

## Chapter 28 Social Physique Anxiety and Muscle Dysmorphia

Urska Dobersek & Robert C. Eklund

Social physique anxiety (SPA) and body dysmorphic disorder (BDD) have the body as a common denominator. These constructs both involve concerns with either others or one's own perceptions about the body or specific physical features; SPA involves concern about the evaluation of others while BDD involves concern over self-perceptions. This chapter provides definitions and information on diagnostic and statistical elements of SPA, BDD, and muscle dysmorphia (MD) which is a particular type of BDD. Psychological, physiological, and environmental factors implicated in the experience of these constructs are outlined as well as potential co-morbidities. Despite the wide range of physical and psychological benefits derived from exercise and physical activity, evidence suggests that these involvements can have negative effects for some individuals with SPA and MD. Consulting, counseling, and pharmacological strategies for addressing SPA and MD are outlined including commentary on cognitive behavior therapy (CBT), antidepressants (e.g., selective serotonin reuptake inhibitors), and a combination thereof.

In this chapter we first provide commentary on the theoretical background of the mechanisms that play an essential role in development of SPA and MD among exercisers and physically active individuals. Main topics and associated concepts are introduced in vignettes to illustrate experiences of SPA and MD, and how they relate to exercise and physical activity. We then describe variables that have been linked to SPA and MD, including potential causes, moderators, mediators, and other correlates. Finally, we provide theoretically grounded recommendations for the professionals working with the physically active individuals who

portray symptoms of SPA and/or MD and provide suggested readings for further exploration in the area.

### **Anna's Experiences: Social Physique Anxiety**

Anna, a 25-year old high-school teacher, felt that she was an attractive woman except, perhaps, for a few “extra” pounds. She decided that joining the fitness center to more regularly engage in exercise would put her on the path to losing those extra pounds. Anna had second thoughts, when it came time to start her membership. She started worrying that everyone in the gym would stare at her heft and that she would make a fool of herself because of her lack of knowledge on how to operate the machines. Even the thought of going to the gym started causing her to break out in a sweat, get flush, and have a racing heart. Sally, Anna's best friend, realized the distress Anna was experiencing and offered to come along to support her during her workouts. Although she still felt uneasy and anxious, she was able to get over her fears enough to attend her very first session at the gym. She still, however, felt as though she was “on display” and that everyone was critiquing her size and shape. Even so, her motivation and social support allowed her to make three workouts per week until she had finally lost 10lbs. Sally recognized Anna's progress by saying: “You look amazing! I am so proud of you and your accomplishments. You should be very proud of yourself as well.” Unfortunately, Sally was not able to accompany Anna to the gym after a few more months due to scheduling conflicts. Because Anna was uncomfortable going to the gym by herself, she gradually slid into a routine of working out at home, and walking around her neighborhood with another friend while going to the gym to a lesser extent. Before too long, Anna stopped attending the gym completely.

Anna's story is not uncommon, and certainly not rare among individuals who are new to exercise and exercise settings. Many people face similar experiences on a daily basis in their

efforts to become (more) physically active and adhere to their new exercise regimens. The additional stress of experiencing body-related anxiety, embarrassment, or even shame at the gym further undermines exercise initiation and subsequent adherence.

## **Theoretical and Empirical-Based Evidence for Social Physique Anxiety**

### **Self-Presentational Processes Lead to Development of Social Physique Anxiety**

SPA is a *self-presentational* psychosocial variable that is conceptually grounded in concerns about the extent to which others perceive our bodies in the way we prefer to be seen. At times, we may care a great deal about the impressions others form about us, while other times we may care less. When we care, we are motivated to attempt to shape those impressions in desired directions but not so much when we do not care. When motivated in social interactions, people usually seek to shape the impressions that others form in socially desirable ways. For the most part, these efforts are not inherently deceptive or manipulative but rather a matter of trying to “put one’s best foot forward.”

To explain self-presentation, Leary and Kowalski (1990) developed a two-component model involving two discrete processes. *Impression motivation* involves the desire to be perceived in certain ways by others. The extent to which individuals are motivated to control how others view them is influenced by situational and dispositional determinants that include the relevance of the impressions to the individual’s goals, the value of desired goals to the individual, and the perceived discrepancy between the desired and current images. In our vignette, Anna’s desire to be perceived as an attractive young woman could be considered impression motivation. Her interest in taking up exercise was to lose weight to that end. She experienced anxiety both in contemplating the gym and in working out there. Without her friend’s social support, she ended up dropping out despite the visible effects highlighted by her

friend Sally. Nonetheless, the importance she placed upon losing weight to appear attractive kept her trying to be active albeit in her “home environment.”

The second component of Leary and Kowalski (1990) model has to do with *impression construction*. This component deals with one’s behavioral attempts to self-present to others to create the desired impressions. These behaviors are shaped by personal attributes, attitudes, moods, social status, roles, interests, belief system, and physical states among many others. Self-concept, or, “a person’s perceptions of him- or herself” (Marsh & Shavelson, 1985, p. 107), is thought to be the primary determinant of impression construction but self-presentation does not depend only upon how people see themselves. These efforts are also influenced by how the person would like to be perceived (and/or not be perceived), the constraints on the social role the person occupies, and the person’s perceptions of the values of the self-presentational target. Moreover, the impressions people try to construct for others are always affected by their beliefs about how they are currently perceived, and by how they think others could perceive them in the future as a consequence of their present self-presentational efforts (Leary & Kowalski, 1990).

Evidence indicates that self-presentational concerns are associated with both increased and decreased exercise participation (Leary, 1992). Anna’s goal, for example, was to lose weight to appear attractive, so she was motivated to join and attend a fitness club. At the same time, however, her self-presentational concerns about being perceived as overweight, unfit, and incapable of working out properly (attributes she “knew” to be contrary to the values of regular gym members) undermined Anna’s interest in exercising at the club. Also, her unfamiliarity with operating the machines in the gym made her experience as an exerciser unpleasant.

When individuals want to make desired impressions on others but are unsure as to whether they will be perceived as intended, it is common to experience a negative affective state

termed *social anxiety* (Schlenker & Leary, 1982). According to the fifth edition of the Diagnostic and Statistical Manual (DSM-V; American Psychiatric Association, 2013), *social anxiety* is, “marked fear or anxiety about one or more social situations in which the individual is exposed to possible scrutiny by others” (p. 203). Socially anxious individuals often have unrealistically high self-standards, which in turn increase doubts that they will be able to perform successful self-presentation or impression management (Schlenker & Leary, 1985). Their cognitive appraisals tend to be focused upon the status of the self in social settings and their efforts to self-present only serve to exacerbate the intensity of their anxieties, perhaps even causing them to cope by avoidance or withdrawal. *Social physique anxiety* is a specific social anxiety having particular relevance to exercise and physical activity settings. It is the anxiety that is experienced when individuals perceive threat as a consequence of the prospect (or actuality) of physique and appearance evaluation. Exercise settings often come laden with evaluation potential about the physique because, after all, the body is central to the enterprise, and an array of others as potential observers inhabit many of the sites where exercise occurs including other exercisers, the exercise guide (e.g., personal trainer, aerobics instructor), and sometimes onlookers who are simply spectating.

### **Social Physique Anxiety**

SPA is one of the most studied self-presentational constructs in sport and exercise psychology (Martin Ginis, Lindwall, & Prapavessis, 2007). It has most typically been studied from a dispositional perspective (i.e., a trait that is relatively stable across situations).

Reasonably consistent relationships have been observed between SPA and psychological variables related to thoughts and feelings about the self. For example, SPA has been inversely associated with physical self-esteem (Hagger & Stevenson, 2010) and self-presentational

efficacy, and positively associated with body dissatisfaction (Martin Ginis, Murru, Conlin, & Strong, 2011), drive for thinness (Thompson & Chad, 2002), and muscularity (McCreary & Saucier, 2009). It has also been identified as a risk factor for psychopathologies such as depression (Woodman & Steer, 2011), disordered eating (Fitzsimmons-Craft, Harney, Brownstone, Higgins, & Bardone-Cone, 2012), and exercise dependence (Goodwin, Haycraft, Willis, & Meyer, 2011).

Perhaps unsurprisingly, SPA has been inconsistently and typically weakly linked to exercise behavior when studied as a trait or disposition. Individuals with heightened levels of SPA may, like Anna in our vignette, be motivated to engage in exercise as a consequence of their desire to lose weight, improve their appearance, and so on, but exercise settings can also come laden with evaluative risk that can stimulate exercise avoidance—at least in settings perceived to be threatening. Investigations of state SPA experiences (i.e., the “right now” experience that fluctuates on a moment-to-moment basis) in exercise have been revealing on that account. For example, Focht and Hausenblas (2004) presented evidence that women’s state SPA during exercise varies across settings according to the extent to which threat is perceived in the exercise environment. Interestingly, the environment in their study prompting the greatest perceived evaluative threat and elevations in state SPA involved a university fitness center. On that account, Martin Ginis, McEwan, Josse, and Phillips (2012) more recently investigated hormonal effects of threatened social evaluation (e.g., presence of an evaluative other, a videotaped recording, negative social comparison) of the physique. Results from this study indicated that participants in a “threatening” environment experienced significantly higher perceived self-evaluation and increased cortisol levels compared to individuals in a non-threatening environment.

## **Motives for Exercise in Relation to Social Physique Anxiety**

Individuals engage in exercise for a variety of reasons. Common reasons for exercise include improvement or maintenance of one's health and fitness, enjoyment, socializing with others, or experiencing psychological benefits associated with exercise involvement. For some individuals, being physically active can be anchored in self-presentational motives such as appearance related weight management, physical attractiveness, and/or increased muscle mass and tone (Culos-Reed, Brawley, Martin, & Leary, 2002).

