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Testing a Comprehensive Model of Body Image, Anxiety, and Eating Pathology Among College Men

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TESTING A COMPREHENSIVE MODEL OF BODY IMAGE, ANXIETY, AND EATING PATHOLOGY AMONG COLLEGE MEN

by

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Bachelor of Arts in Psychology
Washington University
2008

Master of Arts – Psychology
University of Nevada, Las Vegas
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A dissertation submitted in partial fulfillment
of the requirements for the

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December 2014

ABSTRACT

Testing a Comprehensive Model of Body Image, Anxiety, and Eating Pathology Among College Men

by

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Historically, researchers conceptualized eating disorders, subclinical eating pathology, and negative body image as issues that only affected women. However, more recent research suggests that men experience significant body image concerns that mirror current Western cultural ideals of appearance (i.e., desire to attain a lean, muscular physique with very little body fat). Theoretically, men with a strong desire to achieve this cultural ideal (i.e., drive for muscularity) may experience dissatisfaction with their appearance (i.e., muscle dysmorphia), unpleasant psychological states (e.g., social physique anxiety), and engage in potentially harmful behaviors related to eating pathology (e.g., body checking) that lead to clinical impairment (e.g., decreased social or occupational functioning). To build on our understanding of eating pathology in men, the primary aim of this study was to explore and test the relationships among drive for muscularity, muscle dysmorphia, social physique anxiety, body checking, global eating pathology, and clinical impairment in a sample of nonclinical college men ($N = 343$). Testing and comparing the fit of three hypothesized models describing these relationships indicated that one hypothesized model fit the data very well. In this model, higher levels

of muscle dysmorphia predicted higher levels of drive for muscularity, social physique anxiety, and clinical impairment; higher levels of social physique anxiety predicted higher levels of drive for muscularity and clinical impairment; higher levels of drive for muscularity predicted higher levels of body checking; and higher levels of body checking predicted higher levels of clinical impairment. These findings improve our understanding of the attitudinal and behavioral correlates of social physique anxiety, eating pathology, and body image in nonclinical men. Consistent with the psycho-behavioral model of muscle dysmorphia (Lantz, Rhea, & Mayhew, 2001), body dissatisfaction (e.g., drive for muscularity) was associated with muscle dysmorphia and behavioral physique concerns (e.g., body checking), and these aforementioned constructs were associated with negative consequences (e.g. clinical impairment). However, eating pathology was less salient to these relationships than predicted.

In addition to these core findings, an ancillary aim of this study was to examine the factor structure, mean scores, and measurement invariance of a modified version of the Social Physique Anxiety Scale (MSPAS) with subtle wording changes that I hypothesized may be more palatable to men and have a less feminine connotation (i.e., changing "physique or figure" to "body or build"). Results indicated that the MSPAS and SPAS were configurally invariant (best captured by 7-item, 1-factor structure). Mean scores did not differ between the measures. Although the MSPAS and SPAS did not demonstrate full measurement invariance, results suggest that both questionnaires conceptualize and measure the underlying construct of social physique anxiety in the same way. Results provide preliminary support that sex-specific wording may not be necessary to measure social physique anxiety in men. However, results raised concerns

with the SPAS/MSPAS: The measures are very brief, have low internal consistency, questionable face validity, and may not adequately address all aspects of social physique anxiety. Researchers should substantially revise items or develop an alternate questionnaire to improve the measurement of social physique anxiety.

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John Donne famously asserted that “No man is an island” and the invaluable contributions of so many individuals to this project certainly confirms that. I would like to express my gratitude for those who – whether knowingly or unknowingly – supported and guided me along the way. My sincerest appreciation to Dr. Cortney Warren, the chair of my committee. You encouraged me to think about the big picture and answer the “so what?” question, you helped me articulate my ideas, and you constantly challenged me to improve. Thank you for your mentorship. Thank you as well to my committee members, Drs. Mark Ashcraft, Kimberly Barchard, Gary Larson, and Marta Meana. I value your insights and contributions very much. Thank you Dr. Lindsey Ricciardi for helping me conceptualize these findings and encouraging me to apply them clinically. To that end, working with several male clients with eating disorders inspired me to pursue this project; I would like to thank them for the profound influence they had on me. To my amazing parents: Your mantra of “work hard, learn lots” sticks with me to this day. Your constant support and encouragement have kept me going through the tough times. I love you very much. I am honored to call you my family. And to my family of friends – the ones I have known since kindergarten to the ones I met in graduate school – thank you as well. You are all so special to me and are truly the most incredible Friendship Village anyone could ask for. Love you all.

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CHAPTER 1

INTRODUCTION

Eating disorders, eating pathology, and body image are understudied in men. Historically, researchers considered eating disorders and subclinical symptoms to be female phenomena (Corson & Andersen, 2002). Only within the past three decades have researchers acknowledged that men suffer from eating disorders and body image concerns and shifted their research focus to include men. Results of recent studies document that men: (1) develop eating disorders, although at rates lower than women (Hudson, Hiripi, Pope, & Kendler, 2007); (2) display eating pathology in the absence of a clinical eating disorder (Woodside et al., 2001); and (3) experience significant body image problems (Garner, 1997).

Among men, college students appear to be especially vulnerable to eating and body image concerns, as rates of diagnosed eating disorders are higher than in the general male population (Hesse-Biber, Gilmartin, & Lydenberg, 1999; Pyle, Halvorson, Mitchell, & Neuman, 1991; Schwitzer, Bergholz, Dore, & Salimi, 1998; Wilfley, Agras, & Taylor, 2013). In addition, college students exhibit elevated rates of subclinical eating pathology such as binge eating, restrictive eating, purging, excessive exercise, dissatisfaction with one's appearance, and overvaluing the importance of one's weight or shape on self-concept (Hoerr, Bokram, Lugo, Bivins, & Keast, 2002; Mintz & Betz, 1998). For example, while less than 1% of college men meet full criteria for an eating disorder (Hoek & van Hoeken, 2003), nearly 4% report clinical-level eating pathology (Eisenberg, Nicklett, Roeder, & Kirz, 2011; Hoerr et al., 2002), and between 20 and 30% report subclinical eating pathology (Heatherton, Mahamedi, Striepe, Field, & Keel, 1997; O'Dea

& Abraham, 2002). As a result, college students are often considered at-risk for eating disorder development (Taylor et al., 2006).

Given estimates of elevated rates of eating pathology in nonclinical college men, it is critical to examine correlates of eating pathology in this population, particularly because body image concerns differ substantially between men and women. Specifically, whereas women strive for thinness, men typically desire a muscular build with very little body fat (Mishkind, Rodin, Silberstein, & Striegel-Moore, 1986). To that end, *drive for muscularity* (McCreary & Sasse, 2000) and *muscle dysmorphia* (Pope, Phillips, & Olivardia, 2000), defined as misperceptions and/or obsessions with muscularity and dissatisfaction with one's current build, are common male body image concerns. While there is a paucity of research identifying the predictors and correlates of eating disorder development in college men (i.e., Klein & Walsh, 2003; Stice, 2002), emerging research suggests an association between each of these aspects of body image and a host of negative consequences; for example, increased use of appearance and performance enhancing drugs (Hildebrandt, Alfano, & Langebucher, 2010a), extreme attempts to increase body weight and muscle mass (Olivardia, Pope, Borowiecki, & Cohane, 2004), poor self-esteem, and symptoms of depression (McCreary & Sasse, 2000).

Despite these concerning associations, few studies to date have tested the relationship between several aspects of male body image using conceptual models. Theoretically, men who aspire to cultural appearance ideals (i.e., muscularity) and experience appearance dissatisfaction (i.e., muscle dysmorphia) may experience negative psychological, behavioral, and social consequences. For instance, research demonstrates an association of drive for muscularity (Martin, Kliber, Hodges Kulinna, & Fahlman,

2006) and muscle dysmorphia (Grieve, Jackson, Reece, Marklin, & Delaney, 2008) with s*ocial physique anxiety*, which is fear of negative evaluation of one's physique or body composition by others in public (Hart, Leary, & Rejeski, 1989). Furthermore, men who report a high drive for muscularity, muscle dysmorphia, and concerns about negative evaluation of one's body by others may engage in increased *body checking* (Walker, Anderson, & Hildebrandt, 2009; Walker, Murray, Lavender, & Anderson, 2012), defined as behaviors aimed at monitoring or assessing one's body shape, weight, or muscularity (i.e., checking the size, hardness, density, or symmetry of muscles; Alfano, Hildebrandt, Bannon, Walker, & Walton, 2011; Hildebrandt, Walker, Alfano, Delinsky, & Bannon, 2010b). Body checking behaviors, in turn, can lead to *clinical impairment* in personal, social, or cognitive functioning (White & Warren, 2013).

To build on previous research, the overarching goal of this study was to explore and test the relationships among drive for muscularity, muscle dysmorphia, body checking, social physique anxiety, global eating pathology, and clinical impairment in a sample of nonclinical college men using path modeling (see Figures 2-4). Based on previous research, I created three comprehensive path models of these relationships and tested the degree to which each model fit the data. I developed model 1 (Figure 2) based on research by McCreary and Saucier (2009). In this model, I hypothesized that drive for muscularity predicts social physique anxiety; social physique anxiety predicts body checking; and eating pathology and muscle dysmorphia moderate this relationship. Furthermore, I hypothesized that body checking and general eating pathology predict clinical impairment. Although this was my primary study model, it was desirable to test other similar models based on theory to determine if an alternate model fit the data better.

To that end, model 2 (Figure 3) hypothesized slightly different relationships among constructs: that drive for muscularity predicted muscle dysmorphia and social physique anxiety; muscle dysmorphia mediated the relationship between social physique anxiety and body checking; and body checking mediated the relationship between eating pathology and clinical impairment. Model 3 (Figure 4) hypothesized that muscle dysmorphia predicted drive for muscularity, social physique anxiety, and clinical impairment; social physique anxiety predicted drive for muscularity and clinical impairment; drive for muscularity predicted body checking; and body checking predicted clinical impairment.

Before testing this overarching study goal, it was necessary to first psychometrically examine a measure of social physique anxiety for men. Consequently, a secondary study goal became to evaluate a modified version of the Social Physique Anxiety Scale (SPAS). While the SPAS has demonstrated acceptable psychometric properties within samples of nonclinical men (Elkund, Kelley, & Wilson, 1997), it was originally written for women and several items include the phrase "physique or figure." While there is no research examining how men interpret the term "physique" or "figure," it is possible that these words have a feminine connotation and may be more salient to female body image. To that end, male body image measures usually use terms like "build" or "body" instead. Thus, I created and administered a modified version of the SPAS in which the words "build or body" replaced "physique or figure" on the relevant items.

To test if the MSPAS differed from the original, I conducted a confirmatory factor analysis to examine the underlying factor structures of both measures. I predicted the

measures would be factorially variant (i.e., two different factor structures). Next, I compared mean scores on the MPAS and SPAS, hypothesizing that men would score higher on the MSPAS. Finally, I tested for measurement invariance of the original and modified SPAS by conducting a multigroup confirmatory factor analysis using two samples of men: one that completed the original SPAS and one that completed the MSPAS. I hypothesized results would indicate measurement variance – meaning that the modified terminology (i.e., "build or body") influenced how men responded to the SPAS.

CHAPTER 2

LITERATURE REVIEW

The purpose of this section is to provide a rationale for the theoretical models I tested. These models described the relationships among drive for muscularity, muscle dysmorphia, body checking, social physique anxiety, global eating pathology, and clinical impairment in nonclinical college men. Below I review the literature on each of the various components of the proposed models to elucidate how these constructs are conceptually related.

Section 1 reviews eating pathology in men by providing general information on eating pathology and its' prevalence; discussing sex differences in the presentation of eating pathology and body image concerns; and detailing a theoretical framework for the nature of eating pathology and body image concerns in Western cultures. Section 2 reviews the literature on body checking (one particular form of eating pathology) including the presentation of body checking overweight and normal weight men; correlates of body checking behavior; results of experimental studies of body checking; and limitations of existing research to address in the current study. Section 3 describes the theoretical relationship between eating pathology and anxiety through concerns about negative evaluation of one's physique and body composition by others (known as social physique anxiety). Furthermore, this section reviews the relationships among social physique anxiety, body satisfaction, and eating pathology. Finally, Section 4 outlines how this extant literature has informed the design of the present study, which comprises the examination of three comprehensive path models of the relationships among body

dissatisfaction, drive for muscularity, eating pathology, social physique anxiety, and eating disorder-related clinical impairment in nonclinical college men.

