinal randomized control trial	174 older adults (60 years & sedentary)	9-item SPAS	1. Group (aerobic exercise or strength control group) 2. Physical self-efficacy 3. Body composition 4. Aerobic capacity 5. PA participation	Significant reductions in SPA over 12-months, controlling for treatment group. Improvements in self-efficacy and fitness were significant predictors of SPA change; exercise frequency was not associated with SPA
Melbye, Tenenbaum & Eklund (2008)	Examine self-objectification and SPA in relation to exercise behavior	Cross-sectional survey	291 females (ages 18-74 years)	7-item SPAS (Motl & Conroy, 2000)	1. Age 2. Self-objectification 3. Exercise behavior (apparel; location; company) 4. Body shame 5. Body surveillance 6. Body control	Females lower in self-objectification reported exercising more, wearing more concealing exercise apparel and preferring outdoor locations. Females with higher self-objectification also reported higher SPA, but there was no significant correlation with exercise behavior.
Mulazimoglu-Balli, Koca & Asci (2010)	Investigate the difference in SPA among competitive athletes, exercisers and non-exercisers.	Cross-sectional survey	255 exercisers, 261 competitive athletes, 350 non-exercisers	7-item Turkish version of SPAS	1. Gender 2. Level of exercise	Significant differences in SPA with regard to sex, with men having lower SPA scores. Significant differences on sport involvement, with competitive athletes and

						exercisers having lower SPA than non-exercisers.
Niven, Fawkner, Knowles, Henretty & Stephenson (2009)	Examine the influence of maturation on SPA, relationship between SPA and PA and influence of motives for PA.	Longitudinal (6-month) survey	162 adolescent girls	9-item SPAS	1. Age 2. Motives for PA 3. Self-reported PA	Girls became less active across 6 months and girls at early stages of maturation had significantly lower SPA than girls in middle or late stages. SPA was not related to current or future PA. Different motive profiles were identified, with the high appearance and fitness group demonstrating negative relationship between SPA and PA.
Raedeke, Focht & Scales (2007)	Examine if social-environmental factors influenced the psychological responses to participation in females with heightened body image concerns.	Randomized control trial with exercise manipulation	99 female college students with high SPA	9-item SPAS	1. Leadership style 2. Mirror presence 3. Affective response 4. Enjoyment 5. Self-efficacy 6. PA intentions	Females with high SPA in health oriented class report more positive affective experiences than those in appearance oriented class. These females enjoyed exercise more and reported higher intentions for future PA; Mirrors did not influence responses.
Raedeke, Focht & Scales (2009)	Examine if enjoyment or task self-efficacy mediates the relationship between exercise environment and affective responses and intentions to exercise	Randomized control trail with exercise manipulation	99 female college students with high SPA	9-item SPAS	1. Health vs. appearance leadership 2. Affect 3. Task self-efficacy 4. Enjoyment PA intentions	In women with high SPA, enjoyment mediated the relationship of class atmosphere on affect (revitalization and exhaustion). Enjoyment partially mediated the relationship of class orientation with engagement and future intentions. Task self-

						efficacy was an independent predictor of affective responses and intentions, but it did not significantly mediate the effect of social environment on outcomes in women with high SPA.
Ransdell, Wells, Manore, Swan & Corbin (1998)	Examine SPA in postmenopausal women relative to leisure time physical activity and in relation to body composition correlates.	Cross-sectional survey with body composition measures	164 females (50 years or older, postmenopausal)	12-item SPAS	1. Age 2. Leisure time PA 3. % Body fat 4. Body fat distribution 5. Hormone replacement therapy	Females who expended more than 500kcal/week had significantly higher SPA than women who expended more than 2000 kcal/week, independent of % body fat. Women with more than 37.5% body fat had significantly higher SPA that those with less than 37.5% body fat. Women with upper body fat distribution had higher SPA than women with lower distribution. No significant differences in SPA relative to age or hormone replacement therapy.
Russell (2002)	Examine the relationship between SPA, self-esteem, body satisfaction across males of different exercise frequency and racial background	Cross-sectional survey	557 male college students differing in exercise frequency and racial background (407 Caucasian, 150 African-American)	12-item SPAS	1. BMI 2. Self-esteem 3. Body satisfaction 4. Strength training frequency 5. Aerobic exercise frequency 6. Race	Significant overall interaction between race and weight training on SPA, self-esteem and body satisfaction. Caucasian, BMI, body dissatisfaction and self-esteem were significant correlates of SPA. Exercise frequency was not related to SPA.