Even though exercising for self-presentational reasons can encourage individuals to be physically active, they may exercise considerably less than those who exercise for the health-related reasons (Culos-Reed et al., 2002). The former is not surprising given the current aesthetic standard for women to be slender and toned and men to be lean and muscular. It is also important to note that persons who exercise primarily to alter their body shape and weight do not necessarily experience positive psychological benefits associated with exercise (Tiggemann & Williamson, 2000). In fact, exercising to improve one's appearance has been positively related with SPA (Crawford & Eklund, 1994). Additionally, research demonstrated that SPA is positively associated with introjected regulation (i.e., motivation to avoid negative emotions or to support conditional self-worth; Ryan & Deci, 2000) and negatively associated with intrinsic motivation (Thøgersen-Ntoumani & Ntoumanis, 2006).

As illustrated in the vignette about Anna, the desire to improve appearance can motivate individuals to exercise. Self-presentational concerns, however, can also serve as a barrier to exercise participation for those who have reservations about how they will be perceived while exercising in some settings. Evidence provided by Lantz, Hardy, and Ainsworth (1997) indicates that individuals with bodily insecurities can employ a variety of defense mechanisms to manage

self-presentational concerns by avoiding threatening environments and social interactions, and by minimizing their body exposure during exercise. For example, individuals who think they are overweight may not wish to be seen in swimming suits or exercise in tight clothing; individuals who believe they lack appropriate muscle mass, strength, or appropriate technique may avoid types of exercise (e.g., weight lifting) that could highlight their self-perceived inadequacies.

### **Self-Presentational Responses on the Exercise Environment**

Environmental attributes including exercise setting itself (Bain, Wilson, & Chaikind, 1989; Van Raalte, Cunningham, Cornelius, & Brewer, 2004), norms on attire, fitness leader characteristics and leadership style (Raedeke, Focht, & Scales, 2007), social composition of participants, and gender make-up of the exercise group (Kruisselbrink, Dodge, Swanburg, & MacLeod, 2004), can potentially influence psychological responses to acute bouts of exercise. Within exercise settings, an array of environmental factors (e.g., mirrors, presence of others, leader characteristics, etc.) can draw attention to one's physique and appearance that may result in perceived evaluative threat and hence less positive psychological responses (Focht & Hausenblas, 2004). Bain et al. (1989), for example, reported that obese women tended to avoid public places for exercise because of their worries about appearance evaluation and social disapproval. Similarly, Van Raalte et al. (2004) reported that exercisers' SPA levels were lower in the library than in the fitness center and dining hall perhaps because of differences in the ambient levels of physique evaluation inherent across the settings.

Even though mirrors are common in many exercise settings, findings reported in the extant literature on their effects have been inconsistent. The presence of mirrors can elevate self-awareness and lead to an increased experience of state SPA (Focht & Hausenblas, 2003). Others suggested that the presence or absence of mirrors may be less important in influencing self-

presentational concerns than capably participating an exercise session (Lamarche, Gammage, & Strong, 2009). Nonetheless, Focht and Hausenblas (2006) presented evidence indicating that women with high SPA were more likely to experience negative feeling states when exercising in a public, mirrored environment than when exercising in public, unmirrored environment where increased levels of pleasure and positive feeling states were more likely to occur. However, mirrors have sometimes been found to moderately increase exercise-related self-efficacy perhaps as a consequence of successful participation in the exercise bout (Katula & McAuley, 2001) and other times to have no effect on the feeling states, enjoyment, or task self-efficacy among women with high levels of SPA (Raedeke et al., 2007).

Swimming pools, malls, locker rooms, sport teams, and presence of peers may also act as environmental antecedents of SPA with appearance-related conversations and peer comparisons playing a particular role in generating physique related self-presentational concern (Sabiston, Sedgwick, Crocker, Kowalski, & Mack, 2007). Brunet and Sabiston (2011), for example, found that individuals experienced higher SPA when surrounded by their peers than when surrounded by their parents. Perhaps the heightened experience of SPA results from perceived peer pressure to alter their appearance (Mack, Strong, Kowalski, & Crocker, 2007).

With regard to gender, women have reported that they would experience higher levels of SPA when working out in all-male and mixed-sex settings than they would in all-female settings whereas males reported lower levels of SPA regardless of the gender of other exercisers in the settings (Kruisselbrink et al., 2004). Interestingly, the women in the Kruisselbrink et al. study reported they would shorten their exercise session in all-male settings relative to their intentions in all-female or mixed-sex exercise scenarios. Martin Ginis et al. (2011) provided further support

for this notion in reporting that women exercising in a mixed-sex environment scored higher on the state SPA than in a same-sex environment.

Fitness leaders play an important role in shaping exercise environments; their leadership style, sex, and physical characteristics all potentially impact on how they are perceived by the exercisers. For example, Martin and Fox (2001) found that a bland leadership style (i.e., avoiding conversations, comments to the group rather to individuals, no positive reinforcement or encouragement) contributed to heightened social anxiety among exercisers relative to what was experienced by participants in the enriched leadership style condition (i.e., emphasizing pleasant, energetic social interaction, addressing participants' names, providing positive reinforcement). Even individuals with increased SPA levels, who are more likely to exercise for appearance-related reasons, responded more positively to a leadership style that did not focus on appearance. Raedeke et al. (2007) found that exercisers whose instructor wore a gym shorts and a t-shirt and made health-related comments experienced more positive affect and enjoyment compared to exercisers whose instructor wore tight-fitting attire and made appearance-related comments.

In a qualitative study, Lamarche, Kerr, Faulkner, Gammage, and Klentrou (2012) found that perceived comfortable environments were associated with the presence of supportive others (e.g., family, friends), feelings of calmness, self-confidence and attractiveness, and unawareness of other's evaluations. Uncomfortable environments, on the other hand, were associated with the presence of ideal others, nervousness, embarrassment, body-dissatisfaction, and self-presentational concerns.

As the above presented findings exemplify, that social environment and presence of others can have different impact on exercisers' mental representations of their physical self. Large discrepancies are noted in the present body of research including social and contextualized

SPA warranting for future research to examine a myriad of behavioral, affective, and cognitive outcomes.

### **The Effects of Exercise and Social Physique Anxiety**

Aside from evidence indicating that SPA can influence individuals' exercise involvement preferences in and perceptions of exercise environments, and engagement in physical activity has been found to impact their experience of SPA. We comment on how individuals with heightened SPA levels deal with experiences of anxiety and the coping strategies used to manage unwanted potential ramifications.

#### **Exercise Interventions**

Physical activity intervention studies have been found to attenuate the extent of SPA experienced by participants. Williams and Cash (2001), for example, have presented evidence that even involvement in a relatively short 6-week circuit weight training program can result in not only improved body strength, but also decreased SPA, more positive self-appraisals of appearance, greater body-satisfaction, and enhanced physical self-efficacy among college students compared to relevant control group participants. Similar effects were reported in McAuley, Bane, and Mihalko's (1995) 20-week aerobic exercise program involving formerly sedentary middle-aged participants. Anticipated decreases in body weight and adiposity were observed as well as increases in self-efficacy and decreases in SPA even after controlling for gender and reductions in body fat, weight, and measures of circumference. Similar findings have been reported in other physical activity intervention studies (e.g., McAuley, Marquez, Jerome, Blissmer & Katula, 2002) with some evidence indicating that the addition of a brief educational session on relevant issues to an exercise intervention can result in even greater decreases in SPA

when compared to control and exercise-only groups (Scott, Joyner, Czech, Munkasy, & Todd, 2009).

Some evidence also suggests that perceived changes in body appearance might be more important to exercise-related improvements in psychological well-being than bodily changes that are objectively identifiable (Martin Ginis et al., 2012). For example, Martin Ginis, Eng, Arbour, Hartman, and Phillips (2005) reported that improvements in body image measures (e.g., SPA, body satisfaction, and drive for muscularity) at the end of a 12-week, 5-day/week strength-training program were not associated with objective physical changes among the men participating in the intervention even though significant associations were observed with subjective perceptions of physical change. Interestingly, changes in body image measures were significantly associated with both objective and subjective measures among the women participating in the study.

### **Client Coping with Social Physique Anxiety**

An array of coping strategies have been identified to manage aversive SPA experiential states. These strategies can include behavioral and cognitive avoidance, appearance management, social support, dieting, physical activity, substance abuse, seeking of sexual attention, reappraisal, acceptance, and humor (Kowalski, Mack, Crocker, Niefer, & Fleming, 2006; Niefer, McDonough, & Kowalski, 2010; Sabiston et al., 2007). Interestingly, Kowalski et al. (2006) have reported that even though females typically experience higher levels of SPA than males, they typically have better emotion coping mechanisms for dealing with the affective experience.

Exercise imagery has also been found to be a useful strategy for many individuals coping with the experience of SPA while participating in aerobics exercise classes (Hausenblas, Hall,

Rodgers, & Munroe, 1999). Both motivational (e.g., goal attainment, getting in shape) and cognitive (e.g., performance enhancement, rehearsing strategies, and techniques) imagery during exercise have been positively associated with appearance and health outcomes, and emotions and feelings experienced during the exercise (Giacobbi, Hausenblas, Fallon, & Hall, 2003) as well as improvements in exercise technique (Giacobbi et al., 2003; Hausenblas et al., 1999).

Additionally, imagery-related to appearance and fitness outcomes has been argued to play an important role in exercise adherence (Giacobbi et al., 2003).

### **Mike's Experiences: Muscle Dysmorphia**

At 11-years of age, Mike saw a movie with Jean-Claude van Damme. Mike's fascination with van Damme's appearance prompted him to start working out—a behavioral engagement that progressed into working out *a lot* with the passage of time. By the time he had graduated, he had acquired the reputation of being “the fit muscular guy” in his high school. When he set his sights on becoming a professional bodybuilder a few years later, Mike started taking steroids to gain even more bulk. From that point on, his life was dominated by training and workout regimens—and of course his preoccupation with weight, size, and muscularity.