Section 1: Eating Pathology in Men

As characterized in the Diagnostic and Statistical Manual for Mental Disorders (DSM-IV-TR, American Psychiatric Association [APA], 2000), the eating disorders consist of Anorexia Nervosa (AN), Bulimia Nervosa (BN), and Eating Disorder Not Otherwise Specified (EDNOS), which includes the provisional diagnosis of Binge-Eating Disorder (BED). In the most recent revision of the DSM (DSM-5, APA, 2013), BED is no longer considered a provisional diagnosis and now merits its own diagnostic category. Additionally, the APA reorganized the catch-all diagnosis of EDNOS to Other Specified Feeding and Eating Disorder (OSFED) and Unspecified Feeding and Eating Disorder (UFED) in DSM-5 (APA, 2013). These new diagnostic categories describe situations when symptoms cause significant impairment yet do not meet the full criteria for any of the eating disorders (OSFED) or when there is insufficient information to make a more specific eating disorder diagnosis (UFED). Despite these subtle changes to the diagnostic criteria in the DSM-5, the core symptoms of the eating disorders – an overvalued importance of one's weight and shape on self-concept and extreme weight/shape regulation behaviors such as restrictive eating, purging, laxative abuse, or excessive exercise – remain unchanged in the most recent diagnostic manual (DSM-5, APA, 2013).

Prevalence of Eating Pathology in Men

Clinically diagnosed eating disorders are rare in men. Epidemiological data suggest that less than 5% of adults in the United States meet criteria for an eating disorder (Hoek & van Hoeken, 2003; Hudson et al., 2007) and approximately one tenth of those

cases are men (Carlat & Camargo, 1991; van Hoeken, Seidell, & Hoek, 2003). For instance, a large population-based analysis conducted in the United States (N = 9,282) revealed that 0.3% of men met criteria for AN, 0.5% for BN, and 2.0% for BED (Hudson et al., 2007). Woodside and colleagues (2001) found similar prevalence rates for AN (0.2%) and BN (0.1%) in a sample of 3,831 men.

Although clinically diagnosed eating disorders in men are rare, rates of subclinical *eating pathology* are relatively high (Hudson et al., 2007). Eating pathology includes a continuum of behaviors that are indicative of the eating disorders but do not meet the full diagnostic criteria. Common forms of eating pathology include restrictive eating, binge eating, engaging in compensatory behaviors to offset eating (e.g., vomiting), dissatisfaction with one's appearance, and overvaluing the importance of one's weight or shape on self-concept. For example, a large survey of 52,677 men in the United States revealed that nearly 50% reported dissatisfaction with their weight (Frederick, Peplau, & Lever, 2006). Although symptoms of eating pathology in isolation do not satisfy the criteria for an eating disorder, changes in DSM-5 now allow that the constellation of numerous disordered eating symptoms may satisfy the criteria for OSFED or UFED if they cause significant impairment (American Psychiatric Association, 2013).

In fact, rates of eating pathology in men may be even higher than these studies suggest. Many large epidemiological studies use data collection methods with skip logic, so participants who do not endorse screener items (i.e., refusal to maintain average body weight or binge eating) are not asked further questions about eating pathology or body image concerns (Striegel-Moore et al., 2009). Men may be less likely to endorse such items because researchers developed most assessment instruments for women; thus, most

describe typical female body concerns (Lewinsohn, Seeley, Moerk, & Striegel-Moore, 2002; Weltzin et al., 2005). According to some researchers, for example, the rate of body dissatisfaction has become comparable in males and females in the United States (Frederick, Forbes, Grigorian, & Jarcho, 2007). Thus, population-based studies may underrepresent the prevalence of eating pathology in adult men.

Additionally, both clinical and subclinical eating pathology are increasingly prevalent among young adults and college students (Olivardia, Pope, Mangweth, & Hudson, 1995; White, Reynolds-Malear, & Cordero, 2011). Recent estimates suggest that about 14% of college women and 4% of college men met full criteria for an eating disorder (Eisenberg et al., 2011; Hoerr et al., 2002) and between 5 and 10% reported disordered eating behaviors and cognitions (i.e., loss of control over eating, vomiting, believing they are fat when others say they are thin). In a sample of 93 college men, O'Dea and Abraham (2002) found that approximately 20% of college men reported significant, impairing concerns about their weight and shape and that many of these men engaged in highly restrictive eating to influence their body weight and shape. These rates are concerning as subclinical symptoms persist over time without intervention and may cause distress and impairment (Eisenberg et al., 2011). As previously mentioned, the presence of multiple, impairing eating disorder symptoms is now more likely to result in a OSFED or UFED diagnosis than in earlier versions of the DSM (American Psychiatric Association, 2013).

Sex Differences in Eating Pathology

Despite increasing information that men experience eating pathology, a large body of research suggests that eating disorders are less common in men than women,

with prevalence studies estimating that only 10-25% of those with eating disorders are male (Hudson et al., 2007; van Hoeken et al., 2003). However, for many years, researchers conceptualized eating disorders as a uniquely female problem (Pope et al., 2000). As a result, there is a female bias within the eating disorders field and the eating disorder diagnostic criteria reflect this bias (Striegel-Moore & Marcus, 1995). For instance, amenorrhea was part of the AN diagnostic criteria until DSM-5; consequently, men with an AN-like presentation often received the less specific diagnosis of EDNOS. This is undesirable because many professionals consider EDNOS a "residual" diagnostic category that is generally suggestive of less severe or "subthreshold" pathology and has few treatment guidelines (Fairburn & Bohn, 2005). Furthermore, although men may present with the same eating disorder symptoms as women, they are less likely to receive any eating disorder diagnosis due to the stereotype that these are "feminine" disorders (Andersen, 1999).

Perhaps as a result, men are less likely than women to seek treatment for eating disorders (Woodside et al., 2001). Failure to seek treatment can result in a longer, more protracted disease course (Andersen & Holman, 1997). Men who do seek treatment often receive less care than women (Lewinsohn et al., 2002). In fact, some treatment programs will not accept male patients (Andersen, 1999; Drummond, 2002). Thus, men are at a "double disadvantage" relative to women with eating disorders (Striegel-Moore, Leslie, Petrill, Garvin, & Rosenheck, 2000). These findings reinforce the need to investigate the perpetuating factors of eating disorders in men to reduce the development and chronicity associated with these conditions.

In recent years, research investigating sex differences in eating pathology and body image has gained popularity. For instance, the journal *Sex Roles* published several special issues (volumes 63 and 65) focusing on gendered experience of body image and eating pathology within the past five years. This emerging body of research highlights three key qualitative differences between the sexes. First, men appear to use different compensatory behaviors than women (Anderson & Bulik, 2004). For example, men in a large community sample of 1,056 college students scored significantly higher on measures of excessive exercise than women (Lewinsohn et al., 2002). Men are also less likely to engage in purging or laxative use but more likely to engage in excessive/compulsive exercise than women (Weltzin et al., 2005).

Second, patterns of over- and under-eating differ between men and women (Olivardia et al., 1995; Striegel-Moore et al., 2009). Men are more likely to engage in overeating than restrictive eating (Weltzin et al., 2005) and are less likely to experience a sense of loss of control during a binge-eating episode (Smolak & Striegel-Moore, 2004). For example, a large epidemiological, community-based study ($N = 5{,}522$) on sex differences and eating pathology found that men were more likely to report overeating while women were more likely to report loss of control eating, binge eating, fasting, or highly restrictive eating to control weight (Striegel-Moore et al., 2009). Similarly, Lewinsohn and colleagues (2002) found that men were more likely to report overeating than women, although men were less likely to endorse loss of control eating or perceive the amount of food consumed as excessive (Lewinsohn et al., 2002).

The final and most researched sex difference relates to body image concerns (e.g., Cash & Pruzinsky, 2002; Feingold & Mazzella, 1998; Mintz & Betz, 1986). *Body image*

is a subjective, multidimensional concept that encompasses perceptions about satisfaction with one's physical appearance, acceptance of one's body, anxiety related to one's body, and the salience of one's appearance to one's identity and self-concept (Cash, 1997; Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999). Both the DSM-IV-TR (APA, 2000) and DSM-5 (APA, 2013) include negative or distorted body image among the diagnostic criteria for several eating disorders, including AN, BN, and Body Dysmorphic Disorder (BDD). Besides being a key component of eating disorders, negative body image is a robust risk factor for depressive symptoms, low self-esteem, and reduced quality of life (Olivardia et al., 2004).

Research suggests that male and female body image concerns are substantially different because most cultural ideals and values of appearance differ greatly by sex (Muth & Cash, 1997). Specifically, men typically desire a muscular build with very little body fat, while women are more concerned with thinness than muscularity. As such, the ideal-looking male body in today's mainstream Western culture has very little body fat; a muscular torso with well-developed shoulders, chest, arms, and abdomen; and a thin waist with defined buttocks (Miller, Coffman, & Linke, 1980; Pope et al., 2000). Described as the *V-shape* or *muscular* ideal, studies suggest that children's toys (Pope, Olivardia, Gruber, & Borowiecki, 1999) and magazine centerfolds (Leit, Pope, & Gray, 2001) have evolved in the past 50 years to reflect this ideal of extreme and defined muscularity (Leit, Gray, & Pope, 2002).

In contrast, the female body ideal is a thin, elongated body with little body fat (Garner & Garfinkel, 1980). Women do not endorse the same muscularity concerns as men and report greatest concern with their hips, buttocks, thighs, and legs (Cash &

Henry, 1995). Male and female body image concerns represent different ends of a continuum: Women often see themselves as unacceptably large and aspire to unrealistic levels of thinness while men see themselves as unacceptably small and aspire to extreme levels of muscularity (Murray, Rieger, Touyz, & Garcia, 2010). Furthermore, some researchers characterized the difference between male and female body image as men wanting to swell everything above the waist, and women wanting to shrink everything below the waist (Pope et al., 2000).

At their most extreme, male body image concerns manifest as *muscle dysmorphia* (Pope, Gruber, Choi, Olivardia, & Phillips, 1997). Although diagnosed as a form of BDD (a somatoform disorder) instead of an eating disorder (DSM-5, APA, 2013), sufferers of muscle dysmorphia experience a pathological preoccupation with their muscularity which may manifest through special diets to increase muscle mass and/or decrease fat, preoccupation with weight lifting, eating large amounts of food to increase weight, or the use of steroids and other performance enhancing agents (Pope et al., 2005). Notably, men with muscle dysmorphia experience significant body image disturbance as they view themselves as much smaller and less muscular than they actually objectively appear (Pope et al., 2000). For this reason, muscle dysmorphia was originally called "reverse anorexia" (Pope, Katz, & Hudson, 1993). This distorted perception can lead to significant distress or impairment, including extreme efforts to conceal one's body or avoid exposing one's body to others (Frederick et al., 2006; Pope et al., 2000). Furthermore, men with muscle dysmorphia exhibit high rates of eating pathology, similar to men with eating disorders (Olivardia, Pope, & Hudson, 2000).

Theories Explaining Sex Differences

Evolutionary and sociocultural factors impact body image formation and may account for sex differences in body image and eating pathology. From an evolutionary perspective, reproductive desirability may underlie sex differences in body image. For centuries, societies have valued women for their beauty and sexual attractiveness (i.e., a sign of their reproductive ability), which is most apparent in their body shape (Buss, 1987). For example, researchers have historically used metrics such as waist-to-hip ratio to define what an "attractive" female body shape is in the eyes of potential male mates (Singh, 1993). Men, on the other hand, are often valued for their resources and ability to provide for offspring, which includes brute strength (Buss & Barnes, 1986). Thus, the importance of one's body shape or weight is not just an ancestrally "female" problem (Abed, 1998).

Some research supports an evolutionary explanation for the drive for muscularity in men. Namely, muscular men may have higher reproductive fitness. For instance, a muscular body may increase a man's status in relation to other males (Frederick & Haselton, 2007). Women also perceive a muscular physique as more attractive and indicative of better genes (Penton-Voak & Perrett, 2000). For example, women rate men with exaggerated secondary sex characteristics (like muscularity) as more attractive (Frederick & Haselton, 2007). Women may also value men with a muscular build for their capacity for protection or assistance with physically demanding tasks (Frederick & Haselton, 2007).