Russell & Cox (2003)	Examine the relationship between SPA and body dissatisfaction, self-esteem, weight-discrepancies and exercise frequency in terms of race	Cross-sectional survey	168 female college student (63 African-Americans, 105 Caucasians)	12-item SPAS	1. Race 2. BMI 3. Exercise frequency 4. Weight discrepancies 5. Body dissatisfaction 6. Self-esteem	African-American females had significantly lower SPA, body dissatisfaction and higher self-esteem compared to Caucasian females. Perceived weight discrepancy was more predictive of SPA in Caucasians than African-Americans but was equally significant in predicting body dissatisfaction across racial background.
Sabiston & Chandler (2009)	Examine the effect of exposure to fitness advertising on weight and body shape dissatisfaction, SPA and exercise motives	Randomized control trial with fitness advertising manipulation	185 healthy weight female college students	9-item SPAS	1. Age 2. BMI 3. Body weight and shape satisfaction 4. Exercise motives 5. Advertising manipulation	No significant main effects for group or time on weight and body shape dissatisfaction, SPA or exercise motives. A group by time interaction for affective body image, with females exposed to model-focused fitness reporting higher SPA.
Sabiston, Crocker & Munro-Chandler (2005)	Examine current-ideal discrepancy scores and exercise motivation as predictors of SPA	Cross-sectional survey	296 female college students (regular exercisers)	9-item SPAS	1. BMI 2. Self-discrepancies 3. Exercise motives	BMI, self-discrepancies, and exercise motives were significant correlates of SPA.
Sinden, Martin Ginis & Angrove (2003)	Examine effects of exercise attire on older women's feelings toward exercise groups and self-presentational efficacy	Pre-post exercise video manipulation	81 community-dwelling females (age 53 to 84 years)	12-item SPAS	1. Attire in video 2. BMI 3. Self-reported exercise 4. Self-presentational efficacy 5. Feeling towards	No differences in feeling states toward exercise groups, but women who were more active had more positive feelings toward revealing attire group than women who were less active. No main

					exercise group	effect for exercise attire on self-presentational efficacy but women with higher SPA reported lower self-presentational efficacy after watching revealing attire.
Spink (1992)	Examine the relationship between SPA to location of PA	Cross-sectional survey	37 nursing students participating in a fitness program	12-item SPAS	1. Exercise setting	Females that reported higher SPA were more likely to exercise in private than publicly.
Strong, Martin Ginis. Mack & Wilson (2006)	Examine the relationship between self-presentational exercise motives and SPA. Also, examine if gender moderates relationship between self-presentational exercise motives and SPA.	Cross-sectional survey	320 female, 154 male college students	12-item SPAS	1. Gender 2. BMI 3. Exercise motivation (weight management, appearance, strength and endurance, social recognition competition)	Significant relationship between self-presentational exercise motives and SPA. Interaction between weight management and gender was a positive predictor of SPA.
Thogersen-Ntoumani & Ntoumanis (2006)	Examine if amotivation, self-determined and controlling motivation could predict exercise related behaviors, cognitions and physical self-evaluations.	Cross-sectional survey	375 health club exercisers	12-item SPAS	1. Age 2. Sex 3. Exercise motivation 4. Barrier self-efficacy 5. Physical self worth	Self-determined motivation (intrinsic an identified regulation) predict more adaptive behavioral, cognitive and physical self-evaluations like SPA than external regulation and amotivation.
Treasure, Lox & Lawton (1998)	Investigate if SPA could be a predictor of exercise adherence in obese females	Post-manipulation (exercise program)	31 sedentary and obese (BMI >26) female university students, staff and faculty	12-item SPAS (modifying 2 items to reflect a positive statement)	1. Age 2. % body fat 3. BMI 4. VO_2 5. Resting heart rate 6. Program adherence	SPA was positively correlated to BMI, body fat and negatively correlated to adherence and age. Age and SPA were significant predictors of exercise

						program adherence.
Van Raalte, Cunningham, Cornelius, & Brewer (2004)	Examine the relationship between SPA and environmental factors	Cross-sectional survey & manipulation	225 college students (study 1); 70 female, 50 male exercisers	9-item SPAS	1. Gender 2. Exercise environment	SPA was significantly greater in the fitness center and dining hall than in the library. SPA was significantly greater in the fitness center than in the library among exercisers and females had significantly higher SPA than males.
Walton & Finkenberg (2002)	Comparison of SPA between new members of all-female facilities compared with new members of coed facilitates	Cross-sectional survey	71 female new members of all-female facilities, 43 female new members from coed facilities	9-item SPAS	1. Sex of facility members	SPA was not significantly different among females attending female-only or coed facilities.
Woodgate, Martin Ginis & Sinden (2003)	Examine self-presentational efficacy as potential moderator between SPA and PA	Cross-sectional survey	81 community-dwelling women (age 53 to 84 years)	12-item SPAS	1. BMI 2. Age 3. Leisure PA Self-presentational efficacy	SPA, self-presentational efficacy and SPA & self-presentational efficacy were significant predictors of PA. SPA was negatively correlated with activity only for women with high self-presentational efficacy and unrelated to activity for females with low self-presentational efficacy.
SPORT CONTEXT						
Cox, Lantz & Mayhew (1997)	Examine SPA as a potential predictor of disordered eating behaviors	Cross-sectional survey	180 college students comparing athletes and non-athletes	12-item SPAS	1. Gender 2. Body fat 3. Eating behaviors	SPA, gender and body fat were significant predictors of disordered eating behaviors. No significant differences in correlates in athletes and non-athletes.
Crocker,	Examined	Cross-	101 elite female	12-item SPAS	1. Physical self-	SPA was significantly