A few years later, when preparing to enter his first body building competition, Mike experienced intense feelings of guilt and shame about the insufficiency of his gains in muscle mass and definition. Despite weighing a very lean 240lbs and having good muscle definition, he was certain that his “small” size would reveal to everyone that his training efforts have been simply inadequate. To feel better, he intensified and prolonged his workouts, and he began to incessantly troll for reassurance from his girlfriend and other close friends on his muscularity. He also spent a lot of time scrutinizing himself in the mirror to identify body areas that were insufficiently massive. In addition to strict training, Mike became preoccupied with his diet. He

spent hours planning his caloric intake, preparing his food and becoming an expert on nutritional supplements including protein bars, shakes, and other “natural” methods of promoting muscle growth. He would even bring his own food and beverages to social gatherings to avoid consuming anything that would interfere with his diet plan, or alternatively decline invitations that he thought would present uncomfortable choices in diet. In fact, sometimes he declined invitations to avoid meeting people socially on those days when he felt particularly puny and thus embarrassed about his body size.

A few weeks before his contest, Mike felt compelled to increase his time in the gym once again as well as the volume of his training. That was typical because he had been ceaselessly moving his goalposts further out because of the need he felt to acquire more and more size and definition. This time, however, he felt a grinding pain in his wrist when completing one of his heavy sets. He nonetheless continued working out and adhering to his training regime because the competition was looming. His anxieties over the thought of missing training and getting slimmer were greater than the pain experienced in working out with his injured wrist. With his goals having the nature of a mirage, he experienced no sense of accomplishment in his efforts despite a bodily massiveness that was evident to everyone. His injury exacerbated this problem because his anxieties and insecurities were skyrocketed by the limits that his wrist placed on his efforts to reach the mirage of his unattainable goals. His girlfriend noticed that he even started to “avoid” undressing in front of her with the lights on. The final week or so before the bodybuilding contest, was the worst of all because Mike’s priorities shifted completely to his training and dieting at the expense of his family and friends. Even his relationship with his girlfriend became rocky. His sole focus was on the inadequacies of his muscularity, body size, and weight. His distorted body image had taken over his life.

This vignette introduces Mike as an illustration of an individual obsessed with ideas of being too small, too skinny, and lacking in musculature even while having a body objectively inconsistent with those beliefs. In the vignette, Mike was not satisfied with being known as the “fit muscular guy” because he perceived himself as being too skinny and thin—perhaps even underweight—and certainly as lacking in muscle mass and definition. His hypervigilance in detecting even small deviations from his perceived ideal reached the point where he was able to ignore the fact that his body image is inconsistent with his atypical lean massiveness at 240 pounds of “ripped” muscle definition. This story represents a glimpse of what a person with MD might be experiencing. In the following paragraphs, we discuss a theoretical background of BDD and MD and provide research on MD related to exercise and physical activity. Finally, we elaborate key points that practitioners should keep in mind when working with individuals showing signs of MD.

## **Theoretical and Empirical-Based Evidence for Muscle Dysmorphia**

### **Muscle Dysmorphia – a Specific Type of Body Dysmorphic Disorder**

MD is a particular type of BDD. BDD is characterized with an excessive concern with a negligible physical deformity in one’s appearance. BDD or “dysmorphophobia” as named in the DSM-III was described as an example of atypical somatoform disorder with no specific formal criteria (American Psychiatric Association – APA, 1980). In the revised version of the DSM-III, BDD was categorized as a separate disorder in the somatoform section. In the DSM-IV, the diagnosis of BDD was substantially altered by the deletion of the criterion which minimized the distinction between delusional and nondelusional BDD (Phillips et al., 2010; Phillips, Hart, Simpson, & Stein, 2013). In DSM-V, BDD is defined as “preoccupation with one or more perceived defects or flaws with physical appearance that are not observable....individual has

performed repetitive behaviors....in response to the appearance concerns....[causing] significant distress or impairment in social occupational and other important areas of functioning....concern with body fat or weight....” (APA, 2013, p. 243). Appearance concerns might relate to one or many body areas but most commonly they involve the face, head, skin, hair, and nose (Phillips, 2005; Phillips et al., 2010). Women tend to be concerned with skin, hips, legs, thighs, and breasts/chest, and perceive themselves as too large or overweight. Men, on the other hand, tend to be concerned with genitals, body build, height, excessive body hair, and perceive themselves as not large enough (Perugi et al., 1997; Phillips & Diaz, 1997; Phillips, Menard, & Fay, 2006).

BDD is associated with high levels of anxiety, depressed mood, neuroticism, shame (Buhlmann et al., 2010), social avoidance (Kelly, Walters, & Phillips, 2010), feeling of embarrassment, unwillingness to reveal peculiar behaviors, and low self-esteem, (Buhlmann et al., 2010; Phillips et al., 2010). To deal with negative ramifications of BDD and to minimize their effects, individuals engage in an array of behaviors that can include excessive grooming (e.g., makeup, shaving, styling), mirror checking, camouflaging (e.g., clothing or makeup), skin picking, social comparisons, seeking reassurance, dieting, substance use, excessive exercising, and cosmetic surgeries (Phillips et al., 2006; Pope et al., 2005). Studies indicate that patients with BDD respond poorly to surgical treatments because they rarely experience psychological improvements afterwards (Sarwer & Spitzer, 2012). In fact, exacerbation of BDD symptoms are not uncommon following the cosmetic treatments (Crerand, Menard, & Phillips, 2010).

Impairments in the frontal-striatal and temporo-parietal-occipital circuits responsible for processing images and emotional information, have been identified among BDD patients in neurophysiological and brain imaging research. This is not entirely surprising given that BDD is associated with executive dysfunction (e.g., difficulties with manipulating, planning and

organizing information), attentional biases (Grochowski, Kliemb, & Heinrichsa, 2012), and visual processing abnormalities. Individuals with BDD tend to encode details rather than holistic or configural aspect of the input from the environment (Feusner, Hembacher, Moller, & Moody, 2011). BDD patients portray some common characteristics of other disorders such as obsessive-compulsive disorder (OCD), anxiety, psychotic, and major depressive disorders. Many of these can comorbid with BDD including OCD and substance-related disorders (Phillips et al., 2010), social anxiety, major depressive disorder (Fang & Hofmann, 2010; Pinto & Phillips, 2005), and social phobia (Kelly, Dalrymple, Zimmerman, & Phillips, 2013).

### **Past and Present – Where Does Muscle Dysmorphia Belong?**

Researchers have long debated MD as a classification because it overlaps with the symptomology of other psychopathologies. Chung (2001) argued that due to the historical and clinical aspects, MD should be classified as OCD. Some authors have suggested that MD should fall under an umbrella of eating disorders (Olivardia, Pope, & Hudson, 2000), because of its similarities with anorexia nervosa including its symptomology, and epidemiological and etiological factors (Murray et al., 2012). Others have considered MD as an exercise disorder due to the exorbitant amounts of time spent working out and some of its common symptomology with exercise dependency (Maida & Armstrong, 2005). In this case, it is important to identify individuals' reasons for exercising (e.g., being muscular vs. desire for “runner's high”).

According to DSM-V, MD is a specific type of BDD that occurs almost exclusively in males, even though the BDD's clinical characteristics appear to be largely similar across sexes (Phillips et al., 2010). In addition to BDD symptoms, a person with MD is “preoccupied with the idea that his or her body build is too small or insufficiently muscular” (APA, 2013, p. 243). Individuals with BDD can simultaneously show characteristics of MD (Pope, Gruber, Choi,

Olivardia, & Phillips, 1997). Pope et al. (1997) found that among 193 participants with BDD, 9.3% of them also had apparent MD symptoms. Men with MD are more likely to exhibit compulsive behaviors, report poorer quality of life, present greater attempts for suicide (Lecrubier, 2001), and abuse substance compared to men with BDD (Pope et al., 2005).

### **Increasing Evidence for Muscle Dysmorphia**

Individuals in the bodybuilding culture colloquially labelled the MD syndrome as *bigorexia*, a term that was first found in the *Oxford English Dictionary* in 1990 (Quinion, 1997). It was first scientifically described in 1993 and termed *reversed anorexia nervosa* (Pope, Katz, & Hudson, 1993). Years later, Pope et al. (1997) named it MD and has thereafter rapidly spread through the literature. Nowadays, MD has become well-established diagnostic entity and has received an increased attention in clinical settings and evolving scientific research (Bjornsson, Didie, & Phillips, 2010).

A large number of men suffer from MD, striving for a perfect V-shaped torso, lean, and muscular sculpted body that is rather impossible to achieve through natural developmental processes and engagement in healthy behaviors (Bjornsson et al., 2010). Masculinity signifies health, strength, power, sexual virility, and threat (Buss, 1988), all of which, from an evolutionary perspective, are highly valued by potential partners as they denote reproductive fitness (Singh, 1993).

The ideal male was epitomized in images of slim and muscular bodies with broad-shoulders and narrow hips in the mid-19<sup>th</sup> century. In the 1880s, mainstream of Western media idealized naked male bodies as having well-developed muscularity while often eyes and faces were averted or not visible (Grogan, 2008). Nowadays, companies such as Calvin Klein, use men

with “perfect” physiques to model and promote clothing and underwear as well as products that are unrelated to the body (Pope, Phillips, & Olivardia, 2000).

The appearance of naked men in popular magazines (e.g., *Cosmopolitan*) rose steeply from the 1950s (i.e., 3%) to the 1990s (i.e., 35%) (Pope, Olivardia, Borowiecki, & Cohane, 2001). Leit, Pope, and Gray (2001) suggested that *The Playgirl* centerfold men models lost approximately 5.4kg of fat and gained about 12.3kg of muscle mass from 1973 to 1997. They also showed the direct effect of the media’s portrayal of the ideal male body, where men exposed to the muscular images demonstrated greater discrepancy between their ideal and actual subjective muscularity. It is not surprising that societal and cultural expectations start early in life. In fact, over the (past 30) years, action toys for children significantly changed in musculature (Pope, Olivardia, Gruber, & Borowiecki, 1999), which may contribute to body image disturbances for both sexes.