From a sociocultural perspective, Western cultural sex roles traditionally placed more value on attaining a specific appearance for women than men. Until recently, Western women had limited possibilities for status attainment and thus physical

attractiveness was a major determinant of women's worth (Garner & Garfinkel, 1980). Although culture and appearance ideals change over time, current Western values promoting an association between thinness and several positive traits have propagated the pursuit of thinness among Western women. For example, thinness and small stature are signs of femininity, youthfulness, good health, and higher social class (Owen & Laurel-Seller, 2000; Stunkard, 1975). Thus, women may pursue thinness to achieve higher status in these areas. However, as women gained more power (e.g., entering the mainstream workforce, having more choice about choosing a romantic partner, and whether to stay or leave a relationship) and marketing in the mass media emerged portraying the ideal man as having a certain build, cultural pressure to attain the ideal appearance has increased for men. Pressure to attain an attractive appearance is strong in today's culture (Wolff, 2002) because being able to provide for one's offspring is not as essential to mate selection as it once was (Cere, 2000).

While appearance ideals change significantly with culture and over time, researchers agree that the current ideal body type is muscular, with very low body fat, wide shoulders, and narrow waist and hips (Andersen, Cohn, & Holbrook, 2000). For example, the dominant male beauty themes of the past several centuries evolved from leanness and youthfulness, to well-roundedness and plumpness, to the current ideal present in several cultures across the world: muscularity (Ricciardelli & Williams, 2012). Researchers refer to the current ideal male body type as the *muscular ideal* and pursuit of that ideal is commonly known as the *drive for muscularity* (McCreary & Sasse, 2000), which forms the core of current body image concerns in men.

In support of sociocultural theories of eating disorder development, research suggests that body image concerns are increasingly prevalent among boys and men in the United States (Grieve, 2007). The most frequently cited data are from a series of three large surveys in *Psychology Today* magazine (Berscheid, Walster, & Bohrnstedt, 1973; Cash, Winstead, & Janda, 1986; Garner, 1997). These data illustrated that the proportion of men dissatisfied with their overall appearance increased from 15% in 1972 to 34% in 1985, and to 43% in 1996 (Cash, 2000). Thus, in two decades the percentage of men reporting dissatisfaction with their appearance nearly tripled. Similarly, dissatisfaction with one's weight, muscle tone, and upper torso increased significantly (Berscheid et al., 1973; Cash et al., 1986; Garner, 1997).

Additionally, media exposure negatively influences men's body image by propagating the unattainable muscular ideal: the so-called *culture of muscularity* (Agilita & Tantleff-Dunn, 2004, p. 8). For instance, Pope and colleagues found that media portrayals of the male body (through film, magazines, and children's action figure toys; see Figure 1) have become significantly more muscular between the 1970s and 1990s (Leit et al., 2001; Pope et al., 1999).

Figure 1. Comparison of children's action figures. Luke Skywalker and Hans Solo, 1978 (left); Luke Skywalker and Hans Solo, 1998 (right). Image originally printed in Pope et al. (1999). See Appendix D for copyright approval to reproduce this image.

For example, G.I. Joe action figures have become more muscular and have sharper muscle definition (Pope et al., 1999). The authors concluded that changes to children's toys mirror the changing cultural expectations for the ideal body and may be contributing to body image problems in men (Pope et al., 1999). Another study documented the rising muscularity of Playgirl centerfolds, finding that models in the 1990s gained 27 pounds of muscle and had 12 fewer pounds of fat as compared to models from 1976 (Leit et al., 2001).

As the media exposes this ideal to men, they are likely to internalize the muscular ideal as self-relevant. Perceived social pressure to attain the muscular ideal and personal internalization of this ideal can lead to body dissatisfaction and eating pathology

(Thompson et al., 1999). As it does for women (Thompson et al., 1999), the discrepancy between one's own body and the cultural ideal (as portrayed by the mass media and other cultural outlets) can lead men to experience body dissatisfaction, lower self-esteem, and depression (Agilita & Tantleff-Dunn, 2004; Pope et al., 2000). Experimental studies suggest that men experience increases in body dissatisfaction and muscle dysmorphia after viewing images of the ideal male body. For example, college men who viewed advertisements featuring very muscular men with low body fat (i.e., the male ideal) rated their own muscularity as lower and reported an increased drive for muscularity compared to men who viewed advertisements featuring neutral male bodies (Leit et al., 2002). As the current male body ideal in mainstream United States media is unattainable without the use of extreme dieting and anabolic steroids or other appearance and performance enhancing drugs (Pope et al., 1999), men are more likely to resort to extreme weight control strategies (Cafri et al., 2005).

Summary

Recent research discredited the myth that men do not suffer from eating disorders, eating pathology, or body image concerns (Cash & Pruzinsky, 2002; Frederick et al., 2006; Hoerr et al., 2002; Lewinsohn et al., 2002; Mintz & Betz, 1986; Striegel-Moore et al., 2009; Woodside et al., 2001). Our current understanding is that sex influences the nature of these concerns (Cash & Pruzinksy, 2002; Lewinsohn et al., 2002; Mintz & Betz, 1986; Striegel-Moore et al., 2009). Evolutionary and sociocultural theories provide explanations for sex differences in body image and eating pathology (Abed, 1998; Buss, 1987). These theories also elucidate reasons for the rising importance of muscularity for men in Western cultures (Frederick & Haselton, 2007). Drive for muscularity and muscle

dysmorphia are common components of modern male body image (Grieve, 2007; Pope et al., 2000). Unfortunately, there are significant negative psychological and physical consequences associated with the pursuit of muscularity and muscle dysmorphia (Olivardia et al., 2004; Yesalis & Bahrke, 2002).

Section 2: Body Checking in Men

Although understudied in men, one particular form of eating pathology that has gained attention in the recent research literature is *body checking*. Body checking provides information about one's body size, shape, weight, or overall appearance that can identify changes over time (Shafran, Fairburn, Robinson, & Lask, 2004). For example, body checking behaviors include conducting visual and tactile assessments of one's body (e.g., measuring or pinching body parts, repeatedly weighing one's self or checking one's appearance in the mirror) and soliciting information or descriptions from others (Mountford, Haase, & Waller, 2006). Body checking often co-occurs with the some of the core cognitive features of the eating disorders; mainly, the overvalued importance of weight and shape on one's self-concept (Reas, Whisenhunt, Netemeyer, & Williamson, 2002; Shafran et al., 2004). Thus, some have concluded that body checking is a behavioral manifestation of eating disorder symptomatology (Shafran et al., 2004).

Body checking commonly co-occurs with *body avoidance*, which is described as efforts to avoid exposure of one's body shape or weight to self or others (Rosen, Srebnik, Saltzberg, & Wendt, 1991). These behaviors include efforts to camouflage or avoid visual input of one's body or avoiding exposure of one's body in public, such as wearing baggy clothing; avoiding looking in the mirror; and avoiding social situations that involve body exposure (e.g., swimming; Fairburn, Cooper, & Shafran, 2003). Some researchers

suggest that the nature of body checking changes over time and eventually becomes characteristic of body avoidance (Fairburn, Shafran, & Cooper, 1999). Theoretically, body checking can be highly arousing or anxiety-provoking for an individual who is very concerned with his or her appearance. Consequently, repeated body checking may lead to an escape response whereby an individual begins to avoid their body altogether to manage the intense anxiety (Fairburn et al., 1999). As with body checking, there is a relationship between body avoidance and the overevaluation of weight and shape (Grilo et al., 2005; Reas, Grilo, Masheb, & Wilson, 2005).

Correlates of Body Checking

Overweight/obese men. Body checking is common within overweight or obese samples (Grilo et al., 2005; Latner, 2008; Reas et al., 2005). As such, most existing studies investigate the correlates of body checking in overweight or obese men who are attempting to lose weight through behavioral weight loss or surgical intervention (Grilo et al., 2005; Latner, 2008; Reas et al., 2005). For instance, in a study of 44 overweight individuals seeking bariatric surgery, over one fourth endorsed body checking "often" and nearly 16% of the men in this sample endorsed "always" engaging in body checking (Grilo et al., 2005). Similarly, in a study of 30 overweight men enrolled in a behavioral weight control treatment, Latner (2008) found that 28% of the sample reported body checking "often" or more frequently. In a sample of overweight men with BED (n = 80), over 50% reported body checking "often" and 18% reported "always" checking their appearance via pinching areas of their body to assess for adiposity (Reas et al., 2005).

Body checking is also associated with behavioral and cognitive elements of disordered eating among overweight men. For instance, body checking is uniquely

associated with restrained eating (Grilo et al., 2005). In addition, body checking correlates with the overvalued importance of weight and shape to self-concept (Grilo et al., 2005; Reas et al., 2005), which is one of the core diagnostic criteria for the eating disorders (APA, 2000, 2013). Furthermore, body dissatisfaction is common among those who engage in body checking (Latner, 2008). Body dissatisfaction accounted for a large amount of the variance in predicting body checking, suggesting that body checking may be a behavioral manifestation of low body satisfaction (Latner, 2008). Moreover, body checking predicts overevaluation of weight/shape, accounting for between 22 and 25% of the variance in overevaluation of weight and shape (Reas et al., 2005). Thus, body checking may contribute to the onset and maintenance of eating disorders (Shafran et al., 2004).

Normal weight men. As mentioned above, the majority of studies examining the correlates of body checking in men utilize overweight or obese samples. Nonetheless, a few studies investigating the relationships among body mass index (BMI) and body checking yield mixed results. Most studies point to no relationship (Grilo et al., 2005; Latner, 2008; Masheb & Grilo, 2000; Reas et al., 2005), although one recent study found that body size is positively related to the frequency of body checking (Haase, Mountford, & Waller, 2011). Notably, most of these studies were underpowered and included small samples of men (Reas et al., 2005).

In light of these methodological limitations and mixed findings, several recent studies examined body checking behavior in nonclinical, normal weight samples of college men (Alfano et al., 2011; Meyer, McPartlan, Rawlinson, Bunting, & Waller, 2011; Walker et al., 2009; Walker et al., 2012). The first of these studies (Walker et al.,

2009) investigated the prevalence and nature of body checking in a large sample of undergraduate men ($N = 549$). Results indicated that body checking was significantly, positively correlated with weight and shape concerns, depressive symptoms, muscle dysmorphia, and negative affect (Walker et al., 2009). Body checking was most common among men who desired an extreme BMI increase and men who reported using appearance and performance enhancing drugs (APEDs). These findings suggest that body checking may be a behavioral manifestation of body dissatisfaction, which may lead to extreme weight or appearance control methods. According to Walker and colleagues (2009), there are negative behavioral (i.e., body checking, APED use), emotional (i.e., depression/negative affect), and cognitive (i.e., weight/shape concerns) consequences of body checking in nonclinical college men.

To follow up on this initial report on body checking in men, Meyer et al. (2011) investigated whether body checking significantly contributed to global eating pathology in a sample of 88 nonclinical men. Results indicated that body checking was a significant predictor of all measured forms of eating pathology, including restrained eating, eating concerns, weight concerns, and shape concerns (Meyer et al., 2011). Affective factors (i.e., anxiety and depression) could not explain this association; thus, the authors concluded that affective states alone do not drive body checking behaviors.

Experimental studies of body checking. Given the limitations of the previously reviewed correlational studies, Walker and colleagues (2012) designed an experimental study to test how body checking behavior affects body image and muscle dissatisfaction. A sample of 234 normal weight nonclinical college men participated in either high or low body checking conditions and completed measures of body and muscle satisfaction

before, immediately following, and ten minutes after the body checking manipulation. Immediately after the manipulation, men in both conditions reported significantly decreased body image satisfaction; however, body image satisfaction returned to baseline levels in both groups after ten minutes (Walker et al., 2012). Therefore, the effect of the body checking manipulation on body satisfaction was short-lived and did not differ based on intensity of body checking. On the other hand, in both conditions muscle dissatisfaction increased immediately after the body checking manipulation, continued to increase after ten minutes, and remained significantly higher than baseline levels in both conditions (Walker et al., 2012). The negative effects of body checking on muscle dissatisfaction were slower to build yet more long-lasting than ratings of body dissatisfaction.