Snyder, Kowalski & Hoar (2000)	relationship between physical self-concept and SPA in high performance Canadian adolescent female athletes	sectional survey	athletes	used but SPA scores calculated using 9 items	perceptions including global self-worth, physical self-worth, appearance, body fat, coordination, endurance, sport competence, strength, health, physical activity, strength, flexibility	correlated with various physical self-perceptions and physical self-worth; no differences in SPA scores between athletes in different types of sports. Body fat perception was a strong correlate of SPA.
Cumming & Duda (2012)	Examine relationships between perfectionism and body-related concerns and psychological health.	Cross-sectional survey	194 vocational dance students (196 females, 25 males)	9-item SPAS	1. Perfectionism 2. Affect 3. Physical symptoms 4. Athlete burnout (physical symptoms, emotional and physical exhaustion)	Dancers with adaptive achievement tendencies demonstrated greater psychological adjustment (low SPA, higher positive affect). Dancers with greater concerns over mistakes and high doubts reported greater psychological distress (high SPA, high negative affect).
Greenleaf (2004)	Examine weight and physical appearance pressures and SPA in collegiate synchronized skating.	Cross-sectional survey	86 collegiate synchronized skaters	12-item SPAS	1. Weight-related pressures 2. Ideal skating physique	Skaters experienced moderate weight pressures related to synchronized skating, as well as moderate levels of SPA.
Haase & Prapavessis (2001)	Compare SPA among different female groups and examine relations between SPA and disturbed eating attitudes	Cross-sectional survey	215 females (63 = physique salient sport; 60 = weight restricted sport; 75 = non-physique salient sport athletes; 53 = non athletes)	9-item SPAS	1. Eating attitudes 2. Sport	SPA scores did not differ among different female groups (physique salient athletes, non-physique salient athletes and non-athlete students). Significant relationship between SPA and eating

						attitudes for all four groups, however interactions were not significant suggesting that type of sport does not moderate SPA and disordered eating.
Haase, Prapavessis & Owens (2002)	Examine the relationship between positive and negative perfectionism and SPA, and the extent to which these two variables predict disturbed eating attitudes	Cross-sectional survey	316 male and female athletes	12-item SPAS	1. Positive and negative perfectionism 2. Eating attitudes 3. Social desirability	Negative perfectionism was significantly related to SPA in both male and females. For females, negative perfectionism and SPA contributed to the prediction of disturbed eating attitudes.
Hausenblas & Mack (1999)	Examine physical self-presentational and eating disorder correlates among female divers	Cross-sectional survey	114 females (36 elite female divers; 39 athletic group; non-athletic control group)	12-item SPAS	1. BMI 2. Eating disorder symptoms 3. Athletic group	Divers had significantly lower SPA compared to athletic control and the nonathletic control. The groups did not differ significantly on eating disorder symptoms.
Hurst, Hale, Smith & Collins (2000)	Investigate psychological correlates (SPA) of exercise dependence in experienced and inexperienced bodybuilders and weightlifters.	Cross-sectional survey	35 experienced body builders, 31 inexperienced bodybuilders, 23 weightlifters	12-item SPAS	1. Bodybuilding dependence 2. Bodybuilding identity 3. Social support	Experienced bodybuilders scored significantly higher than inexperienced bodybuilders and weightlifters on bodybuilding dependence, social identity, social support, and lower on SPA.
Krane, Stiles-Shipley, Waldron & Michalenok (2001)	Examine body satisfaction and related concerns in sport and exercise settings	Cross-sectional survey	198 female aerobic exercisers; 204 female college athletes (divided based on	12-item SPAS	1. Exercise status 2. Athletic uniform 3. Body dissatisfaction 4. Drive for thinness	Exercisers and athletes in different uniforms did not differ in body dissatisfaction, drive for thinness, bulimia or SPA.