Attributing increased prevalence of MD to social reasons (e.g., media, culture) only, may be shortsighted as MD shares some underlying biological and genetic predispositions that are similar to OCD (Phillips, McElroy, Hudson, & Pope, 1995). Therefore, it is not surprising that OCD has been identified as a comorbid disorder of BDD and MD. Additional psychological risk factors for MD include low self-esteem, body dissatisfaction, drive for muscularity, and eating disorders (Grossbard, Atkins, Geisner, & Larimer, 2012). Nevertheless, most of the psychological research in MD is correlational in nature therefore cannot infer causal relationships.

### **Characteristics and Manifestations of Muscle Dysmorphia**

Despite recent evidence on body image and associated pathologies among men, the literature in this area remains scarce. Given the current research, it is evident that MD affects

psychological, physical, and social aspects of one's well-being, which can be evident in potential negative ramifications and characteristics discussed below.

Dissatisfaction with one's body size and musculature is one typical characteristic of MD (Grieve, 2007). Individuals with MD can spend hours and hours thinking, objectifying, and monitoring their bodies (Olivardia, 2001). Interestingly, they may acknowledge that others are muscular, yet perceive themselves as too small regardless of their actual size. Distortion of body image and internalization of body ideal may lead to compulsive exercise and overtraining. As illustrated in Mike's vignette, the drive to attain an ideal musculature can be associated with extreme dieting and use of dangerous anabolic steroids (Pope et al., 1997).

A confluence of psychological and physical preoccupation with one's physique, may lead to impairment in social and intimate relationships, occupational functioning (Grieve, Truba, & Bowersox, 2009), and poor quality of life (Pope et al., 2005). For example, individuals with MD can shy away from situations that involve bodily exposure and consequently tend to wear baggy clothing—either to look larger or to hide their “tiny, weak” bodies (Dawes & Mankin, 2004). When attending social events, they are more likely to experience intense anxiety and distress (Pope et al., 1997). Additionally, it is not uncommon for individuals with MD to miss out on important event(s) such as a birth of a child either because they are preoccupied with thoughts about their physique or because they do not want to skip their workout (Pope et al., 1993). Another common characteristic of MD is to remain housebound for days, due to poor body image and body dissatisfaction (Olivardia, 2001), to prevent body exposure and to minimize levels of anxiety.

Although there are men who experience a high drives for muscularity such as those with MD (Grossbard et al., 2012), some other men experience a high drives for thinness (Kelley,

Neufeld, & Musher-Eizenman, 2010; Krane, Choi, Baird, Aymar, & Kauer, 2004). Men falling into either of these categories have higher rates of body preoccupation and compulsivity suggesting that these constructs can be mutually inclusive. Men with MD also characteristically perceive a substantial discrepancy between their desired and actual bodies (Pope et al., 2000) accompanied by body and muscularity dissatisfaction (Grossbard et al., 2012; Olivardia, Pope, Boroweicki, & Cohan, 2004), body distortion, and muscle belittlement (Olivardia et al., 2004). Olivardia and his colleagues (2004) have reported, for example, that ideal body selections in a sample of men with MD were an average of 11.4kg more muscular and 3.6kg leaner in body fat than carried on their actual bodies. Other researchers have observed individuals with MD reporting greater body dissatisfaction focused on the lower torso (e.g., buttocks, hips, thighs, legs) relative to musculature, muscle tone, weight, and size (Choi, Pope, & Olivardia, 2002; Maida & Armstrong, 2005). MD is associated with poorer body image and tendency for self-objectification (Choi et al., 2002), which is not surprising as individuals suffering from MD are known to spend a vast amount of time scrutinizing their bodies.

Individuals with body or muscle dissatisfaction and body image issues tend to experience low self-esteem, negative affect, disordered eating, increased depressive symptoms, and perceptions of being fat and out of shape (Grieve, 2007; McFarland & Kaminski, 2009). MD is also associated with trait anxiety and SPA, obsessive-compulsive features, anorexic and bulimic behaviors, risk indicators for interpersonal problems (Chandler, Derryberry, Grieve, & Pegg, 2009), perfectionism, and hostility (Maida & Armstrong, 2005). Individuals with MD experience a sense of shame and embarrassment about having this disorder. To minimize the negative consequences, these individuals may engage in risky muscle enhancing behaviors including excessive weightlifting, and anabolic steroid and dietary supplement use (Pope et al., 1997).

*Bodybuilding, weightlifting, and exercise.* In 2002, Choi et al. wrote a short report on MD titled: *Muscle dysmorphia: A new syndrome in weightlifters*. Bodybuilders were familiar with MD and its symptomology well before it appeared in the DSM. In fact, many early studies on MD were conducted with bodybuilders and/or weightlifters (Pope et al., 1993). More recently, competing and non-natural bodybuilders have been reported to be more likely to develop MD symptoms than non-competing and natural bodybuilders (Cella, Iannaccone, & Cotrufo, 2012). Moreover, the symptoms experienced by competing and non-natural bodybuilders tend to be more severe (Santarnecchi & Dèttore, 2012). Baghurst and Lirgg (2009), however, observed nonsignificant differences in MD symptoms between natural and non-natural bodybuilders other than in pharmacological use.

Discrepancies in MD development may depend on individuals' motivation for exercise. For instance, weightlifters more interested in enhanced appearance rather than improved performance have been reported to exhibit MD symptoms to a greater extent (Skemp, Mikat, Schenck, & Kramer, 2013). Interestingly, MD can have a state-like properties among men who weightlift on a regular basis as reported by Thomas, Tod, and Lavallee (2011). Specifically, they reported lower scores on MD attributes of drive for size, appearance intolerance, and functional impairment after a training day compared to a rest day.

*Androgenic-anabolic steroid and other pharmacological substances use.* Androgenic-anabolic steroids (AAS) are synthetic substances that have effects similar to testosterone (Barceloux & Palmer, 2013). AAS promote protein synthesis leading to growth of skeletal muscles and development of male sexual characteristics (van Amsterdam, Opperhuizen, & Hartgens, 2010). In other words, AAS contribute to increase in fat free mass, strength, and decrease in fat mass, which is appealing to individuals who would like to gain muscle mass, be

stronger and faster. Long-term use and excessive doses of AAS can produce harmful health effects including aggressiveness, depression, negative mood symptoms, irritability, acne, and liver cancer among others (van Amsterdam et al., 2010). An increased prevalence of AAS use is evident (McCabe, Brower, West, Nelson, & Wechsler, 2007) in sport for performance enhancement, but also in other realms for appearance enhancement purposes (Rohman, 2009; Schwartz, Grammas, Sutherland, Siffert, & Bush-King, 2010).

In addition to AAS, the use of other pharmacological substances such as diuretics and laxatives tend to be associated with MD (Pope et al., 2005). It is unclear whether the use of these substances is a function of body dissatisfaction or competitive issues, or whether the symptoms of MD are a cause or an effect of the AAS use (Kanayama, Barry, Hudson, & Pope, 2006). To that end, Rohman (2009) has suggested that perhaps a preexisting body image disturbance leads to AAS use in hopes to enhance physique and minimize negative psychological effects.

### **Recommendations for Sport and Exercise Psychology Practitioners**

Even though SPA and MD differ conceptually, they share considerable commonality. Recommendations forwarded in subsequent paragraphs are therefore largely applicable to practitioners working with clients who have MD or SPA. Clearly there is at least one important distinction between constructs that cannot be ignored. Specifically, MD is a psychosomatic disorder categorized as a subtype of BDD in the DSM-V. SPA, on the other hand, is a type of anxiety that is not inherently pathological, but rather a natural human experience elicited under certain circumstances.

## **Motivating and Adhering to Exercise when Experiencing Social Physique Anxiety and Muscle Dysmorphia**

Individuals with SPA and/or MD tend to experience (intense) negative emotions, as such, it is important to build rapport and establish trust through active listening and non-verbal gestures (Grieve et al., 2009). Another critical aspect when dealing with individuals suffering from either of these conditions is the understanding of their needs, motives, and deterrents of exercise.

Unlike MD, SPA can either increase or decrease one's motivation and adherence to exercise. In addition to spending less time exercising, individuals with high SPA are more likely to exercise for appearance-related reasons than individuals with low SPA (Frederick & Morrison, 1996). Psychoeducational approaches for promotion of individualized programs of healthy exercise behavior (i.e., intensity, duration, mode) as well as for the promotion of healthy exercise-related behaviors (i.e., diet, dietary supplementation) among individuals with SPA and/or subclinical levels of MD can be recommended as having potential utility.

Focusing on health-related (as opposed to appearance-related) motives may increase exercise participation and adherence (Walsh, 2012). Additionally, Thøgersen-Ntoumani and Ntoumanis (2006) showed that promoting self-determined motivation may lead to adaptive (e.g., behavioral, cognitive, physical) self-evaluative strategies to foster exercise. Exercise-related changes in physical and psychological parameters tend to occur over time and anticipated benefits may not occur immediately; therefore, realistic client expectations on this account should be fostered by practitioners through well-considered goal-setting programs. Identification of the client's presenting stage of change, perhaps in conjunction with motivational interviewing processes, is warranted in program development because that information can allow intervention

strategies to be tailored to optimize progression into healthful exercise maintenance (Thøgersen-Ntoumani & Ntoumanis, 2006). As mentioned earlier, psychoeducational processes providing relevant information on exercise and exercise-related behaviors should be embedded in consultation process to avoid misconceptions about the effects of exercise.

With regard to doses of exercise for the reduction of anxiety levels, exercising three to four times per week has been shown to be the most effective (Wipfli, Rethorst, & Landers, 2008). Some research suggests that exercising as little as 20 minutes in each bout can help decrease anxiety (Petruzzello, Landers, Hatfield, Kubitz, & Salazar, 1991), although Ekkekakis and Petruzzello (1999) subsequently argued that duration of exercise does not mediate anxiolytic effects. Modalities of physical activity and exercise have been found to be effective in reducing anxiety include walking, running, resistance training, yoga, and tai chi (Merom et al., 2008) although almost certainly client-preferred modalities have more potential on that account than those that are aversive. Although the stable tendency to experience SPA can be positively influenced by long-term exercise participation (McAuley, Bane, Rudolph, & Lox 1995), that trait tendency is unlikely to be noticeably affected in acute or short-term programs of physical activity. Exercise interventions of 16 weeks or more have been found to result in decreases in trait anxiety (Petruzzello et al., 1991), and the SPA trait, as a specific type of anxiety, would very likely require similar length intervention for effects to be observed.