Limitations of Existing Research

While these studies improve our understanding of the nature and correlates of body checking in men, there are significant limitations to consider. First and most importantly, the assessment of body checking is inconsistent and rarely sex-appropriate. For example, several authors (Grilo et al., 2005; Latner, 2008; Reas et al., 2005) relied upon a one-item assessment of body checking behavior (i.e., from Body Shape Questionnaire: "Have you pinched areas of your body to see how much fat there is?") and those who used a more comprehensive assessment instrument (i.e., the 23-item Body Checking Questionnaire; Reas et al., 2002) may not have adequately measured body checking in men. Due to the different body image ideals for men and women (i.e., muscularity versus thinness), the nature of body checking behavior differs between the sexes (Alfano et al., 2011): Women typically check for adiposity and focus on areas of

typical female discontent (i.e., thighs, bottom, stomach); while men check the size, hardness, density, and symmetry of muscles and focus on areas of greater muscularity (i.e., chest, arms, abdomen; Hildebrandt et al., 2010b). Thus, using a measure of body checking developed for females (i.e., the Body Checking Questionnaire; Reas et al., 2002) does not fully capture the body checking behavior of males and is a weakness of some existing studies (e.g., Meyer et al., 2011).

Second, many studies included a relatively small sample of men and were not adequately powered (e.g., Grilo et al., 2005; Latner, 2008; Meyer et al., 2011; Reas et al., 2005). Third, the demographic makeup of these samples has been largely limited to White/European American males with small samples of ethnic minority men. Many existing studies either did not report the demographic characteristics of the sample (Haase et al., 2011; Meyer et al., 2011) and in those that did, less than 20 percent of the participants are non-White/Caucasian (Latner, 2008; Reas et al., 2005; Reas, White, & Grilo, 2006). I aim to address these limitations in the current study by using a comprehensive, sex-appropriate measure of body checking behavior and recruiting a large, ethnically diverse sample.

Summary

There is a paucity of research on the nature and correlates of body checking in men yet existing studies suggest several concerning associations. Among overweight men, body checking is common and associated with behavioral and cognitive features of eating disorders (Grilo et al., 2005; Latner, 2008; Reas et al., 2005). Similarly, normal weight men who report body checking are more likely to experience body dissatisfaction, muscle dysmorphia (Walker et al., 2012), or use extreme weight or appearance control

methods (Walker et al., 2009). Body checking also predicts global eating pathology (Meyer et al., 2011). Experimental studies suggest that body checking results in short-term increases in body dissatisfaction and long-term increases in muscle dissatisfaction and dysmorphia (Walker et al., 2012). Overall, the relation between body checking and various facets of eating pathology is concerning and suggests that body checking may be a risk factor for eating disorder development.

Section 3: Eating Pathology and Social Physique Anxiety

In general, anxiety and eating pathology are highly comorbid in women with eating disorders. According to Pearlstein's (2002) review of the comorbidity literature, 20-55% of women with AN and 13-75% of women with BN report a lifetime anxiety disorder diagnosis (Godart, Flament, Lecrubier, & Jeammet, 2000). Rates are slightly lower in women with BED, ranging from 9-46% (de Zwaan, 2001). These rates are significantly higher when compared to the lifetime prevalence of an anxiety disorder among nonclinical women (approximately 28%; Kessler et al., 2005). Among the various forms of anxiety examined in these comorbidity studies, social anxiety or social phobia is the most common anxiety disorder diagnosis (Godart et al., 2000).

Comparatively, there is less research examining the co-occurrence of eating and anxiety pathology in men. Nonetheless, in clinical populations of men with eating disorders, the prevalence of a comorbid anxiety disorder does not differ significantly from rates in women (Woodside et al., 2001). For example, Woodside and colleagues (2001) compared men with eating disorders (n = 62) to women with eating disorders (n = 212) and a community sample of men without eating disorders (n = 3,769). The authors found that men with eating disorders were much more likely than men without eating

disorders to have an anxiety disorder diagnosis, lifetime (OR = 4.23) or current (OR = 2.84). These odds ratios indicate that, as compared to men without eating disorders, men with eating disorders are over four times more likely to meet criteria for an anxiety disorder during their lifetime, and nearly three times as likely to have a current anxiety disorder diagnosis. Additionally, men with eating disorders had a significantly higher rate of multiple comorbid psychiatric disorders (i.e., all anxiety disorders, major depressive disorder, and alcohol dependence) compared to the community sample of nonclinical men. The authors suggested that the elevated rates of psychiatric comorbidity in the clinical sample of men could indicate that anxiety is a risk factor for eating disorder development.

In nonclinical men, the association between anxiety and eating pathology may depend on the particular form of disordered eating in question. For instance, Mitchell and Mazzeo (2004) found that trait anxiety was not a significant predictor of binge eating behavior in African American and European American undergraduate males without eating disorders (n = 55). Conversely, among a community sample of nonclinical men (n = 206) and women (n = 335), Slane and colleagues (2010) found that internalizing symptoms (i.e., anxiety) correlated with eating pathology. Furthermore, the pattern of associations did not differ between men and women, suggesting that anxiety is related to eating pathology in both sexes (Slane et al., 2010).

One form of anxiety that researchers often study in conjunction with disordered eating is *social physique anxiety*. Social physique anxiety describes fears of negative evaluation of one's physique by others (Hart et al., 1989). According to Hart and colleagues (1989), *physique* encompasses one's body composition (i.e., body fat

percentage and muscle tone) and general body proportions. Notably social physique anxiety is distinct from constructs like negative body image: Social physique anxiety is fear related to assumed negative evaluation of one's body by others (Hart et al., 1989) while negative body image is an internal construct and does not necessarily involve negative evaluation by others (Cash, 1997). Given that male body image typically involves muscularity concerns, social physique anxiety may be particularly salient to men.

Correlates of Social Physique Anxiety

Researchers originally studied social physique anxiety within the fitness and exercise science domain (e.g., Crawford & Eklund, 1994; Eklund & Crawford, 1994; Eklund, Mack, & Hart, 1996). Results of these studies indicate that there is a relationship between social physique anxiety and frequency of exercise, attitudes towards exercise, motivation for exercising, and body image satisfaction in men (Frederick & Morrison, 1996; Grieve et al., 2008; Holle, 2004; Williams & Cash, 2001). More recent research suggests that men who endorse social physique anxiety are also more likely to report body dissatisfaction and eating pathology (Aşçi, Tüzün, & Koca, 2006; Baş, Aşçi, Karabudak, & Kiziltan, 2004; Cox, Lantz, & Mayhew, 1997; Hausenblas & Fallon, 2002; Russell, 2002).

Exercise and related constructs. Exercise frequency appears to be one of the most robust correlates of social physique anxiety in nonclinical college men. Numerous studies suggest a positive effect of weight training on social physique anxiety. For instance, Williams and Cash's (2001) comparison of exercising and non-exercising college students found that the weight training group demonstrated a significant decrease

in social physique anxiety compared to the control group (Williams & Cash, 2001). Similarly, Bowden and colleagues (2005) found that college men (n = 98) enrolled in a fitness course showed significant decreases in social physique anxiety over the 16-week course of the class. Hausenblas and Fallon (2002) demonstrated that exercise behavior negatively predicted social physique anxiety: Men who exercised most frequently were more satisfied with their body and reported less social physique anxiety. Furthermore, men who participated in an exercise class showed a significant decrease in social physique anxiety post-exercise compared to pre-exercise levels (Lamarche & Gammage, 2010). In sum, even a brief exercise intervention can reduce ratings of social physique anxiety.

Some researchers theorized that subjective assessments of increased strength may partially account for the relationship between decreased social physique anxiety and exercise frequency. In a sample of 28 exercising college men who completed a 12-week weight-lifting program, participants who reported subjective physical changes endorsed less social physique anxiety yet objective increases in strength were not significantly associated with reduced social physique anxiety (Martin Ginis, Eng, Arbour, Hartman, & Phillips, 2005). Men who perceive they have improved strength and musculature from exercise report less concern about their physique being negatively evaluated by others (Bowden et al., 2005).

Along with increased strength and muscularity, changes to one's body weight may impact social physique anxiety. Within a sample of 20 obese male behavioral weight loss participants, the amount of weight lost positively predicted social physique anxiety such that those who lost more weight after 20 weeks reported greater fears of negative

physique evaluation (Baş & Donmez, 2009). Social physique anxiety is also associated with reasons for exercise. For example, Frederick and Morrison (1996) found that among male university fitness-center users, men who scored higher on a measure of social physique anxiety were more likely to endorse extrinsic motives for exercise (i.e., to improve their appearance) and report higher public body awareness. Moreover, the authors reported that men with higher scores on a measure of social physique anxiety demonstrated an emotional profile similar to addicted exercisers (Frederick & Morrison, 1996).

Theoretically, men involved in competitive body-focused exercise (e.g., weightlifting or body building) may experience more social physique anxiety due to the demands of their sport. However, in a comparison of subgroups of exercising (i.e., anabolic-steroid using body builders, non-steroid using body builders, regular exercisers) and non-exercising college men ($N = 175$), Schwerin and colleagues (1996) found that steroid-using body builders had significantly lower levels of social physique anxiety and higher body satisfaction compared to all other groups. Similarly, in a comparison of novice versus experienced body builders and weightlifters, the experienced body builders had significantly lower ratings of social physique anxiety than inexperienced body builders (Hurst, Hale, Smith, & Collins, 2000).

Body image and eating pathology. Conceptually, there appears to be an association between social physique anxiety, eating attitudes, exercise behaviors, and body image, although the nature of these relationships is not well understood. For instance, in an attempt to improve their physique, individuals with high levels of social physique anxiety might engage in healthful eating behavior (i.e., eating a balanced diet,

engaging in regular physical activity) or engage in more extreme, pathological eating behavior (i.e., restrictive eating, fasting, purging, excessive exercise; Haase & Prapavessis, 1998). Both positions have received support in the extant literature; therefore, it is unknown whether and under what conditions experiencing social physique anxiety may lead to more positive or negative behavioral changes.

Women. Much of the research attempting to clarify these relationships includes female-only samples. Results of these studies suggest that women who endorse more concerns about social physique appraisals engage in more disordered eating behaviors (Diehl, Johnson, Rogers, & Petrie, 1998; Fitzsimmons-Craft, Harney, Brownstone, Higgins, & Bardone-Cone, 2012; Haase et al., 2011; Haase & Prapavessis, 1998; Haase, Prapavessis, & Owens, 2002; Thompson & Chad, 2002). With regard to body checking, one study demonstrated a positive relationship between health-related anxiety and body checking behavior within a sample of nonclinical female college students ($N = 122$; Hadjistavropoulos & Lawrence, 2007). While this study did not assess for social physique or general trait level anxiety, the results suggested that women with higher body-related concerns are more likely to engage in body checking. The authors concluded that perhaps internal factors like mood or anxiety influence the manifestation of body checking behavior (Hadjistavropoulos & Lawrence, 2007).

Men. There is a small body of research investigating the disordered eating correlates of social physique anxiety in men, largely because social physique anxiety was originally assumed to be more salient to women than men (Hart et al., 1989). Results of most studies demonstrate that women report higher levels of social physique anxiety than men (Davison & McCabe, 2005). However, researchers have argued that social physique

anxiety concerns may be growing among men, in part due to the increasing pressures on men to obtain the muscular body ideal (Grieve, 2007; Olivardia, 2001). Social physique anxiety may lead to body dissatisfaction and pathological eating behaviors to reduce feelings of anxiety.

To that end, men with higher levels of social physique anxiety report less body image satisfaction. For instance, Russell (2002) assembled a large sample of European and African American college students ($N = 557$) and found that men with higher levels of social physique anxiety reported greater body dissatisfaction and lower self-esteem. These results were independent of race and the frequency of aerobic exercise or weight training. Russell (2002) concluded that social physique anxiety may contribute to low body satisfaction and poor self-esteem among nonclinical college men. Similarly, in a study of 231 college men, those who were more satisfied with their body reported less social physique anxiety (Hausenblas & Fallon, 2002). Furthermore, men who engaged in a brief exercise intervention ($N = 12$) experienced reduced social physique anxiety and improved body satisfaction (Williams & Cash, 2001).

Social physique anxiety also appears to be correlated with decreased self-esteem. Grieve and colleagues (2008) investigated the relationships between social physique anxiety, symptoms of muscle dysmorphia, and self-esteem in a sample of nonclinical college men ($N = 134$). Results indicated that men who reported more social physique anxiety had greater levels of muscle dysmorphia and lower self-esteem. Furthermore, these men were more likely to report self-presentational (or appearance-related) motivation for exercising, rather than for health/fitness or recreational reasons (Grieve et al., 2008).