			how revealing sports' athletic uniform)		5. Bulimia 6. Perfectionism 7. Time spent exercising	These measures were not significant predictors of time spent exercising. Body dissatisfaction and drive for thinness were the strongest predictors of SPA in both exercisers and athletes.
Martin (1999)	Examine predictors of SPA in adolescent swimmers with physical disabilities	Cross-sectional survey	57 adolescent swimmers (27 females, 30 males)	12-item SPAS	1. Countries 2. Gender 3. Disabilities 4. Athletic identity (social identity, exclusivity and negative affect) 5. Self-esteem	Significant differences in SPA between countries and among disabilities but not gender. Self-esteem and self-identity were the best predictors of SPA but gender, country and type of disability were not significant.
Martin & Mack (1996)	Examine the relationship between SPA and physical self-presentation confidence on sport competition trait anxiety.	Cross-section survey	146 university students (93 females; 53 males) with history of sport involvement	12-item SPAS	1. Age 2. Gender 3. Physical self-presentation confidence 4. History of sport involvement 5. Sport competition anxiety	Women's sport competition anxiety was significantly correlated with SPA and physical self-presentational confidence.
Monsma, Pfeiffer, Karin & Malina (2008)	Examine the relationship between SPA and biological predictors among participants in aesthetic sports	Cross-sectional survey	159 adolescent and young adult female enrolled in sports (skating, dancing, diving)	12-item SPAS	1. Age 2. Weight 3. BMI 4. Skin folds 5. Somatotype	Age, body weight, BMI, and skin folds were significant predictors of SPA, and stronger than somatotype.
Reel & Gill (1996)	Examine psychosocial factors related to eating disorders in female cheerleaders	Cross-sectional survey	157 female cheerleaders (73 college students, 84 high school students)	12-item SPAS	1. School level 2. Body dissatisfaction 3. Eating behaviors 4. Pressures in	Strong relation between SPA, body dissatisfaction and eating behavior. High school cheerleaders reported fewer pressures

					cheerleading	but exhibited greater body dissatisfaction and disordered eating
Reel & Gill (2001)	Identify weight stressors in swimming, prevalence of weight concerns and relation to SPA	Cross-sectional survey	62 female swimmers	12-item SPAS	1. Weight pressures in swimming	
Schwerin, Corcoran, Fischer, Patterson, Askew, Olrish & Shanks (1996)	Examine SPA, upper body esteem, social anxiety and body dissatisfaction among various groups	Cross-sectional survey	185 males from USA (ages 17-49), anabolic steroid-using bodybuilders, non-using bodybuilder, athletically active individual, non-athletically active individuals	12-item SPAS	1. Exercise group 2. Steroid use 3. Upper body esteem 4. Social anxiety 5. Body dissatisfaction	Bodybuilders that use anabolic steroids had significantly lower levels of SPA than non-users. No significant differences among groups on social anxiety.
Smith, Wright & Winrow (2010)	Examine differences in exercise dependence and SPA between competitive and non-competitive runners	Cross-sectional survey	184 distance runners	9-item SPAS	1. Gender 2. Exercise dependence 3. Running addiction	No significant between group differences in SPA and no significant differences between males and females.
Van Raalte, Schmelzer, Smith & Brewer (1998)	Explore relationships among SPA, type of sport participation and body size in female athletes.	Cross-sectional survey	Study 1 - 104 female rowers Study 2 – 113 competitive female swimmers	12-item SPAS	1. Sport type 2. Level of sport 3. Weight class	In study 1, no significant differences in SPA among female rowers in regard to elite status and weight class. In study 2, NCAA division 1 swimmers had lower SPA than recreational swimmers and that lightweight simmers had lower SPA than heavyweight simmers.
PHYSICAL EDUCATION CONTEXT						

Cox, Ullrich-French, Madonia & Witty (2011)	Examine associations of social relationships with teachers and peers to SPA and motivation in physical education	Cross-sectional survey	146 high school physical education students	9-item SPAS	1. Perceived teacher support 2. Perceived teacher support 3. Perceived peer acceptance 4. Presence of friends 5. Motivation regulations 6. Self-reported effort 7. Participation avoidance	Perceived peer acceptance was a negative predictor of SPA. Individual motivation regulations did not mediate SPA and PA behavior (effort, participation, avoidance). SPA was a negative predictor of autonomous motivation and positive predictor of external regulation, amotivation and participation avoidance.
Cox, Ullrich-French & Sabiston (2013)	Examine how SPA and motivation regulations influence effort and enjoyment in PE and leisure PA	Cross-sectional survey	298 high school students	8-item SPAS	1. Motivation 2. Enjoyment 3. Effort 4. Self-reported PA behavior	Four profiles were identified with combinations of motivation and level of SPA. Externally controlled and high SPA individuals reported lowest PA and PE effort and enjoyment.
Koca & Asci (2006)	Examine SPA with regard to gender composition of physical education classes	Cross-sectional survey	1807 adolescents (936 females, 871 males)	12-item SPAS	1. Gender 2. Attitude towards PE 3. Gender composition of class	SPA did not differ according to gender composition of PE class. Significant difference in class preference, with most females who had high SPA preferring non-coed classes.
Mookerjee, Singh & Cash (2002)	Compare anthropometric profiles and SPA of physical education professionals	Cross-sectional survey	182 male physical educational professionals from India	12-item SPAS	1. BMI 2. Skinfolds 3. Waist/hip ratio	No significant differences between groups on SPA. No significant relationship between SPA and anthropometric measures.
Yin & Ryska	Assess if there are	Post-	112 high school	12-item SPAS	1. Sex of exercise	No significant differences