The experience of SPA states are subject to environmental influence (Van Raalte et al., 2004). Offering individuals environmental alternatives for exercise engagement, particularly in initial encounters, with activities may prove useful in overcoming evaluative concerns that clients with SPA and subclinical MD may harbor. After a period of successful engagement, progression to environments previously considered threatening by these clients may be viable.

Promotion of autonomy supporting exercise environments (Hagger & Chatzisarantis, 2009) is likely to have beneficial effects on exercise adherence and lead to positive affect in any event (Vazou-Ekkekakakis & Ekkekakis, 2009; Walsh, 2012). Indeed, affective states during acute exercise are likely determinants of continued exercise participation (Ekkekakis, Hall, & Petruzzello, 2005). Finally, implementing self-regulatory strategies designed to increase self-esteem levels among clients can be effective mechanism in exercise promotion (Thøgersen-Ntoumani, Ntoumanis, Cumming, Bartholomew, & Pearce, 2011) as high levels of self-esteem might protect against the development of body image concerns, symptoms of MD (Grieve, Jackson, Reece, Marklin, & Delaney, 2008), and eating disorders (O'Dea, 2004).

### **Additional Recommendations for Muscle Dysmorphia**

Most recommendations offered in the previous section refer to individuals who experience SPA, but individuals with subclinical MD can benefit from them as well. When consulting with clients exhibiting MD symptoms, additional therapy might be required. Therefore, sport and exercise psychology professionals may require additional training to enhance their ability to recognize potential challenges in the area while also seeking to develop networks of clinically oriented professionals so that ethically appropriate referrals can be made when needed. To reiterate, MD has a variety of comorbidities including depressive disorders, a disordered eating, and OCD, so practitioners need to be aware and exercise appropriate caution when clients present with symptoms that may suggest MD even at a subclinical level (Olivardia et al., 2004).

Treatments for MD by appropriately trained clinicians involve psychological (e.g., behavioral, cognitive-behavioral, cognitive) and pharmacological therapies. Cognitive Behavioral Therapy (CBT) has been recommended as having considerable utility and

effectiveness (Williams, Hadjistavropoulos, & Sharpe, 2006) with rational emotive behavioral therapy modalities offering avenues for practitioners to identify distorted patterns of thinking (Dryden & David, 2008). Moreover, cognitive restructuring and reframing negative self-statements and thoughts about one's appearance can usefully challenge patients' assumptions about being too small or weak (Veale, 2004). Concerns about exposing the *defect* to others and avoidance behaviors such as camouflaging present challenges for practitioners, so clinically relevant strategies available in CBT to reduce anxieties that a person with MD experiences during body exposure or missing a workout can have relevance. Response prevention to manage compulsive behaviors (e.g., mirror checking, self-surveillance) and reassurance seeking can be implemented through self-monitoring and understanding the antecedents of the behavior (Coles, Heimberg, Frost, & Steketee, 2005). Behavioral intervention strategies can also be implemented to address with excessive weightlifting, disproportionate time spent at gym, or use of steroids when appropriate. These involve *behavioral shaping* and *reinforcement of successive approximations* of desired behaviors (Grieve et al., 2009; Skinner 1958). Using mindfulness techniques including Mindfulness-Acceptance-Commitment approach (Gardner & Moore, 2007) or Acceptance and Commitment Therapy (Hayes & Strosahl, 2004) can be useful for treating individuals with MD. These approaches emphasize awareness and acceptance of the present moment without being judgmental. Veale (2002) suggests mindfulness-techniques can help modify one's values and improve the course of treatment.

Finally, pharmacological therapy may also be effective for treating MD symptoms that are similar to those in eating disorders and OCD (Phillips, 2005). Pharmacological approaches to MD typically involve selective serotonin-reuptake inhibitors (SRRI; fluvoxamine, sertraline, clomipramine, etc.), which are neurotransmitters to facilitate more positive mood states (Barlow

& Durand, 2009). Regardless of whether interventions are psychological or pharmacological in nature, professionals should incorporate techniques for relapse prevention. These might include discussions of fears and reflective thinking on the session to monitor progress and gains (Wilhelm, Phillips, Fama, Greenberg, & Steketee, 2011).

## Recommended Readings

- Asmundson, G. J. G., Fetzner, M. G., DeBoer, L. B., Powers, M. B., Otto, M. W., & Smits, J. A. J. (2013). Let's get physical: A contemporary review of the anxiolytic effects of exercise for anxiety and its disorders. *Depression and Anxiety, 30*(4), 362-373. doi: 10.1002/da.22043
- Cafri, G., & Thompson, J. K. (2004). Measuring male body image: A review of the current methodology. *Psychology of Men & Masculinity, 5*(1), 18-29. doi: 10.1037/1524-9220.5.1.18
- Campbell, A., & Hausenblas, H. A. (2009). Effects of exercise interventions on body image: A meta-analysis. *Journal of Health Psychology, 14*(6), 780-793. doi: 10.1177/1359105309338977
- Grieve, F. G., Truba, N., & Bowersox, S. (2009). Etiology, assessment, and treatment of muscle dysmorphia. *Journal of Cognitive Psychotherapy, 23*(4), 306-314. doi: 10.1891/0889-8391.23.4.306
- Hausenblas, H. A., Brewer, B. W., & Van Raalte, J. L. (2004). Self-presentation and exercise. *Journal of Applied Sport Psychology, 16*(1), 3-18. doi: 10.1080/104132004902600
- Leone, J. E., Sedory, E. J., & Gray, K. A. (2005). Recognition and treatment of muscle dysmorphia and related body image disorders. *Journal of Athletic Training, 40*(4), 352.
- Martin Ginis, K. A., & Bassett, R. L. (2011). Exercise and changes in body image. In T. F. Cash & L. Smolak (Eds.), *Body image: A handbook of science, practice, and prevention* (2<sup>nd</sup> ed., pp. 378–386). New York, NY: Guilford Press.

- Martin Ginis, K. A., Bassett, R. L., & Conlin, C. (2012). Body image and exercise. In E. Acevedo (Ed.), *Oxford handbook of exercise psychology* (pp. 55–75). London, UK: Oxford University Press.
- Nieuwoudt, J. E., Zhou, S., Coutts, R. A., & Booker, R. (2012). Muscle dysmorphia: Current research and potential classification as a disorder. *Psychology of Sport and Exercise, 13*(5), 569-577. doi: 10.1016/j.psychsport.2012.03.006
- O’Dea, J. A. (2004). Evidence for a self-esteem approach in the prevention of body image and eating problems among children and adolescents. *Eating Disorders, 12*(3), 225-239. doi: 10.1080/10640260490481438
- Olivardia, R. (2001). Mirror, mirror on the wall, who's the largest of them all? The features and phenomenology of muscle dysmorphia. *Harvard Review of Psychiatry, 9*(5), 254-259. doi: 10.1080/hrp.9.5.254.259
- Phillips, K. A. (1996). *The broken mirror: Understanding and treating body dysmorphic disorder*. Oxford, UK: Oxford University Press.
- Phillips, K. A. (2011). Body image and body dysmorphic disorder. In T. F. Cash, & L. Smolak (Eds.). *Body image: A handbook of theory, research, and clinical practice* (2<sup>nd</sup> ed., pp. 305-314.). New York, NY: Guilford Press.
- Pope, Jr. H. G., Phillips, K. A., & Olivardia, R. (2000). *The Adonis Complex: The secret crisis of male body obsession*. New York, NY: The Free Press.
- Ragan, J., Greenberg, J. L., Beeger, E., Sedovic, M., & Wilhelm, S (2010). Body dysmorphic disorder. In S. G. Hofmann, & M. A. Reinecke (Eds.), *Cognitive-behavioral therapy with adults: A guide to empirically-informed assessment and intervention* (pp. 149-161. Cambridge: Cambridge University Press.

- Thompson, J. K. (2004). The (mis)measurement of body image: Ten strategies to improve assessment for applied and research purposes. *Body Image, 1*(1), 7-14. doi: [http://dx.doi.org/10.1016/S1740-1445\(03\)00004-4](http://dx.doi.org/10.1016/S1740-1445(03)00004-4)
- Thompson, J. K., & Cafri, G. (2007). *The muscular ideal: Psychological, social, and medical perspectives*. Washington, DC: American Psychological Association.
- Tucker, L. A., & Mortell, R. (1993). Comparison of the effects of walking and weight training programs on body image in middle-aged women: An experimental study. *American Journal of Health Promotion 8*(1), 34-42. doi: <http://dx.doi.org/10.4278/0890-1171-8.1.34>
- Veale, D. (2004). Advances in a cognitive behavioural model of body dysmorphic disorder. *Body Image, 1*(1), 113-125. doi: [10.1016/s1740-1445\(03\)00009-3](https://doi.org/10.1016/s1740-1445(03)00009-3)
- Walsh, A. (2012). Exercise intensity, affect, and adherence: A guide for the fitness professional. *Journal of Sport Psychology in Action, 3*(3), 193-207. doi: [10.1080/21520704.2012.674629](https://doi.org/10.1080/21520704.2012.674629)
- Williams, J., Hadjistavropoulos, T., & Sharpe, D. (2006). A meta-analysis of psychological and pharmacological treatments for Body Dysmorphic Disorder. *Behaviour Research and Therapy, 44*(1), 99-111. doi: <http://dx.doi.org/10.1016/j.brat.2004.12.006>