Men with elevated levels of social physique anxiety also report increased body avoidance (i.e., they are less willing to expose their body). Holle (2004) collected a sample of 157 college men and tested whether ratings of social physique anxiety and men's self-reported weight status influenced willingness to expose the upper torso to a stranger. Social physique anxiety and non-average weight status (i.e., over or underweight) were significant predictors of unwillingness to expose one's body. According to Holle (2004), weight status and social physique anxiety may both contribute to body dissatisfaction and thus unwillingness to expose one's physique to potential negative evaluation from others.

Furthermore, men who report social physique anxiety exhibit more disordered eating behaviors. For instance, among a sample of 49 college undergraduate male athletes and non-athletes, social physique anxiety was a strong, significant predictor of eating pathology (Cox et al., 1997). Moreover, men with high social physique anxiety score significantly higher on a measure of eating pathology than men with low social physique anxiety (Aşçi et al., 2006). The relationship between eating pathology and social physique anxiety holds for younger men as well. Among adolescents, those who engage in disordered eating endorse higher ratings of social physique anxiety (Baş et al., 2004). Adolescents with higher social physique anxiety reported more negative eating attitudes, self-worth, and body image as compared to those with low levels of social physique anxiety (Caglar, Bilgili, Karaca, Ayaz, & Aşçi, 2010).

Conceptually, social physique anxiety may be particularly salient to body checking behaviors. Individuals with anxiety disorders tend to have a hyperviligiant awareness and bias for detecting feared stimuli (Rosen & Schulkin, 1998). Some posit

that body checking may function similarly for those with eating disorders (Williamson, 1996). Specifically, individuals with highly negative feelings about their weight or shape may experience extreme anxiety and then engage in body checking to manage that anxiety. Body checking can verify that one has not gained weight and therefore help temporarily reduce anxiety and body dissatisfaction (Rosen, 1997). Body checking behaviors may prevent or undo the distress resulting from preoccupation with body weight and shape (Shafran et al., 2004). Ultimately, this process may moderate affect (Shafran et al., 2004).

To that end, some researchers conceptualize body checking as a "safety behavior" (Shafran, Lee, Payne, & Fairburn, 2007) to regulate adverse affective states, like body dissatisfaction or anxiety. Body checking can provide acute reassurance that one's weight or shape has not changed, thus reducing anxiety. In the long term, continual body checking may actually lead to increased distress, as individuals may believe that regular body checking is necessary to monitor any changes (Meyer et al., 2011). Over time, body checking behaviors can maintain and propagate the underlying cognitions about the functions of these behaviors and the negative affect associated with not performing body checking (Shafran et al., 2007).

Alternately, some have suggested that trait anxiety (rather than learned avoidance responses) motivates body checking. Hinrichsen and colleagues (2003) proposed that fear of negative social evaluation may be the affective component that underlies body checking behaviors. These authors hypothesized that significant anxiety due to social evaluation fears can be temporarily reduced through body checking to verify one's

appearance (Hinrichsen et al., 2003). Through a process of negative reinforcement, body checking provides objective verification of one's appearance.

Support for these theoretical models of anxiety and body checking is mixed. Meyer and colleagues (2011) explored the associations between eating attitudes, affect, and disordered eating behaviors in a sample of nonclinical college men and women (N = 250) and found that the associations between eating-/body-related cognitions and body checking occurred independent of depression or anxiety. Thus, the authors concluded that anxiety alone was not a significant predictor of body checking in this nonclinical sample. Another study found that specific anxiety symptoms (i.e., obsessive-compulsive behaviors) are predictive of body checking in male college students (Vartanian & Grisham, 2012).

To my knowledge, only one published study has investigated the relationship between social physique anxiety and body checking. Haase and colleagues (2007) tested whether social physique anxiety mediated the relationship between body checking cognitions and behaviors in a sample of undergraduate nonclinical women (N = 292). The authors found that social physique anxiety partially mediated this relationship, such that the relationship between beliefs about the function or utility of body checking behaviors and then engaging in those behaviors was stronger in those with higher social physique anxiety (Haase et al., 2007). The major limitation of this study is that it did not investigate these relationships in men.

To address this limitation and expand upon Haase and colleagues' (2007) research, I examined the role of various forms of social anxiety on the body checking behaviors of male (n = 337) and female (n = 567) college students (White & Warren,

2014). My results suggested that social physique anxiety was a significant predictor of body checking in women but not in men. For men, an alternate form of social anxiety, social appearance anxiety, explained more of the variance in body checking behavior. This result was somewhat puzzling, as I hypothesized that social physique anxiety would be highly salient to the body checking behaviors of men because male body image concerns typically center around muscularity and/or body composition. One possible explanation for these unexpected results relates to the wording of several items on the SPAS. Some men may have responded negatively to the phrase "figure or physique," which has a feminine connotation. Perhaps modifying the wording of the SPAS to "body or build" in place of "figure or physique" would eliminate the feminine connotation and result in men endorsing more social physique anxiety. Nonetheless, this study contributed to the existing literature by suggesting that social anxiety does appear to be salient to the body checking behaviors of men.

Overall, these studies suggest associations between body dissatisfaction, eating pathology, and social physique anxiety. Theoretically, concerns about how others are evaluating one's body may contribute to body dissatisfaction and engaging in disordered eating behaviors among college men.

Moderators of Social Physique Anxiety and Eating Pathology

As described above, there is a small body of research that points to a relationship between social physique anxiety and disordered eating cognitions and behaviors in men (Aşçi et al., 2006; Baş et al., 2004; Cox et al., 1997; Hausenblas & Fallon, 2002; Russell, 2002). Yet the potential mechanisms of this relationship are not well understood. Martin and colleagues (2006) investigated how various body-related cognitions (i.e., desire for

muscularity, positive attributes of muscularity, appearance orientation, and appearance evaluation) predicted social physique anxiety while controlling for body composition in a sample of 98 male college students. Results indicated that appearance-related constructs were the most significant predictors of social physique anxiety. Specifically, men who evaluated their appearance negatively reported more social physique anxiety than men who evaluated their appearance more positively. Additionally, men who reported very high positive attributes for muscularity had higher social physique anxiety than men with low positive attributes for muscularity. The authors concluded that social physique anxiety may be a result of high investment in the benefits of muscularity or strong overall appearance orientation (Martin et al., 2006).

Hypothesized models. While there is substantial research illuminating the singular correlates of social physique anxiety, few researchers have tested comprehensive path models of the associations between social physique anxiety, body image, and eating pathology. Two known studies have attempted to expand our understanding of the relationships between multiple constructs using theoretical models. First, McCreary and Saucier (2009) investigated the relationships between body comparison tendency, drive for muscularity, and social physique anxiety in a sample of 182 college men. Using structural equation modeling, the authors found that men who engaged in more weight- and muscle-related body comparison reported the highest levels of social physique anxiety. Also engaging in such body comparisons mediated the relationship between drive for muscularity and social physique anxiety in these men (McCreary & Saucier, 2009). Thus, the relationship between a desire to increase muscularity and social

physique anxiety is stronger for those who engage in muscle- and weight-related body comparison.

Second, McCreary and colleagues (Brunet, Sabiston, Dorsch, & McCreary, 2010) tested a theoretical path model specifying that self-esteem influences social physique anxiety, which (in turn) influences drive for muscularity in a sample of adolescent boys and girls. Results of structural equation modeling supported this hypothesized model: In boys, self-esteem significantly negatively influenced social physique anxiety and social physique anxiety significantly positively influenced the drive for muscularity (Brunet et al., 2010). The authors concluded that social physique anxiety may influence disordered eating through cognitive factors like drive for muscularity.

Limitations of Existing Research

Although recent research efforts have incorporated more advanced statistical methods to test multiple relationships simultaneously (i.e., Brunet et al., 2010; McCreary & Saucier, 2009), few studies have tested complex, multidimensional models of male body image. Existing models provide helpful insights for how we conceptualize social physique anxiety and related concerns in men, yet future research can improve upon these models by testing the relationship among numerous salient constructs simultaneously.

Furthermore, while the number of studies examining male body image and related constructs has increased in recent years, advances in the assessment and measurement of social physique anxiety lag behind. The most commonly used assessment of social physique, the SPAS (Hart et al., 1989), was not created, adapted, or validated for men and there are few studies examining its psychometric properties and factor structure in men. Items on the SPAS are heavily influenced by female concerns (i.e., concerns about

one's appearance in a bathing suit) and use terms with a feminine connotation (i.e., "figure" and "physique"). Furthermore, men were not included in the standardization sample (Hart et al., 1989) and the factor structure of the measure is questionable.

According to Hart and colleagues' (1989) original factor analysis, the SPAS is a unidimensional measure, although several other researchers suggest a two-factor solution (Cramer-Hammann, Lutter, Cornelius, Piontek, & Hardy, 1993; Jackson, Kambis, & Jackson, 1991). According to Jackson et al. (1991) and Eklund et al. (1996), a two-factor solution describes: (1) expectations of negative evaluation of one's physique by others; and (2) feelings of discomfort about the presentation of one's physique. As a result of these studies, McAuley and Burman (1993) concluded that the SPAS factor structure is more complex than originally described. Unfortunately, these studies have been underpowered and used exclusively female or small male samples, so it is unclear whether this factor structure generalizes to undergraduate men.

Summary

Body satisfaction and drive for muscularity may be salient to the association between social physique anxiety and eating pathology in men. How men perceive their appearance, particularly in regards to muscularity, has important implications for men's body image (e.g., Hausenblas & Fallon, 2002; Lamarche & Gammage, 2010; Williams & Cash, 2001). Generally, men with greater levels of social physique anxiety report feeling more self-conscious about their bodies (Frederick & Morrison, 1996; Grieve, 2007; Holle, 2004) and are more likely to report eating pathology and body dissatisfaction (Aşçi et al., 2006; Baş et al., 2004; Cox et al., 1997; Hausenblas & Fallon, 2002; Russell, 2002). Theoretically, body checking and anxiety may be associated (e.g., Haase et al.,

2007; Haase & Prapavessis, 1998; Hinrichsen et al., 2003; Meyer et al., 2011; Vartanian & Grisham, 2012; Williamson, 1996), although this relationship is understudied to date.

Section 4: Present Study

From the aforementioned research, it is clear that men experience significant body image concerns with negative behavioral (i.e., body checking, APED use), emotional (i.e., depression/negative affect), and cognitive (i.e., weight/shape concerns) consequences (Meyer et al., 2011; Walker et al., 2009; Walker et al., 2012). Men with poor body image are more likely to engage in disordered eating and are at higher risk for developing eating disorders (Cash & Pruzinsky, 2002; Stice, 2002). These associations underscore the need for an improved understanding of the correlates of body dissatisfaction to prevent the onset of dangerous eating disorders. Furthermore, it is especially important to study these relationships in men, who remain an understudied population in the eating disorders field.

Researchers can expand upon the relatively limited research on male body image and related constructs in two important ways. First, the majority of these studies have not tested comprehensive, theoretical models. Second, studies frequently measure these constructs with assessment tools that were not developed or validated for men. Consequently, to supplement existing research, the primary goal of this study was to examine the relationships among drive for muscularity, muscle dysmorphia, social physique anxiety, body checking, eating pathology, and clinical impairment in a sample of nonclinical college men. Specifically, I tested the fit of three hypothesized models of the relationships among these variables (see Figures 2-4).

To test the primary study goal, I conducted path analyses using an *alternate models* (AM) approach. In this approach, one tests two or more path models to determine which has the best fit. Research suggests that testing three models with an AM approach is typically sufficient (Santor, 2011). I chose the AM approach rather than the *model development* approach, in which the researcher tests one model and the model is respecified based on modification indexes if it fits the data poorly (Byrne, 2006). Although the model development approach is common, it is problematic (Kenny, 2011). Models confirmed in this manner are post-hoc ones; thus, the models may not be stable. Because such models are based on the uniqueness of the initial dataset, they may not fit other data (Santor, 2011).

Consequently, to develop these three models to test, I integrated findings from existing studies and hypothesized three possible models of relationships among study constructs. With limited research support for existing models that could be replicated and expanded upon, I developed these models based on my own interpretation of the extant literature. Because these models were developed for this study and have not been tested elsewhere, it was best to test several different potential models and then compare the relative fit of each to determine the best fitting model of these relationships.