(1999)	differences in agility and coordination performance, SPA, perceived competence and enjoyment when performing in mixed-sex versus all-female physical education classes.	manipulation (sex of exercise group)	students in physical education classes (56 assigned to control		group 2. Psychomotor performance (agility and coordination) 3. Perceive competence 4. PA enjoyment	between groups on performance, perceived competence and SPA. Mixed-sex group reported significantly greater enjoyment on both tests than the all-female group.
MEASUREMENT						
Eklund, Mack & Hart (1996)	Testing the factorial structure of SPAS	Cross-sectional (instrument testing)	760 young adult females	12-item SPAS	N/A	Cross-validation revealed the most appropriate model to have two first-order factors subordinate to one second order factor. Results challenge idea that SPAS is unidimensional.
Eklund, Kelley & Wilson (1997)	Replicate findings on adequacy of SPA higher order factor model with young men and evaluate efficacy of modifying Item 2. Also, evaluate SPAS for factorial invariance across gender.	Cross-sectional (instrument testing)	410 college students	12-item SPAS	Gender	Two first-order factors subordinate to one second-order factor are appropriate for use with young men and women. As expected, item 2 performed poorly and original version should not be used. Routine implementation of item 2 modification is appropriate. No gender sensitivity in SPAS factor structure.
Hagger, Asci, Lindwall, Hein, Mulazumoglu-Ball, Tarrant, Pastor Ruiz & Sell (2007)	Evaluate cross-cultural generalizability of SPAS in European nations	Cross-sectional survey (instrument testing)	College students (Britain n = 1398, Estonia n = 356, Spain n = 291, Sweden n = 442, Turkey n = 313)	8-item SPAS	Culture (British, Estonian, Swedish, Spanish, Turkish)	The 8-item SPAS exhibited good fit with British, Estonian and Swedish samples while the 7-item version was a good fit with Spanish and

						Turkish sample. British and Spanish participants reported highest SPA.
Molt & Conroy (2001)	Examine cross-validity of the 7-item uni-dimensional model to SPAS.	Cross-sectional survey (instrument testing)	Four samples of women, two retrieved from previously published studies (N = 1053)	12-item SPAS 7-item SPAS	Gender	Support for 7-item SPAS due to invariance, factor structure, factor loading, factor variance and item uniqueness across samples and across gender. Women had higher latent mean score than men.
Hagger & Stevenson (2010)	Test generalizability of the factor pattern, structural parameters, factor correlations and latent mean structure of SPAS	Cross-sectional survey (instrument testing)	n = 2334 high school and college students	12-item SPAS	N/A	Tested model satisfied criteria for goodness-of-fit, except for females aged 21 and older. Tests of invariance of factor pattern, structural parameters and correlations across age, gender and interaction were acceptable. Females had higher SPA and lower physical self-esteem than males (except 11-12 year olds).
Hagger, Stevenson, Chatzisarantis, Gaspar, Ferreira & Ravé, 2010)	Examine effects of culture, gender and age on structure and mean levels of physical self-concept and SPA in adolescents	Cross-sectional (instrument testing)	Portuguese and Spanish adolescents n = 3528	12-item SPAS	1. Gender 2. Age 3. Culture	Support for two-factor model of SPA in overall sample, within and across culture. Females had significantly higher SPA and lower physical self-concept compared to males. SPA was relatively similar in males and females in younger ages but declined in older males.
Hart, Leary &	Examine	Cross-sectional	Scale	12-item SPAS	1. Self-	SPAS demonstrated high

Rejeski (1989)	psychometric properties of Social Physique Anxiety Scale (SPAS)	survey (instrument testing)	development (n = 195 + 89 college students); construct validation (n = 187); criterion-related validation (n = 56 college females)		consciousness 2. Fear of negative evaluation 3. Interaction anxiety 4. Body cathexis Self-esteem	internal and test-retest reliability. Correlated with concerns regarding evaluation and negative feelings around the body. Women who score higher on SPAS had higher weight and body fat percentage than those who scored lower. Higher scorers also reported greater anxiety during evaluation of physique.
Molt & Conroy (2000)	Examine validity and factorial invariance of SPAS	Cross-sectional survey (instrument testing)	College students (female = 146, male = 166) in lecture (n = 103) and physical activity courses (n =209)	12-item SPAS 9-item SPAS 7- item SPAS	1. Physical self-efficacy 2. Body surveillance Social desirability	Two-factor model to 12-item SPAS was a methodological artifact representing positively and negatively worded items. The 9-item uni-dimensional model represented an acceptable fir to SPAS, but could be improved. Suggestion for 7-item uni-dimensional measure which demonstrated factorial invariance across gender and evidence of validity.
Lindwall (2004)	Examine factorial validity and invariance across gender of previously supported unidimensional factor models of SPAS.	Cross-sectional survey (instrument testing)	n = 453 Swedish college students	9-item SPAS 7-item SPAS (both versions)	1. Gender 2. Cultural variations of SPAS	The 7-item model (Molt & Conroy, 2000) had closest fit to data in both male and females. No 7-item models demonstrated invariant factor variances or item uniqueness across gender. Factor loadings were not invariant.
Maiano, Morin,	Investigate	Cross-sectional	1563 French	7-item SPAS	1. Age	Support for the item