## References

- American Psychiatric Association (1980). *Diagnostic and statistical manual of mental disorders* (3<sup>rd</sup> ed.). Washington, DC: American Psychiatric Association.
- American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders: DSM-5*. Arlington, VA: American Psychiatric Association.
- Baghurst, T., & Lirgg, C. (2009). Characteristics of muscle dysmorphia in male football, weight training, and competitive natural and non-natural bodybuilding samples. *Body Image*, 6(3), 221-227. doi: 10.1016/j.bodyim.2009.03.002
- Bain, L. L., Wilson, T., & Chaikind, E. (1989). Participant perceptions of exercise programs for overweight women. *Research Quarterly for Exercise and Sport*, 60(2), 134-143. doi: 10.1080/02701367.1989.10607428
- Barceloux, D. G., & Palmer, R. B. (2013). Anabolic—Androgenic steroids. *Disease-a-Month*, 59(6), 226-248. doi: 10.1016/j.disamonth.2013.03.010
- Barlow, D. H. & Durand, V. M. (2009). Mood disorders and suicide. In D. H. Barlow & V. M. Durand (Eds.), *Abnormal psychology: An integrative approach* (5<sup>th</sup> Ed.). Belmont, CA: Wadsworth Cengage Learning.
- Bjornsson, A. S., Didie, E. R., & Phillips, K. A. (2010). Body dysmorphic disorder. *Dialogues in Clinical Neuroscience*, 12(2), 221–232. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3181960/>
- Brunet, J., & Sabiston, C. M. (2011). In the company we keep: Social physique anxiety levels differ around parents and peers. *Journal of Health Psychology*, 16(1), 42-49. doi: 10.1177/1359105310367530

- Buhlmann, U., Glaesmerb, H., Mewesc, R., Famad, J. M., Wilhelm, S., Brählerb, E., & Riefc, W. (2010). Updates on the prevalence of body dysmorphic disorder: A population-based survey. *Psychiatry Research, 178*(1), 171-175. doi: 10.1016/j.psychres.2009.05.002
- Buss, D. M. (1988). The evolution of human intrasexual competition: Tactics of mate attraction. *Journal of Personality and Social Psychology, 54*(4), 616. Retrieved from <http://www.apa.org/pubs/journals/psp/>
- Cella, S., Iannaccone, M., & Cotrufo, P. (2012). Muscle dysmorphia: A comparison between competitive bodybuilders and fitness practitioners. *Journal of Nutritional Therapeutics, 1*, 12-18.
- Chandler, C. G., Derryberry, W. P., Grieve, F. G., & Pegg, P. O. (2009). Are anxiety and obsessive-compulsive symptoms related to muscle dysmorphia? *International Journal of Men's Health, 8*(2), 143. doi: 10.3149/jmh.0802.143
- Choi, P. Y. L., Pope Jr., H. G., & Olivardia, R. (2002). Muscle dysmorphia: A new syndrome in weightlifters. *British Journal of Sports Medicine, 36*(5), 375-376. doi: 10.1136/bjism.36.5.375
- Chung, B. (2001). Muscle dysmorphia: A critical review of the proposed criteria. *Perspectives in Biology & Medicine, 44*(4), 565-574.
- Coles, M. E., Heimberg, R. G., Frost, R. O., & Steketee, G. (2005). Not just right experiences and obsessive-compulsive features: Experimental and self-monitoring perspectives. *Behaviour Research and Therapy, 43*(2), 153-167. doi: <http://dx.doi.org/10.1016/j.brat.2004.01.002>
- Crawford, S., & Eklund, R. C. (1994). Social physique anxiety, reasons for exercise, and attitudes toward exercise settings. *Journal of Sport & Exercise Psychology, 16*, 70-82.

- Crerand, C. E., Menard, W., & Phillips, K. A. (2010). Surgical and minimally invasive cosmetic procedures among persons with body dysmorphic disorder. *Annals of Plastic Surgery*, 65(1), 11-16. doi: 10.1097/SAP.0b013e3181bba08f
- Culos-Reed, S. N., Brawley, L. R., Martin, K. A., & Leary, M. R. (2002). Self-presentation concerns and health behaviors among cosmetic surgery patients. *Journal of Applied Social Psychology*, 32(3), 560-569. doi: 10.1111/j.1559-1816.2002.tb00230.x
- Dawes, J., & Mankin, T. (2004). Muscle dysmorphia. *Strength & Conditioning Journal*, 26(2), 24-25. Retrieved from [http://journals.lww.com/nsca-scj/Abstract/2004/04000/Muscle\\_Dysmorphia.4.aspx](http://journals.lww.com/nsca-scj/Abstract/2004/04000/Muscle_Dysmorphia.4.aspx)
- Dryden, W., & David, D. (2008). Rational emotive behavior therapy: Current status. *Journal of Cognitive Psychotherapy*, 22(3), 195-209. doi: 10.1891/0889-8391.22.3.195
- Ekkekakis, P., Hall, E. E., & Petruzzello, S. J. (2005). Variation and homogeneity in affective responses to physical activity of varying intensities: An alternative perspective on dose-response based on evolutionary considerations. *Journal of sports sciences*, 23(5), 477-500. doi: 10.1080/02640410400021492
- Ekkekakis, P., & Petruzzello, S. J. (1999). Acute aerobic exercise and affect: Current status, problems, and prospects regarding dose-response. *Sports Medicine*, 28(5), 337-374.
- Fang, A., & Hofmann, S. G. (2010). Relationship between social anxiety disorder and body dysmorphic disorder. *Clinical Psychology Review*, 30(8), 1040-1048. doi: 10.1016/j.cpr.2010.08.001
- Feusner, J. D., Hembacher, E., Moller, H., & Moody, T. D. (2011). Abnormalities of object visual processing in body dysmorphic disorder. *Psychological Medicine*, 41(11), 2385. doi: 10.1017/S0033291711000572

- Fitzsimmons-Craft, E. E., Harney, M. B., Brownstone, L. M., Higgins, M. K., & Bardone-Cone, A. M. (2012). Examining social physique anxiety and disordered eating in college women: The roles of social comparison and body surveillance. *Appetite, 59*, 796-805.
- Focht, B. C., & Hausenblas, H. A. (2003). State anxiety responses to acute exercise in women with high social physique anxiety. *Journal of Sport & Exercise Psychology, 25*(2), 123-144.
- Focht, B. C., & Hausenblas, H. A. (2004). Perceived evaluative threat and state anxiety during exercise in women with high social physique anxiety. *Journal of Applied Sport Psychology, 16*, 361-368.
- Focht, B. C., & Hausenblas, H. A. (2006). Exercising in public and private environments: Effects on feeling states in women with social physique anxiety. *Journal of Applied Biobehavioral Research, 11*(3-4), 147-165. doi: 10.1111/j.1751-9861.2007.00002.x
- Frederick, C. M., & Morrison, C. S. (1996). Social physique anxiety: Personality constructs, motivations, exercise attitudes, and behaviors. *Perceptual and Motor Skills, 82*(3), 963-972. doi: 10.2466/pms.1996.82.3.963
- Gardner, F. L., & Moore, Z. E. (2007). *The psychology of enhancing human performance: The Mindfulness-Acceptance-Commitment (MAC) approach*. New York, NY: Springer Publishing Company.
- Giacobbi, P., Hausenblas, H. A., Fallon, E. A., & Hall, C. A. (2003). Even more about exercise imagery: A grounded theory of exercise imagery. *Journal of Applied Sport Psychology, 15*(2), 160-175. doi: 10.1080/10413200305391

- Goodwin, H., Haycraft, E., Willis, A. M., & Meyer, C. (2011). Compulsive exercise: The role of personality, psychological morbidity, and disordered eating. *International Journal of Eating Disorders, 44*(7), 655-660. doi: 10.1002/eat.20902
- Grieve, F. G. (2007). A conceptual model of factors contributing to the development of muscle dysmorphia. *Eating Disorders, 15*(1), 63-80. doi: 10.1080/10640260601044535
- Grieve, F. G., Jackson, L., Reece, T., Marklin, L., & Delaney, A. (2008). Correlates of social physique anxiety in men. *Journal of Sport Behavior, 31*(4), 329-337.
- Grieve, F. G., Truba, N., & Bowersox, S. (2009). Etiology, assessment, and treatment of muscle dysmorphia. *Journal of Cognitive Psychotherapy, 23*(4), 306-314. doi: 10.1891/0889-8391.23.4.306
- Grochowski, A., Kliemb, S., & Heinrichsa, N. (2012). Selective attention to imagined facial ugliness is specific to body dysmorphic disorder. *Body Image, 9*(2), 261-269. doi: 10.1016/j.bodyim.2012.01.002
- Grogan, S. (2008). *Body image: Understanding body dissatisfaction in men, women, and children* (2<sup>nd</sup> ed.). New York, NY: Psychology Press.
- Grossbard, J. R., Atkins, D. C., Geisner, I. M., & Larimer, M. E. (2012). Does depressed mood moderate the influence of drive for thinness and muscularity on eating disorder symptoms among college men? *Psychology of Men & Masculinity, 1*-11. doi: 10.1037/a0028913
- Hagger, M., & Chatzisarantis, N. (2009). Integrating the theory of planned behaviour and self-determination theory in health behaviour: A meta-analysis. *British Journal of Health Psychology, 14*, 277-302.