The first of these models is based on the only two studies that used path modeling to explore the relationships between social physique anxiety, drive for muscularity, and eating pathology in nonclinical men (Brunet et al., 2010; McCreary & Saucier, 2009). These studies suggested that drive for muscularity is predictive of social physique anxiety (Brunet et al., 2010) and that social physique anxiety is predictive of eating pathology (McCreary & Saucier, 2009). Thus, in the first model (Figure 2) I tested whether social

physique anxiety predicts body checking (one specific form of eating pathology that may be particularly problematic for men; Haase et al., 2007) and whether body checking predicts eating pathology-related clinical impairment (White & Warren, 2013). Based on literature support for components of model 1 (Brunet et al., 2010; McCreary & Saucier, 2009), I hypothesized that this model would best fit the data in the current sample. However, I am also testing two other models in accordance with the AM approach to model fitting, which is generally superior to a model development approach (Mueller & Hancock, 2007).

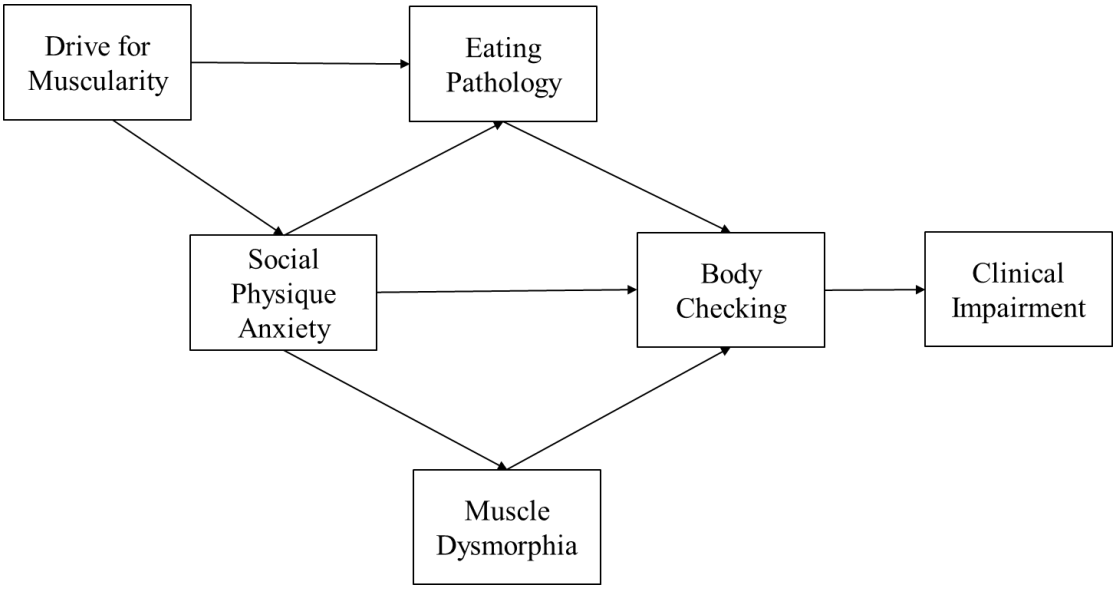

Figure 2. Hypothesized path model 1.

In the second model (Figure 3), I tested whether drive for muscularity predicts muscle dysmophia and social physique anxiety; whether muscle dysmorphia and social

physique anxiety predict body checking; and whether body checking and eating pathology predict clinical impairment. This model is based on recent research demonstrating that social physique anxiety mediated the relationship between drive for muscularity and muscle dysmorphia among young adult men (Thomas, Tod, Edwards, & McGuigan, 2014), muscle dysmorphia is associated with heightened body checking (Walker et al., 2009), eating pathology predicts body checking (Grilo et al., 2005), and my previous research in which eating pathology mediated the relationship between body checking and clinical impairment among men.

Model 2 differs from model 1 in terms of the placement of the muscle dysmorphiam eating pathology, and clinical impairment constructs. In model 2, I hypothesized that drive for muscularity would be directly associated with increased muscle dysmorphia, while in model 1 I predicted the drive for muscularity would lead to increased social physique anxiety, which would be associated with higher muscle dysmorphia. I also predicted that eating pathology would be associated with increased body checking and clinical impairment. To that end, I hypothesized that both eating pathology and body checking would be associated with clinical impairment, while in model 1 I included body checking as the only predictor of clinical impairment.

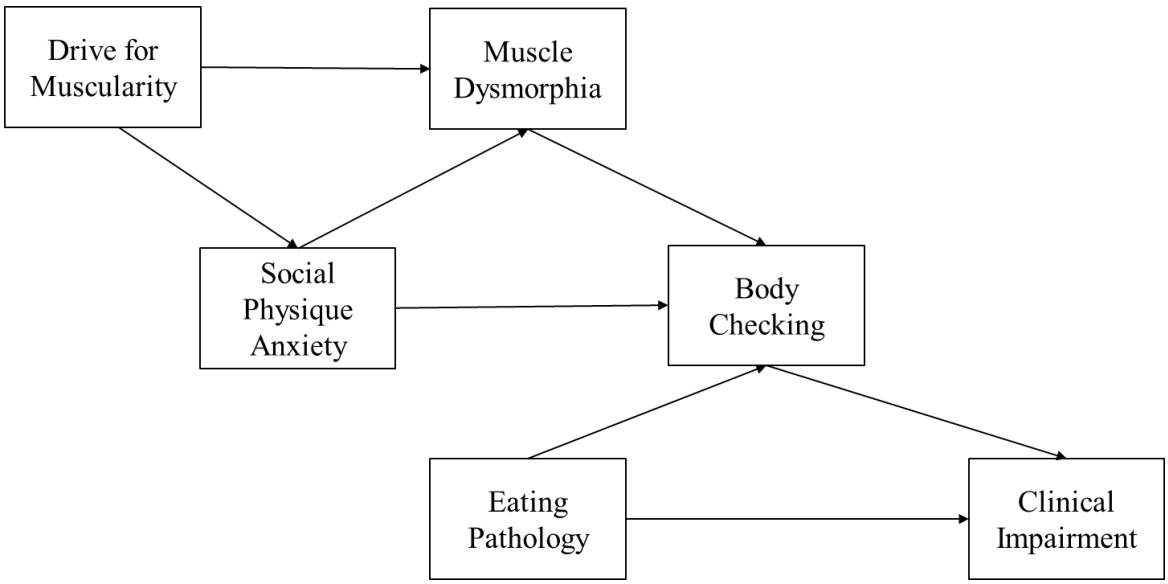

Figure 3. Hypothesized path model 2.

In the third model (Figure 4), I tested whether muscle dysmorphia predicts drive for muscularity, social physique anxiety, and clinical impairment; whether social physique anxiety predicts drive for muscularity and clinical impairment; whether drive for muscularity predicts body checking; and whether body checking predicts clinical impairment. I developed this model based on the aforementioned study identifying social physique anxiety as a mediator of the muscle dysmorphia-drive for muscularity relationship (Thomas et al., 2014). Studies demonstrating a connection between muscle dysmorphia and negative psychological consequences (Grieve, 2007) suggest that muscle dysmorphia may be associated with higher levels of clinical impairment. Theoretically, a man who has internalized and strives for the muscular body ideal may be more likely to engage in muscle-related body checking. Social physique anxiety fears may also lead to clinical impairment (e.g., if an individual avoids social situations due to his appearance).

Finally, although the previous two models included eating pathology, this model posits that factors such as drive for muscularity, muscle dysmrophia, social physique anxiety, and body checking behavior may occur independently of eating pathology. Thus, I hypothesized that these constructs may be somewhat "normative" within a college male population.

Model 3 differs from the previous two models in several ways. First, because there is research support for both directions of the relationship between drive for muscularity and muscle dysmorphia, I tested models that included both orders of variables. Second, I did not include eating pathology in model 3 to examine whether global eating pathology is relevant to the relationships among constructs. Finally, I hypothesized that social physique anxiety may also be associated with increased clinical impairment; thus, I specified this relationship in model 3.

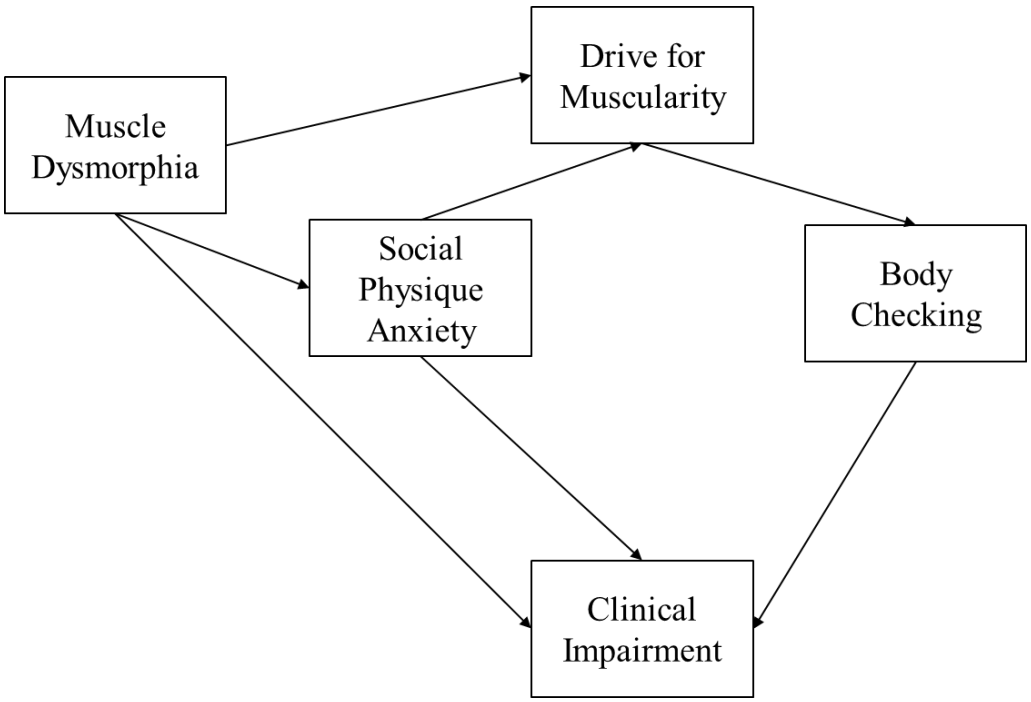

Figure 4. Hypothesized path model 3.

To test the hypothesized models, it was important to use male-specific measures of the constructs of interest because differences in male and female body image are well documented. As eating disorders were typically conceptualized as female concerns, most assessments of eating pathology and related constructs were developed with and validated on female samples (Carlat & Carmago, 1991). Recent interest in body image and eating pathology in men, however, has spurred the development of some male-specific measures (Hildebrandt, Langenbucher, & Schlundt, 2004; Hildebrandt et al., 2010b; McCreary & Sasse, 2000). Male-specific measures exist for drive for muscularity, eating pathology, muscle dysmorphia, and body checking. However, a measure of social appearance anxiety does not. Consequently, before testing the path models it was

necessary to examine the psychometric properties and number of factors that underlie the most commonly used measure of social physique anxiety: the SPAS.

Existing validation studies of the SPAS (Hart et al., 1989) included few if any men; therefore, it is unclear whether the original one-factor structure holds in a sample of nonclinical college men. Furthermore, several follow-up studies to the original validation study suggested an alternate factor structure (Cramer-Hammann et al., 1993; Eklund et al., 1996; Jackson et al., 1991; McAuley & Burman, 1993). Finally, men reliably score lower than women on the SPAS (Mülazimoğlu-Balli, Koca, & Aşçi, 2011), possibly due to the feminine (e.g., "figure or physique") terminology in some items. I hypothesized that men may find alternate words like "body or build" more salient to their appearance concerns and thus be more likely to report social physique anxiety.

Consequently, analyses and hypotheses were as follows: before testing the proposed path models (the primary study goal), I tested whether the Modified Social Physique Anxiety Scale (MSPAS) and SPAS differed in terms of their factor structure, mean scores, and measurement of the underlying construct (social physique anxiety). First, I conducted a confirmatory factor analysis (CFA) of the MSPAS to test whether the factor structure of the original SPAS holds in an independent sample of 344 college men (Sample 1; data collected for this study). Next, I compared the mean scores on the MSPAS in Sample 1 with mean scores on the SPAS in a previously collected sample of 337 college men (Sample 2; White & Warren, 2014). Finally, to examine the measurement invariance of the MSPAS, I performed a multigroup confirmatory factor analysis (MGCFA) to investigate whether the two questionnaires measure the underlying construct of social physique anxiety similarly. I hypothesized that: (1) the MPSAS would

have a different factor structure than the original SPAS (i.e., the two versions of the measure will be configurally/factorially variant); (2) mean scores on the MSPAS in Sample 1 would be significantly higher than mean scores on the original SPAS in Sample 2; and (3) the MSPAS and SPAS will not demonstrate measurement invariance (i.e., they will measure social physique anxiety differently).