Eklund, Monthuy-Blanc, Garbarino & Stephan (2010)	psychometric properties of SPAS in nonclinical sample.	survey (instrument testing)	adolescents		2. Gender Language	content of preliminary version of the French SPAS for adolescents. Also, support for convergent validity of the English and French versions. Lastly, support for factor validity, measurement invariance (across genders, age groups and samples), latent mean structure invariance, reliability, convergent validity and criterion-related validity.
Martin Ginis, Murru, Conlin & Strong (2011)	Examine validity of state version of SPAS	Cross-sectional survey (instrument testing)	Four separate samples of young women (n = 221) who exercise at least 2 days/week	9-item state SPAS	1. Trait SPA 2. Physical appearance state and trait anxiety 3. State body image affect and evaluation 3. BMI	Scores on the state SPAS are significantly correlated in expected directions with trait and state body image and self-presentation and BMI. Scores discriminate between women who exercise in a mixed-sex versus a same-sex environment but trait SPAS do not.
Petrie, Diehl, Rogers & Johnson (1996)	Test higher order factor model for SPAS in sample of college undergraduates and examine reliability and validity.	Cross-sectional survey (instrument testing)	Female (n = 168) and male (n = 120) college students	12-item SPAS	1. Gender 2. Body shape concerns 3. Physical self-esteem Social desirability	SPAS was well-represented by higher order model of two first-order factors underlying a single second-order factor. Model fits well for both males and females. Similar to past research, Item 2 did not load significantly on the SPAS and is suggested to be worded as a positive

						statement.
Smith (2004)	Assess factorial validity and gender invariance of SPAS in a sample of young adolescents.	Cross-sectional survey (instrument testing)	Grade 10 high school students (female = 389, male = 225)	12-item SPAS 9-item SPAS 7-item SPAS [one and two-factor truncated]	1. Gender Body satisfaction	The 12-item one-factor SPAS did not exhibit a good fit to the data, while the 12-item two-factor model and truncated models exhibit good fits. Truncated models were gender invariant and latent means on truncated models showed girls score higher on SPA than boys. The 7-item truncated model best fit the adolescent data.
OTHER PHYSIQUE-RELATED & HEALTH CONTEXTS						
Amorose & Hollembeak (2005)	Determine if appearance impression motivation moderates relationship between perceived physical appearance and SPA	Cross-sectional survey	657 college students	12-item SPAS	1. Appearance impression motivation 2. Perceived physical appearance	Positive correlation between appearance impression motivation and SPA. Negative correlation between perceived physical appearance and SPA. Appearance impression motivation moderated the relationship between perceived physical appearance and SPA.
Bas, Asci, Karabudak & Kiziltan (2004)	Determine relationship between eating attitudes and psychological correlates of SPA, trait anxiety and self-esteem	Cross-sectional survey	783 older adolescent college students	12-item SPAS	1. Eating attitudes 2. Self-esteem 3. Trait anxiety 4. Gender	Participants with disturbed eating attitudes (9.2% males; 13.1% females) had lower self-esteem, higher SPA and higher trait anxiety
Bas, Karabudak & Kizlitan (2005)	Determine if differences in exist in eating attitudes,	Cross-sectional survey	1205 adolescents aged 17-21 (608 females, 597	12-item SPAS	1. BMI 2. Time spent vegetarian	Male vegetarians had significantly higher score than male non-