- Hagger, M. S., & Stevenson, A. (2010). Social physique anxiety and physical self-esteem: Gender and age effects. *Psychology & Health, 25*(1), 89-110. doi: 10.1080/08870440903160990
- Hausenblas, H. A., Hall, C. R., Rodgers, W. M., & Munroe, K. J. (1999). Exercise imagery: Its nature and measurement. *Journal of applied sport psychology, 11*(2), 171-180. doi: 10.1080/10413209908404198
- Hayes, S. C., & Strosahl, K. D. (Eds.). (2004). *A practical guide to Acceptance and Commitment Therapy*. New York, NY: Springer-Verlag.
- Kanayama, G., Barry, S., Hudson, J., & Pope, H. (2006). Body image and attitudes toward male roles in anabolic-androgenic steroid users. *The American Journal of Psychiatry, 163*(4), 697-703.
- Katula, J. A., & McAuley, E. (2001). The mirror does not lie: Acute exercise and self-efficacy. *International Journal of Behavioral Medicine, 8*(4), 319-326. doi: 10.1207/s15327558ijbm0804\_6
- Kelley, C. C., Neufeld, J. M., & Musher-Eizenman, D. R. (2010). Drive for thinness and drive for muscularity: Opposite ends of the continuum or separate constructs? *Body Image, 7*(1), 74-77. doi: 10.1016/j.bodyim.2009.09.008
- Kelly, M. M., Dalrymple, K., Zimmerman, M., & Phillips, K. A. (2013). A comparison study of body dysmorphic disorder versus social phobia. *Psychiatry Research, 205*(1-2), 109-116. doi: 10.1016/j.psychres.2012.08.009
- Kelly, M. M., Walters, C., & Phillips, K. A. (2010). Social anxiety and its relationship to functional impairment in body dysmorphic disorder. *Behavior Therapy, 41*(2), 143-153. doi: <http://dx.doi.org/10.1016/j.beth.2009.01.005>

- Krane, V., Choi, P. Y. L., Baird, S. M., Aimar, C. M., & Kauer, K. J. (2004). Living the paradox: Female athletes negotiate femininity and muscularity. *Sex Roles, 50*(5-6), 315. doi: 10.1023/B:SERS.0000018888.48437.4f
- Kowalski, K. C., Mack, D. E., Crocker, P. R. E., Niefer, C. B., & Fleming, T.-L. (2006). Coping with social physique anxiety in adolescence. *Journal of Adolescent Health, 39*(2), 275.e279-275.e216. doi: <http://dx.doi.org/10.1016/j.jadohealth.2005.12.015>
- Kruisselbrink, L. D., Dodge, A. M., Swanburg, S. L., & MacLeod, A. L. (2004). Influence of same-sex and mixed-sex exercise settings on the social physique anxiety and exercise intentions of males and females. *Journal of Sport & Exercise Psychology, 26*, 616–622.
- Lamarche, L., Gammage, K. L., & Strong, H. A. (2009). The effect of mirrored environments on self-presentational efficacy and social anxiety in women in a step aerobics class. *Psychology of Sport and Exercise, 10*(1), 67-71. doi:10.1016/j.psychsport.2008.06.006
- Lamarche, L., Kerr, G., Faulkner, G., Gammage, K. L., & Klentrou, P. (2012). A qualitative examination of body image threats using social self-preservation theory. *Body Image, 9*(1), 145-154. doi: 10.1016/j.bodyim.2011.10.004
- Lantz, C. D., Hardy, C. J., & Ainsworth, B. E. (1997). Social physique anxiety and perceived exercise behavior. *Journal of Sport Behavior, 20*(1), 83-93.
- Leary, M. R. (1992). Self-presentational processes in exercise and sport. *Journal of Sport & Exercise Psychology, 14*, 339-351.
- Leary, M. R., & Kowalski, R. M. (1990). Impression management: A literature review and two-component model. *Psychological Bulletin, 107*, 34-47.
- Lecrubier, Y. (2001). The influence of comorbidity on the prevalence of suicidal behaviour. *European psychiatry, 16*(7), 395. doi: 10.1016/s0924-9338(01)00596-x

- Leit, R. A., Pope Jr., H. G., & Gray, J. J. (2001). Cultural expectations of muscularity in men: The evolution of playgirl centerfolds. *The International Journal of Eating Disorders*, 29(1), 90-93. doi: 10.1002/1098-108x(200101)29:1<90::aid-eat15>3.0.co;2-f
- Mack, D. E., Strong, H. A., Kowalski, K. C., & Crocker, P. R. E. (2007). Does friendship matter? An examination of social physique anxiety in adolescence. *Journal of Applied Social Psychology*, 37(6), 1248-1264. doi: 10.1111/j.1559-1816.2007.00211.x
- Maida, D., & Armstrong, S. L. (2005). The classification of muscle dysmorphia. *International Journal of Men's Health*, 4(1), 73-91. doi: 10.3149/jmh.0401.73
- Marsh, H. W., & Shavelson, R. J. (1985). Self-concept: Its multifaceted, hierarchical structure. *Educational Psychologist*, 20, 107-125.
- Martin, K. A., & Fox, L. D. (2001). Group and leadership effects on social anxiety experienced during an exercise class. *Journal of applied social psychology*, 31(5), 1000-1016. doi: 10.1111/j.1559-1816.2001.tb02659.x
- Martin Ginis, K. A., Eng, J. J., Arbour, K. P., & Hartman, J. W. (2005). Mind over muscle? Sex differences in the relationship between body image change and subjective and objective physical changes following a 12-week strength-training program. *Body Image*, 2(4), 363-372. doi: 10.1016/j.bodyim.2005.08.003
- Martin Ginis, K. A., Lindwall, M., & Prapavessis, H. (2007). Who cares what other people think? Self-presentation in sport and exercise. In G. Tenenbaum & R. Eklund (Eds.), *Handbook of sport psychology* (3<sup>rd</sup> ed., pp. 136–157). Hoboken, NJ: Wiley.
- Martin Ginis, K. A., McEwan, D., Josse, A. R., & Phillips, S. M. (2012). Body image change in obese and overweight women enrolled in a weight-loss intervention: The importance of

- perceived versus actual physical changes. *Body Image*, 9(3), 311-317. doi:  
<http://dx.doi.org/10.1016/j.bodyim.2012.04.002>
- Martin Ginis, K. A., Murru, E., Conlin, C., & Strong, H. A. (2011). Construct validation of a state version of the Social Physique Anxiety Scale among young women. *Body Image*, 8(1), 52-57. doi: 10.1016/j.bodyim.2010.10.001
- McAuley, E., Bane, S. M., & Mihalko, S. L. (1995). Exercise in middle-aged adults: Self-efficacy and self-presentational outcomes. *Preventive Medicine*, 24(4), 319-328. doi: 10.1006/pmed.1995.1053
- McAuley, E., Bane, S. M., Rudolph, D. L., & Lox, C. L. (1995). Physique anxiety and exercise in middle-aged adults. *Journal of Gerontology: B - Psychological Sciences and Social Sciences* 50B(5), 229-235. doi: 10.1093/geronb/50B.5.P229
- McAuley, E., Marquez, D. X., Jerome, G. J., Blissmer, B., & Katula, J. (2002). Physical activity and physique anxiety in older adults: Fitness, and efficacy influences. *Aging & Mental Health*, 6(3), 222-230. doi: 10.1080/13607860220142459
- McCabe, S. E., Brower, K. J., West, B. T., Nelson, T. F., & Wechsler, H. (2007). Trends in non-medical use of anabolic steroids by U.S. college students: Results from four national surveys. *Drug and Alcohol Dependence*, 90(2-3), 243-251. doi: 10.1016/j.drugaldep.2007.04.004
- McCreary, D. R., & Saucier, D. M. (2009). Drive for muscularity, body comparison, and social physique anxiety in men and women. *Body Image*, 6(1), 24-30. doi: 10.1016/j.bodyim.2008.09.002

- McFarland, M. B., & Kaminski, P. L. (2009). Men, muscles, and mood: The relationship between self-concept, dysphoria, and body image disturbances. *Eating behaviors, 10*(1), 68-70. doi:10.1016/j.eatbeh.2008.10.007
- Merom, D., Phongsavan, P., Wagner, R., Chey, T., Marnane, C., Steel, Z., . . . Bauman, A. (2008). Promoting walking as an adjunct intervention to group cognitive behavioral therapy for anxiety disorders—A pilot group randomized trial. *Journal of Anxiety Disorders, 22*(6), 959-968. doi: <http://dx.doi.org/10.1016/j.janxdis.2007.09.010>
- Murray, S. B., Rieger, E., Hildebrandt, T., Karlova, L., Russell, J., Boon, E., . . . Touyza, S. W. (2012). A comparison of eating, exercise, shape, and weight related symptomatology in males with muscle dysmorphia and anorexia nervosa. *Body Image, 9*(2), 193-200. doi: 10.1016/j.bodyim.2012.01.008
- Niefer, C. B., McDonough, M. H., & Kowalski, K. C. (2010). Coping with social physique anxiety among adolescent female athletes. *International Journal of Sport Psychology, 41*(4), 369.
- O'Dea, J. A. (2004). Evidence for a self-esteem approach in the prevention of body image and eating problems among children and adolescents. *Eating Disorders, 12*(3), 225-239. doi: 10.1080/10640260490481438
- Olivardia, R. (2001). Mirror, mirror on the wall, who's the largest of them all? The features and phenomenology of muscle dysmorphia. *Harvard Review of Psychiatry, 9*(5), 254-259. doi: 10.1080/hrp.9.5.254.259
- Olivardia, R., Pope Jr., H. G., Borowiecki III, J. J., & Cohane, G. H. (2004). Biceps and body image: The relationship between muscularity and self-esteem, depression, and eating

- disorder symptoms. *Psychology of Men & Masculinity*, 5(2), 112-120. doi: 10.1037/1524-9220.5.2.112
- Olivardia, R., Pope, J. H. G., & Hudson, J. I. (2000). Muscle dysmorphia in male weightlifters: A case-control study. *The American Journal of Psychiatry*, 157(8), 1291-1296. doi: 10.1176/appi.ajp.157.8.1291
- Perugi, G., Akiskal, H. S., Psych, M. R. C., Giannotti, D., Frare, F., Di Vaio, S., . . . Psych, F. R. C. (1997). Gender-related differences in body dysmorphic disorder (dysmorphophobia). *The Journal of Nervous and Mental Disease*, 185(9), 578-582. doi: 10.1097/00005053-199709000-00007
- Petruzzello, S., Landers, D., Hatfield, B., Kubitz, K., & Salazar, W. (1991). A meta-analysis on the anxiety-reducing effects of acute and chronic exercise. *Sports Medicine*, 11(3), 143-182. doi: 10.2165/00007256-199111030-00002
- Phillips, K. A. (2005). *The broken mirror: Understanding and treating body dysmorphic disorder*. Oxford, NY: Oxford University Press.
- Phillips, K. A., & Diaz, S. (1997). Gender differences in body dysmorphic disorder. *The Journal of Nervous and Mental Disease*, 185(9), 570.
- Phillips, K. A., Hart, A. S., Simpson, H. B., & Stein, D. J. (2013). Delusional versus nondelusional body dysmorphic disorder: Recommendations for DSM-5. *CNS Spectrums*, 1-11. doi: 10.1017/s1092852913000266
- Phillips, K. A., McElroy, S. L., Hudson, J. I., & Pope, Jr. H. G. (1995). Body dysmorphic disorder: An obsessive-compulsive spectrum disorder, a form of affective spectrum disorder, or both? *The Journal of Clinical Psychiatry*, 56(suppl 4), 41-51.