To test the primary study goal, I used path modeling to test the fit of several hypothesized models (Figures 2-4) using data from Sample 1. I predicted acceptable fit of the data to the proposed models. Rather than conducting an exploratory analysis by respecifying poorly fitting models based on statistical recommendations, I compared the relative fit of three models to determine which was the best fitting, most parsimonious model of the relationships among these constructs.

CHAPTER 3

METHODOLOGY

Participants

Participants were male students, at least 18 years of age, recruited from the UNLV psychology department research pool. Participants received one unit of psychology course credit in exchange for participation and completed study measures online. The university's institutional review board approved this study prior to the commencement of any research procedures.

Two samples of participants were used for this study. First, data from 344 participants were collected for the purposes of this study (Sample 1) to conduct the confirmatory factor analysis (CFA) of the MSPAS and to test the hypothesized path models. In addition, 337 participants from a previous research study (White & Warren, 2014) were used as the comparison group (Sample 2) for a multigroup confirmatory factor analysis (MGCFA) to test for factorial invariance of SPAS and MSPAS (see Appendix A). Both samples satisfied power estimates based on Kline's (2005) sample size guidelines.

Measures

Sample 1 participants completed all of the following questionnaires, which are shown in Appendix A. Sample 2 participants completed only demographic items and the SPAS.

Demographics

Sample 1 and 2 participants self-reported demographic information, including their age, race, ethnicity, height, weight, and history of an anxiety or eating disorder

diagnosis. I calculated BMI (kg/m2) using participants' self-reported height and weight information. Participants also indicated exercise frequency, appearance and performance enhancing drug (APED)/supplement use, sexual orientation, and frequency of sexual activities.

Body Checking

Sample 1 participants completed the Male Body Checking Questionnaire (MBCQ; Hildebrandt et al., 2010b), a 19-item assessment of muscularity-based body checking behaviors (see Appendix A). Participants rated the frequency of body checking behaviors from *never* (1) to *always* (5), with higher scores indicating more frequent body checking. Among nonclinical college men, the MBCQ has demonstrated good convergent validity with measures of perfectionism, eating pathology, and muscle dysmorphia (Hildebrandt et al., 2010b). The MBCQ has also demonstrated good internal consistency (coefficient alpha = .94) and adequate test-retest reliability over a two-week period (r = .84) for college men (Hildebrandt et al., 2010b). Internal consistency was high (coefficient alpha = .95) for Sample 1 in the present study.

Drive for Muscularity

Sample 1 participants completed the Drive for Muscularity Scale (DMS; McCreary & Sasse, 2000), a 15-item measurement of satisfaction with one's muscular appearance (see Appendix A). Participants rated items on a frequency scale from *always* (1) to *never* (6). Scores were reverse-coded such that higher scores indicate a greater drive for muscularity. Researchers developed the DMS specifically to measure the body image concerns of men (McCreary & Sasse, 2000). The DMS demonstrates good concurrent validity with higher scores associated with poor self-esteem and higher levels

of depression, and internal consistency for the measure is good (coefficient alpha = .84; McCreary & Sasse, 2000). In the current study, internal consistency reliability for Sample 1 was good (coefficient alpha = .90).

Muscle Dysmorphia

Sample 1 participants completed the Muscle Dysmorphic Disorder Inventory (MDDI; Hildebrandt et al., 2004), a 13-item assessment based on the diagnostic criteria for muscle dysmorphic disorder proposed by Pope et al. (1997; see Appendix A). Participants rated items on a frequency scale from *never* (1) to *always* (5), with higher scores indicating greater levels of muscle dissatisfaction. Among nonclinical men, scores on the MDDI have demonstrated good construct validity, test-retest reliability, and internal consistency (Walker et al., 2009). Acceptable levels of internal consistency reliability were found in Sample 1 (coefficient alpha = .82).

Global Eating Pathology

Sample 1 participants completed the Eating Disorder Assessment for Men (EDAM; Stanford & Lemberg, 2012), a 50-item assessment of eating disorder behavior that was specifically designed for men (see Appendix A). Participants rated items on a frequency scale from *never* (0) to *always* (5), with higher scores indicating greater eating pathology. Scores on the EDAM demonstrate high internal consistency reliability (coefficient alpha = .91) and discriminative power to identify men with a clinical eating disorder diagnosis with 82.1% accuracy (Stanford & Lemberg, 2012). Internal consistency was good (coefficient alpha = .90) for Sample 1 in the present study.

Clinical Impairment

Sample 1 participants completed the Clinical Impairment Assessment (CIA; Bohn et al., 2008), a 16-item assessment of the degree of functional, psychosocial impairment associated with eating disorder symptoms (see Appendix A). The CIA assesses the severity of impairment in personal, social, and cognitive domains over the past 28 days. Participants rated items on a frequency scale from *not at all* (0) to *a lot* (3), with higher scores indicating greater eating disorder-related impairment. For each item, participants are asked to consider to what extent their eating habits, exercising, or feelings about his eating, shape or weight have influenced his life. The CIA demonstrates acceptable validity and reliability for women without eating disorders and scores on the CIA correlate well with measures of global eating pathology (*r*'s = .58 - .79) in nonclinical samples (Reas, Rø, Kapstad, & Lask, 2010). While researchers have administered the CIA in male samples (Wildes, Zucker, & Marcus, 2012), there are no published norms or psychometric data for men. In my previous research, the CIA demonstrated strong internal consistency reliability among nonclinical college men (coefficient alpha = .93; White & Warren, 2014). Internal consistency was strong for Sample 1 in the present study, as well (coefficient alpha = .94).

Social Physique Anxiety

All participants completed measures of social physique anxiety, but Sample 1 completed a modified version of the questionnaire (MSPAS) and Sample 2 completed the original version (SPAS; see below for details). Specifically, Sample 2 participants completed the Social Physique Anxiety Scale (SPAS; Hart et al., 1989), a 12-item measure of anxiety when an individual believes others are negatively evaluating his or her physique (see Appendix A). Participants rated items on an agreement scale from *not*

at all characteristic of me (1) to *extremely characteristic of me* (5), with higher scores indicating greater social physique anxiety. Within a sample of nonclinical college students, scores on the SPAS demonstrate high internal consistency (coefficient alpha = .90), adequate test-retest reliability (r = .82) over a two-week period (r = .82; Motl & Conroy, 2000). Positive correlations with measures of social anxiety, public self-consciousness, and weight and body shape satisfaction support the convergent validity of SPAS scores (Motl & Conroy, 2000). Internal consistency reliability for the SPAS total score was good for Sample 2 in the current study (coefficient alpha = .90). Elkund and colleagues' (1997) examination of the skewness and kurtosis of SPAS items indicated no significant sex differences and that the SPAS is appropriate for use in both sexes. Nonetheless, I hypothesized that men may interpret the wording of several SPAS items as feminine and thus may be less likely to endorse social physique anxiety concerns on those items.

Thus, I created the Modified Social Physique Anxiety Scale (MSPAS) specifically for this study to include wording with a less feminine connotation (see Appendix A). I replaced the terms "figure or physique" with "body or build," since theoretically "body or build" may be more palatable to men. Men in Sample 1 completed the modified version of the SPAS. Given that this is the first such adaptation of the SPAS to my knowledge, there are no data on the psychometric properties of the MSPAS and establishing some psychometric properties of this measure became a part of this project. Internal consistency for the modified measure total score was good for Sample 1 in this study (coefficient alpha = .89).

Procedure

I recruited Sample 1 (original data collection for this study) and Sample 2 (previously collected data; White & Warren, 2014) participants from introductory psychology courses via the UNLV psychology department's online subject pool. Students who met inclusionary criteria (i.e., male, age 18 or older) registered for the study through the subject pool system. The subject pool system automatically assigned each participant a unique numeric code devoid of any personal identifiers and emailed a link containing that code to registered participants. Clicking on this link gave participants access to the survey. Prior to completing any of the questionnaires, participants had to select "yes" on the electronic informed consent document to give consent to participant. After consenting, the online data collection system routed participants to the first questionnaire, presented in a random order to minimize any order effects. Participants who did not consent were unable to complete the questionnaires.

I intermixed three validity check items within the questionnaires to monitor for random responding. Each validity check item required participants to select a specific answer choice if they are paying attention. Participants were able to log in multiple times to complete the questionnaires. After a participant completed all the study measures, which took approximately 45 minutes to an hour, the data collection system thanked him for his participation and informed him that he would receive credit within one week.

Analytic Strategy

Prior to analyses, I removed data from participants who did not meet the study inclusionary criteria (i.e., females, those under age 18) and who did not respond correctly to all three validity check items (i.e., "Please answer 'strongly agree' if you are paying attention").

Descriptive analyses. I conducted descriptive analyses using SPSS (version 21). First, I examined sample demographic characteristics. For Sample 1, this included computing means and standard deviations for age and BMI. In addition, I computed the frequency (*N* and percentage) for ethnicity, student status (graduate or undergraduate), education level, marital status, work status, generational status, sexual orientation, and history of eating or anxiety disorder. In Sample 2, I computed means and standard deviations for age and BMI. I also computed the frequency (*N* and percentage) for ethnicity, student status, education level, student status, marital status, work status, generational status, and history of an eating or anxiety disorder.

After analyzing sample characteristics, I compared the samples statistically using *t*-tests and chi-square tests to determine if the samples differed on any of the aforementioned demographic variables. Significant *t*-test or chi-square values ($p < .05$) indicated that the two samples were statistically different on the particular variable.

CFA. Before conducting the primary study analyses, I examined the factor structure of the MSPAS using data from Sample 1. First, I examined the suitability of the MSPAS for factor analysis. Using SPSS, I computed the mean, standard deviation, skewness, and kurtosis for each of the MSPAS items. I also calculated the bivariate Pearson product movement correlations among the MSPAS items. The presence of several correlations greater than .3 indicated that the items were factorable. To further test factorability of the correlation matrix, I calculated the Kaiser-Meyer-Olkin (KMO) value and Bartlett's Test of Sphericity. Researchers recommend KMO values greater than .60 (Kaiser, 1970) and a significant test of sphericity for factor analysis (Pallant, 2010). Using the EQS (version 6.2) program, I examined the data to ensure that the data met all

statistical assumptions. I tested for the randomness of missing data using the EQS missing data diagnosis.

After screening the data, I conducted a CFA using maximum likelihood extraction in EQS. My aim was to test whether the SPAS factor solution is tenable for the MSPAS. However, existing literature on the factor structure of the SPAS provides support for four possible factor structures. These include both univariate (12 items, 1 factor; Hart et al., 1989; McAuley & Burman, 1993) and bivariate (12 items, 2 factor; Eklund et al., 1996) factor structures. Alternately, several researchers have proposed truncated factor structures that omit problematic items from the scoring. Research supports both nine and seven item univariate (1 factor) truncated factor solutions (Martin et al., 2006; Motl & Conroy, 2000). Thus when conducing the CFA of the MSPAS, I tested the fit of each of these four factor structures: (a) 12 items, 1 factor; (b) 12 items, 2 factors; (c) 9 items, 1 factor; and (d) 7 items, 1 factor. The items included in each of the four scoring systems are presented in Table 3.

Table 3

Scoring Systems of the SPAS/MSPAS

Scoring system	Factor 1 Items	Factor 2 Items
(a) 12 items, 1 factor	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	N/A
(b) 12 items, 2 factors	1, 5, 8, 11	2, 3, 4, 6, 7, 9, 10, 12
(c) 9 items, 1 factor	3, 4, 6, 7, 8, 9, 10, 11, 12	N/A
(d) 7 items, 1 factor	3, 4, 6, 7, 8, 9, 10	N/A

To determine the optimal factor structure of the MSPAS, I evaluated model fit using multiple goodness-of-fit indexes as recommended in the literature. For each factor structure model tested, I examined comparative fit indexes (CFI; Bentler, 1990), incremental fit indexes (IFI; Bollen, 1989), McDonald's non-centrality index (NCI; McDonald, 1989), and root mean square error of approximation (RMSEA; Steiger & Lind, 1980) statistics as provided by the EQS program. Per Hu and Bentler's (1999) guidelines, CFI values greater than .90 and RMSEA values less than .08 indicated acceptable fit between the hypothesized model and the sample data. CFI values of .95 or greater and RMSEA values of .06 or less indicated good model fit. IFI and NCI values greater than .90 indicate acceptable fit (Hu & Bentler, 1999). I chose these fit indexes as they are relatively independent of sample size (Fan, Thompson, & Wang, 1999).