	self esteem, trait anxiety and SPA in vegetarian and non-vegetarians.		males)		3. Disordered eating 4. Self-esteem 5. State-trait anxiety	vegetarians in disordered eating. No significant differences in SPA in relation to vegetarianism.
Brunet & Sabiston (2011)	Examination of SPA experiences in context of peers and parents	Cross-sectional survey	281 young adults	9-item SPAS (modified contextualized to peers and parents) 9-item trait SPAS	1. Age 2. Gender 3. BMI 4. Peer SPA 5. Parent SPA	Participants reported significantly higher peer SPA compared to parent SPA. Contextualized SPA measures were consistent with trait SPA.
Brunet, Sabiston, Dorsch & McCreary (2010)	Test a model where self-esteem includes SPA which influences drive for muscularity and thinness	Cross-sectional survey	329 adolescents	9-item SPAS	1. Gender 2. Self-esteem 3. Drive for thinness 4. Drive for muscularity	Support for a model with self-esteem significantly negatively correlated with SPA and SPA significantly related to drives for muscularity and thinness. Boys reported significantly lower drive for thinness and SPA and higher drive for muscularity and self-esteem.
Carron & Prapavessis (1997)	Examine SPA across social conditions that vary in group support	Pre-Post design with recall of anxiety-provoking situation	161 college students	12-item SPAS	1. Social conditions (alone, company of best friend, company of friend group) 2. Attractiveness of friend	Individuals with lower SPA perceived less social anxiety. Group presence reduced social anxiety associated with self-presentation. No interaction between SPA and social support conditions.
Diehl, Johnston, Rogers & Petrie (1998)	Examine link between SPA and measures of eating disorder symptoms	Cross-sectional survey	160 female colleges	11-item SPAS	1. BMI 2. Eating disorder symptoms 3. Depression 4. Self-esteem 5. Obligatory exercise	SPA and depression predicted bulimic symptomatology and SPA, depression and obligatory exercise predict anorexic symptomatology. All

						variables were positively related to eating disorder symptoms.
Fitzimmons-Craft, Harnye, Bowstone, Higgins &Bardone-Cone (2012)	Examine possible moderating factors between SPA and disordered eating	Cross-sectional survey	265 college females	12-item SPAS	1. Trait anxiety 2. Social comparison 3. Appearance-related social comparison 4. Body surveillance 5. Disordered eating	Social comparison, appearance-related social comparison and body surveillance significantly moderated the relationship between SPA and disordered eating. Trait anxiety x body surveillance interaction was significant in identifying elevated disordered eating.
Fredrick & Morrison (1998)	Examine SPA relation to social behavior inhibition and disordered eating	Cross-sectional survey	79 college female students	12-item SPAS	1. Social behavior inhibition 2. Disordered eating	Mediation analysis reveals SPA significantly moderately related to disordered eating traits and was mediated by disordered eating behavior.
Haase, Mountford & Waller (2007)	Test a meditational model of the role of SPA in the links between body checking cognitions and behaviors.	Cross-sectional survey	292 females	9-item SPAS	1. BMI 2. Body checking cognitions 3. Body checking	SPA partially mediated the relationship between body checking cognitions and body checking behaviors.
Haase & Prapavessis (1998)	Examine relationship between SPA and eating attitudes, and determine if BMI and gender moderates relationship	Cross-sectional survey	85 university students	12-item SPAS	1. Gender 2. Eating attitudes 3. Social desirability 4. Self-reported BMI	After accounting for social desirability, SPA was positively related to disturbed eating attitude. BMI and gender interact to moderate the relationship between SPA and eating attitudes.
Jordan, Smisson, Burke, Joyner	Examine SPA differences among different cultures	Cross-sectional survey	91 college female students of Euro-American (n = 67)	7-item SPAS	1. Ethnicity	Significant difference in SPA between Euro-American and African-

& Czech (2005)			and African American (n = 24) descent attending PA classes			American, with Euro-American women scoring higher.
Kowalski, Mack, Crocker, Niefer & Fleming (2006)	Explore how adolescents cope with SPA; develop a codebook for SPA coping strategies	Cross-sectional open-ended survey	398 female and 223 male adolescents	9-item SPAS	1. Gender 2. Coping function 3. State SPA	Females had significantly higher SPA and emotion focused coping. SPA was related positively to both trait SPA and number of strategies reported.
Lamarche, Kerr, Faulkner, Gammage, & Klentou (2012)	Identify and describe uncomfortable and comfortable body-related situations and responses of coping	Qualitative semi-structured interviews	23 college female students	9-item SPAS	N/A	Women reported uncomfortable body-related situations consisting of presence of others, body exposure, awareness of others' evaluations and coping with avoidance and concealing behaviors.
Lox, Osborn & Pellet (1998)	Examine if subjectively underweight females report similar psychosocial experiences as women who perceive themselves as being overweight.	Cross-sectional survey	28 college female students	12-item SPAS	1. Body dissatisfaction 2. Depression proneness 3. Self-esteem 4. Weight discrepancies 5. Body and weight preoccupations and concerns	Higher SPA was associated with lower levels of self-esteem and higher body dissatisfaction and depression, regardless of weight perception.
Mack, Strong, Kowalski & Crocker (2007)	Examine the role of peer group composition on SPA	Cross-sectional survey	375 adolescents (181 male, 194 female)	9-item SPAS	1. Gender 2. BMI 3. Exclusivity of peer network 4. Identity to peer network 5. Pressure to change 6. Body-related discussion	Females reported higher SPA, more pressure, and encouragement to alter their physique from peers, than males. Peer pressure and relative attractiveness of peers were significant predictors of SPA for both genders, and extent