- Phillips, K. A., Menard, W., & Fay, C. (2006). Gender similarities and differences in 200 individuals with body dysmorphic disorder. *Comprehensive psychiatry*, *47*(2), 77-87. doi: 10.1016/j.comppsy.2005.07.002
- Phillips, K. A., Wilhelm, S., Koran, L. M., Didie, E. R., Fallon, B. A., Feusner, J., & Stein, D. J. (2010). Body dysmorphic disorder: Some key issues for DSM-V. *Depression and Anxiety*, *27*(6), 573-591. doi: 10.1002/da.20709
- Pinto, A., & Phillips, K. A. (2005). Social anxiety in body dysmorphic disorder. *Body Image*, *2*(4), 401-405. doi: 10.1016/j.bodyim.2005.10.003
- Pope, C. G., Pope, Jr. H. G., Menard, W., Faya, C., Olivardia, R., & Phillips, K. A. (2005). Clinical features of muscle dysmorphia among males with body dysmorphic disorder. *Body Image*, *2*(4), 395-400. doi: 10.1016/j.bodyim.2005.09.001
- Pope Jr. H. G., Gruber, A. J., Choi, P., Olivardia, R., & Phillips, K. A. (1997). Muscle dysmorphia: An underrecognized form of body dysmorphic disorder. *Psychosomatics* *38*(6), 548-557. doi: 10.1016/s0033-3182(97)71400-2
- Pope, Jr. H. G., Katz, D. L., & Hudson, J. I. (1993). Anorexia nervosa and reverse anorexia among 108 male bodybuilders. *Comprehensive Psychiatry*, *34*(6), 406-409.
- Pope, Jr. H. G., Olivardia, R., Borowiecki III, J. J., & Cohane, G. H. (2001). The growing commercial value of the male body: A longitudinal survey of advertising in women's magazines. *Psychotherapy and Psychosomatics*, *70*, 189-192.
- Pope, Jr. H. G., Olivardia, R., Gruber, A., & Borowiecki III, J. J. (1999). Evolving ideals of male body image as seen through action toys. *The International Journal of Eating Disorders*, *26*(1), 65-72. doi: 10.1002/(sici)1098-108x(199907)26:1<65::aid-eat8>3.0.co;2-dc

- Pope, Jr. H. G., Phillips, K. A., & Olivardia, R. (2000). *The Adonis Complex: The secret crisis of male body obsession*. New York, NY: The Free Press.
- Quinion, M. (1997). Worldwide words: Investigating the English language across the globe. Retrieved from <http://www.worldwidewords.org/turnsofphrase/tp-mus1.htm>
- Raedeke, T. D., Focht, B. C., & Scales, D. (2007). Social environmental factors and psychological responses to acute exercise for socially physique anxious females. *Psychology of Sport & Exercise, 8*(4), 463-476.
- Rohman, L. (2009). The relationship between anabolic androgenic steroids and muscle dysmorphia: A review. *Eating Disorders, 17*(3), 187-199. doi: 10.1080/10640260902848477
- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist 55*(1), 68-78.
- Sabiston, C. M., Sedgwick, W. A., Crocker, P. R. E., Kowalski, K. C., & Mack, D. E. (2007). Social physique anxiety in adolescence: An exploration of influences, coping strategies, and health behaviors. *Journal of adolescent research, 22*(1), 78-101. doi: 10.1177/0743558406294628
- Santarnecchi, E., & Dèttore, D. (2012). Muscle dysmorphia in different degrees of bodybuilding activities: Validation of the Italian version of Muscle Dysmorphia Disorder Inventory and Bodybuilder Image Grid. *Body Image, 9*(3), 396-403. doi: 10.1016/j.bodyim.2012.03.006
- Sarwer, D. B., & Spitzer, J. C. (2012). Body image dysmorphic disorder in persons who undergo aesthetic medical treatments. *Aesthetic Surgery Journal, 32*(8), 999-1009. doi: 10.1177/1090820x12462715

- Schlenker, B. R., & Leary, M. R. (1982). Social anxiety and self-presentation: A conceptualization model. *Psychological Bulletin*, *92*(3), 641-669. doi: 10.1037/0033-2909.92.3.641
- Schlenker, B. R., & Leary, M. R. (1985). Social anxiety and communication about the self. *Journal of Language and Social Psychology*, *4*(3-4), 171-192. doi: 10.1177/0261927X8543002
- Schwartz, J. P., Grammas, D. L., Sutherland, R. J., Siffert, K. L., & Bush-King, I. (2010). Masculine gender roles and differentiation: Predictors of body image and self-objectification in men. *Psychology of Men & Masculinity*, *11*(3), 208-224. doi: 10.1037/a0018255
- Scott, L. A., Joyner, A. B., Czech, D. R., Munkasy, B. A., & Todd, S. (2009). Effects of exercise and a brief education intervention on social physique anxiety in college students. *International Journal of Fitness*, *5*(1), 9-17. doi: <http://hdl.handle.net/10518/1661>
- Singh, D. (1993). Adaptive significance of female physical attractiveness: Role to waist-to-hip ratio. *Journal of Personality and Social Psychology*, *65*, 293-307.
- Skemp, K. M., Mikat, R. P., Schenck, K. P., & Kramer, N. (2013). Muscle dysmorphia risk may be influenced by goals of the weightlifter. *Journal of Strength and Conditioning Research*, *1*. doi: 10.1519/JSC.0b013e3182825474
- Skinner, B. F. (1985). Reinforcement today. *American Psychologist*, *13*(3), 94-99. doi: 10.1037/h0049039
- Thøgersen-Ntoumani, C., & Ntoumanis, N. (2006). The role of self-determined motivation in the understanding of exercise-related behaviours, cognitions and physical self-evaluations. *Journal of Sports Sciences*, *24*(4), 393-404. doi: 10.1080/02640410500131670

- Thøgersen-Ntoumani, C., Ntoumanis, N., Cumming, J., Bartholomew, K. J., & Pearce, G. (2011). Can self-esteem protect against the deleterious consequences of self-objectification for mood and body satisfaction in physically active female university students? *Journal of Sport and Exercise Psychology*, *33*, 289-307. Retrieved from <http://journals.humankinetics.com/jsep>
- Thomas, L. S., Tod, D. A., & Lavallee, D. E. (2011). Variability in muscle dysmorphia symptoms: The influence of weight training. *Journal of Strength and Conditioning Research*, *25*(3), 846-851.
- Thompson, A., & Chad, K. E. (2002). The relationship of social physique anxiety to risk for developing an eating disorder in young females. *Journal of Adolescent Health*, *31*(2), 183-189. doi: 10.1016/s1054-139x(01)00397-4
- Tiggemann, M., & Williamson, S. (2000). The effect of exercise on body satisfaction and self-esteem as a function of gender and age. *Sex Roles*, *43*, 119-127.
- van Amsterdam, J., Opperhuizen, A., & Hartgens, F. (2010). Adverse health effects of anabolic-androgenic steroids. *Regulatory Toxicology and Pharmacology*, *57*(1), 117-123. doi: <http://dx.doi.org/10.1016/j.yrtph.2010.02.001>
- Van Raalte, J. L., Cunningham, J., Cornelius, A. E., & Brewer, B. W. (2004). Environmental effects on social physique anxiety. *Kinesiology Slovenica*, *10*(1), 86-95.
- Vazou-Ekkekakis, S., & Ekkekakis, P. (2009). Affective consequences of imposing the intensity of physical activity: Does loss of perceived autonomy matter? *Hellenic Journal of Psychology*, *6*, 125-144.
- Veale, D. (2002). Overvalued ideas: A conceptual analysis. *Behaviour Research and Therapy*, *40*, 383-400. doi:10.1016/S0005-7967(01)00016-X

- Veale, D. (2004). Advances in a cognitive behavioural model of body dysmorphic disorder. *Body Image, 1*(1), 113-125. doi: 10.1016/s1740-1445(03)00009-3
- Walsh, A. (2012). Exercise intensity, affect, and adherence: A guide for the fitness professional. *Journal of Sport Psychology in Action, 3*(3), 193-207. doi: 10.1080/21520704.2012.674629
- Wilhelm, S., Phillips, K. A., Fama, J. M., Greenberg, J. L., & Steketee, G. (2011). Modular cognitive-behavioral therapy for body dysmorphic disorder. *Behavioral Therapy, 42*(4), 624-633. doi: 10.1016/j.beth.2011.02.002
- Williams, J., Hadjistavropoulos, T., & Sharpe, D. (2006). A meta-analysis of psychological and pharmacological treatments for Body Dysmorphic Disorder. *Behaviour Research and Therapy, 44*(1), 99-111. doi: <http://dx.doi.org/10.1016/j.brat.2004.12.006>
- Williams, P. A., & Cash, T. F. (2001). Effects of a circuit weight training program on the body images of college students. *The International Journal of Eating Disorders, 30*(1), 75-82. doi: 10.1002/eat.1056
- Wipfli, B. M., Rethorst, C. D., & Landers, D. M. (2008). The anxiolytic effects of exercise: A meta-analysis of randomized trials and dose-response analysis. *Journal of Sport & Exercise Psychology, 30*(4), 392-410.
- Woodman, T., & Steer, R. (2011). Body self-discrepancies and women's social physique anxiety: The moderating role of the feared body. *British Journal of Psychology, 102*(2), 147-160. doi: 10.1348/000712610x507821