					7. Weight-related pressures 8. Attractiveness relative to peers	to which individuals identified with peer network significant for females.
Marquez & McAuley (2001)	Examine relationship among SPA, self-efficacy, outcome expectations and state anxiety in situations varying physical evaluation threat.	Cross-sectional survey	103 college students (47 males, 56 females)	9-item SPAS	1. Gender 2. Physical attractiveness self-efficacy 3. Outcome expectations 4. State anxiety 5. High or low physical threat	Highest physical threat conditions and the lowest level of anxiety were reported in the low physical threat conditions. Females higher in SPA had greatest state anxiety in a physically evaluative condition. In exercise, more efficacious individuals reported less state anxiety.
Martin Ginis, McEwan, Josse & Phillips (2012)	Examine variables related to body image change among overweight and obese women	Prospective longitudinal design (weight loss program intervention)	88 overweight and obese females	9-item SPAS	1. Perceived physical changes 2. Actual physical changes 3. Self-efficacy 4. Body area satisfaction	Body image satisfaction and SPA improved significantly over study. Improved perceptions of body fat were important predictors of all outcomes.
Martin Ginis, Strong, Arent & Bray (2012)	Examine the effects of threatened social evaluation on one's physique.	Pre-post manipulation design	50 + 40 female university students	9-item SPAS & SPAS-State	1. Perceived stress 2. Physiological stress 3. BMI 4. Depression	Participants in high threat (high state SPA) condition had significantly higher post-manipulation cortisol than participants in no threat condition.
Martin, Kliber & Kulina (2006)	Examine appearance related cognitions and muscularity perceptions as correlates of SPA	Cross-sectional survey	98 male college students	12-item SPAS	1. Drive for muscularity 2. Appearance evaluation and orientation 3. % Body fat	Participants experienced moderate SPA and had positive body image cognitions. Strong significant relationship between SPA and appearance evaluation.
McCreary &	Test model of the	Cross-sectional	383 college	9-item SPAS	1. Drive for	Individuals with high

Saucier (2009)	relationship between drive for muscularity, body comparison and SPA	survey	students (182 males, 201 females)		muscularity 2. Body comparison (general, weight, muscle-related comparisons)	drive for muscularity engaged in more frequent body-related comparisons. Greater frequency of comparisons was predictive of higher SPA. Similar models for both males and females.
McHugh, Kowlalski, Mack, Crocker, Junik, Lejak & Martin (2008)	Better understand young women's experiences of SPA	Qualitative (interview, focus group, photography)	4 adolescent females	N/A	N/A	Women's experiences of SPA were described as being complex, with themes of web of emotion, uncertainly, beyond physique and resignation.
Monro & Huon (2005)	Determine the effects of media-portrayed idealized images on body shame and SPA	Pre-post magazine image manipulation	39 female college students	12-item SPAS	1. Advertisement type 2. Self-objectification Body shame	SPA increased after viewing advertisements. Significant interaction between self-objectification level and idealized body. No differences emerged for body-related compared with non-body related products.
Niefer, McDonough & Kowalski (2010)	Explore how adolescent female athletes cope with SPA.	Cross-sectional survey with qualitative narratives	73 adolescent female athletes	9-item SPAS	1. Coping strategies 2. Coping function 3. Perceived coping effectiveness 4. State SPA	Number of coping strategies was significantly associated with state SPA; Trait SPA was significantly related to avoidance coping.
Sabiston, Sedgwick, Crocker, Kowalski & Mack (2007)	Explore experiences of SPA and related coping strategies	Qualitative (semi-structured interview)	31 adolescent females (ages 13-18 years)	N/A	N/A	Main coping strategies included behavioral and cognitive avoidance, appearance management, diet, social support, physical activity, reappraisal, cognitive

						deflection and comparison to others, seeking sexual attention and substance use.
Thompson & Chad (2002)	Examine relationships of age, SPA and body image dissatisfaction to preoccupation with body weight and shape	Cross-sectional survey	77 non-obese young females (ages 7 to 16 years)	9-item SPAS	1. Preoccupation with body weight and shape 2. Pictorial body image 3. Body image dissatisfaction 4. Disordered eating 5. Drive for thinness 6. Skinfolds	SPA was moderately correlated to body image dissatisfaction and body weight and shape concerns. Young females with higher SPA preferred smaller body shape and experienced more body concerns. SPA was a stronger predictor for disordered eating, body dissatisfaction and drive for thinness than body image dissatisfaction or age.
Woodman & Steer (2011)	Explore ideal, ought and feared body image self-discrepancies as predictors of SPA.	Cross-sectional survey	100 community females	9-item SPAS	1. BMI 2. Ideal self 3. Ought self 4. Feared self 5. Depression	The relationship between ought body fat discrepancies and SPA was moderated by proximity to the feared fat self. The positive relationship between ought fat discrepancies and SPA was stronger when women were far from their feared body weight.

Note: Acronyms in table include: SPA = social physique anxiety; PA = physical activity; BMI = body mass index