When data violated the assumptions of normality, as indicated by Marida's (1970) coefficient values greater than 5.00 (Bentler, 2005), I used robust test statistics, including the Satorra-Bentler scaled chi-square statistic (S-B χ 2; Satorra & Bentler, 1988), along with robust versions of the CFI, IFI, NCI, RMSEA, and RMSEA 90% confidence interval. Normal test theory statistics do not adequately estimate model fit under conditions of non-normality (Hu, Bentler, & Kano, 1992).

In addition to evaluating the goodness-of-fit for each of the four factor structures, I also compared the relative fit of these factor structures to the data. To do so, I used the Akaike Information Criterion (AIC; Akaike, 1974). I considered the factor structure that generated the lowest relative AIC value to be optimal (Kline, 2005).

Internal consistency and means. Prior to conducting the multigroup analyses, I compared the MSPAS and SPAS in terms of their internal consistency reliability and

mean scores. I calculated the internal consistency reliability associated with each of the four factor structures of the MSPAS in Sample 1 and the SPAS in Sample 2 using Cronbach's coefficient alpha (Cronbach, 1951). Coefficient alpha values greater than or equal to .90 indicated excellent internal consistency reliability. Coefficient alpha values between .70 and .90 indicated good internal consistency. I computed mean scores of the MSPAS in Sample 1 and the SPAS in Sample 2. I compared average scores on measures of social physique anxiety between the two samples using *t*-tests. Significant *t*-values ($p < .05$) indicated that one sample earned significantly higher social physique anxiety scores.

MGCFA. After selecting the optimal factor structure of the MSPAS in Sample 1, I used MGCFA to compare that factor structure with the factor structure of the original SPAS in Sample 2. Using EQS, I conducted a MGCFA using maximum likelihood extraction to test for measurement invariance of the MSPAS and SPAS. As outlined by Jöreskog (1971) and van de Schoot and colleagues (2012), this process involves testing increasingly stringent models.

The first step is to establish baseline models/factor structures for both groups (Jöreskog, 1971). Thus, I conducted a CFA in each group and identified the best fitting factor structure (using multiple goodness-of-fit indexes, as described above) for the MSPAS in Sample 1 and the SPAS in Sample 2. I used robust goodness-of-fit statistics (CFI, IFI, NCI, and RMSEA) when data violated the assumption of normality. I used the criteria of parsimony and substantive meaning to select baseline models. Ideally, baseline models evidence good fit to the data and specify few parameters. In the case of poor fitting baseline models, I followed Byrne's (2006) recommendations to achieve

acceptable model fit. Specifically, I consulted modification indexes for suggestions of parameters to add (Lagrange Multiplier test; Breusch & Pagan, 1980) or drop (Wald test; Wald, 1943).

After identifying baseline factor structures in each group, the next step of the MGCFA is to test for configural invariance (Byrne, 2006; Jöreskog, 1971). Configural invariance – or a global test of the equality of covariance structures across groups – tests the null hypothesis that population covariance matrixes are equivalent across groups (Jöreskog, 1971). In other words, configural invariance establishes that the same number of factors and factor-loading pattern do not vary across groups (Byrne, 2006).

After establishing configural invariance, the next step is to test for increasingly stringent levels of structural or measurement invariance using the methods detailed by Steenkamp and Baumgartner (1998) and van de Schoot and colleagues (2012). According to these guidelines, researchers test four different models. In the first model, researchers constrain factor loadings equal across groups but allow the intercepts to differ. This model tests for metric invariance: whether participants in Sample 1 and Sample 2 attribute the same meaning to the underlying construct (i.e., social physique anxiety; Byrne, 2006). In the second model, researchers constrain intercepts equal across groups but allow factor loadings to differ. This model tests whether participants in Sample 1 and Sample 2 attribute the same meaning to the levels of underlying items (intercepts). In the third model, researchers constrain both the factor loadings and intercepts equal across groups. This model tests for scalar invariance: Scalar invariance demonstrates that the underlying meaning of the construct (factor loadings) and the levels of the underlying items (intercepts) are equal across groups. In the fourth and most restrictive model,

researchers also constrain residual (error) variances equal across groups. This model tests for full uniqueness measurement invariance: the explained variance for the SPAS and MSPAS items are the same across groups. This form of measurement invariance demonstrates that researchers are measuring the construct (social physique anxiety) identically across groups.

In all aforementioned tests of metric invariance, I examined the goodness-of-fit statistics for the multigroup model after imposing equality constraints on factor loadings and/or intercepts. I evaluated fit indexes using the aforementioned criteria for acceptable and good fit.

Path analyses. After examining the properties of the MSPAS, I tested the main study goal by examining the relationships among body image, body checking, eating pathology, social physique anxiety, and clinical impairment using data from Sample 1. First, I evaluated the suitability of the data for path analysis. To do this, I computed descriptive statistics (mean, standard deviation, range, skewness, and kurtosis) for each of the six study measures and tested whether these data violated the assumption of normality by conducting Kolmogorov-Smirnov Tests of Normality. Non-significant values (> .05) indicated normally distributed scores. I also computed the Pearson product-movement correlations among study measures; significant correlations ($p < .05$) indicated that variables were significantly associated and thus appropriate to include in the path model.

After establishing the suitability of the Sample 1 data, I used path analysis to assess the fit of the proposed models (see Figures 2-4). I conducted path analyses using EQS following Byrne's (2006) procedures. I input total scores on each of the path analysis constructs as the raw data and conducted path analyses using maximum

likelihood extraction. For each model, I examined the goodness-of-fit statistics and evaluated whether these values met the criteria for acceptable or good fit. As previously described, I used Hu and Bentler's (1999) CFI, IFI, NCI, and RMSEA guidelines to estimate model fit. Per these guidelines, CFI, IFI, and NCI values should be close to .95 and RMSEA values should be close to .06 (Hu & Bentler, 1999). Again, I used robust test statistics when data violated the assumptions of normality.

Rather than respecifying poorly fitting models based on statistical recommendations, I compared the relative fit of all three path models as suggested by Byrne (2006). I selected the model with the lowest AIC (Akaike, 1974) value as the best fitting, most parsimonious model of the relationships among these constructs. Lower AIC values indicate the best trade-off between model fit and complexity.

CHAPTER 4

RESULTS

Sample Characteristics

To test the main study goal, I collected data from 355 students (i.e., Sample 1). However, prior to analyses I removed data from four female participants and seven students who did not respond correctly to three validity check items, leaving a total of 344 participants in Sample 1.

Table 1 (Appendix B) provides a listing of Sample 1 participant demographic characteristics. The majority of students were undergraduates in their first or second year of college. Most students identified as unmarried and second generation, meaning he was born in the United States but at least one parent was born in a different country. The sample was ethnically diverse. Most students listed their ethnicity as European American, followed by Asian, Hispanic/Latino, African American, "other," and Multi-ethnic. The sample overwhelming identified as heterosexual. Participants were normal weight, on average, based on World Health Organization guidelines (2000). Most students denied a history of an anxiety or eating disorder diagnosis. Of the seven students who reported a history of an anxiety disorder, Generalized Anxiety Disorder (n = 3) was the most common diagnosis.

I used previously collected data (i.e., Sample 2) for the measurement validation component of this project. This sample of 337 men completed demographic items and the original version of the SPAS only. Table 2 (Appendix B) provides a full listing of Sample 2 participant demographic characteristics. Like Sample 1, the majority of Sample 2 students were undergraduates in their first or second year of college. Most students

identified as unmarried and second generation. This sample was also ethnically diverse. Most students reported their ethnicity as European American, followed by Asian, Hispanic/Latino, African American, "other," Multi-ethnic, and American Indian. As in Sample 1, participants were normal weight, on average, based on World Health Organization guidelines (2000). Most students denied a history of an anxiety or eating disorder diagnosis. Of the 11 students who reported a history of an anxiety disorder, the most common diagnosis was Panic Disorder (n = 3).

Overall, the two samples were very similar. Average age and body mass did not differ significantly between Sample 1 and 2 (p's > .27). The samples did not differ in terms of participant ethnicity, education level, and student, marital, work, or generational status (p's > .10). Furthermore, the proportion of students with a prior anxiety or eating disorder diagnosis did not differ between samples (p's > .31). As the samples did not differ significantly on these demographic variables, I proceeded with the CFA and MGCFA of the SPAS and MSPAS.

Testing Preliminary Study Goals

Establishing the Factor Structure of the MSPAS in Sample 1

Suitability of the data. Prior to conducting the CFA in Sample 1, I examined the suitability of the MSPAS data. Descriptive statistics for the MSPAS items appear in Table 4. Inspection of the correlation matrix revealed the presence of many coefficients of .3 and above. The Kaiser-Meyer-Olkin value of .89 surpassed the recommended value of .60 (Kaiser, 1970). Bartlett's Test of Sphericity was statistically significant (p < .001), supporting the factorability of the correlation matrix. Most items exhibited univariate skewness and kurtosis; however, these values were not extreme (all < 3.00) according to

Tabachnick and Fidell's (2007) criteria. Mardia's coefficient values supported the non-ormality of the data; thus, I used robust versions of the fit indexes (Bentler, 2005; Byrne, 2006).

Table 4

Descriptive Statistics for MSPAS Items

Item	1	2	3	4	5	6	7	8	9	10	11	12
1	--	.37**	.36**	.42**	.70**	.37**	.31**	.72**	.43**	.44**	.47**	.47**
2		--	.04	.08	.32**	.11*	.06	.28**	.11*	.12*	.29**	.17**
3			--	.60**	.27**	.49**	.53**	.35**	.48**	.43**	.17**	.49**
4				--	.31**	.63**	.65**	.40**	.59**	.51**	.23**	.56**
5					--	.28**	.24**	.69**	.36**	.37**	.45**	.46**
6						--	.70**	.39**	.59**	.54**	.21**	.61**
7							--	.38**	.55**	.51**	.13*	.56**
8								--	.45**	.47**	.54**	.50**
9									--	.62**	.32**	.63**
10										--	.34**	.67**
11											--	.29**
12												--
Mean	2.96	3.33	2.22	2.34	3.08	2.40	2.22	2.98	2.57	2.80	3.58	2.62
SD	1.04	1.29	1.21	1.26	1.07	1.23	1.13	1.14	1.35	1.34	1.19	1.32
Skewness	.14	-.23	.69	.59	.06	.53	.64	.08	.41	.20	-.52	.43
Kurtosis	-.41	-1.02	-.46	-.69	-.59	-.71	-.33	-.74	-1.05	-1.12	-.56	-.93

Note. Pearson product-moment *r* values appear above the diagonal.

*$p < .05$, **$p < .01$.

Confirmatory factor analysis. Given the mixed literature regarding the factor structure of the SPAS (Eklund et al., 1996; Hart et al., 1989; Martin et al., 2006; McAuley & Burman, 1993; Motl & Conroy, 2000), I examined the fit of four possible factor structures for the MSPAS in Sample 1. Specifically, these were: (a) 12 items loading onto 1 factor, (b) 12 items loading onto 2 factors, (c) 9 items loading onto 1 factor, and (d) 7 items loading onto 1 factor. Table 5 provides fit indexes for these four factor structures. In general, results did not support a two-factor solution. The best fitting factor structure, as evidenced by CFI, IFI, and NCI > .95, RMSEA value of .08, and the lowest relative AIC value was the truncated 7 item, 1 factor structure. This factor structure represents acceptable to good fit between the Sample 1 data and the hypothesized MSPAS structure. Based on the results of the CFA, I scored the MSPAS using the truncated, 7-item method for the remaining analyses.

Table 5

Confirmatory Factor Analysis Fit Statistics for Structural Models of the MSPAS

Model	*df*	S-Bχ^2	CFI	IFI	NCI	RMSEA	90% CI RMSEA	AIC
12 items, 1 factor	54	462.70	.761	.762	.542	.151	.138, .163	354.71
12 items, 2 factors	53	178.76	.926	.927	.828	.084	.071, .098	72.76
9 items, 1 factor	26	145.92	.904	.905	.837	.117	.099, .136	93.92
7 items, 1 factor	13	40.88	.969	.969	.960	.080	.053, .108	14.88

Note. S-Bχ^2 = Satorra-Bentler scaled chi-squared statistic; CFI = comparative fit index; IFI = incremental fit index; MFI = McDonald's non-centrality index; RMSEA = root-mean-square error of approximation; CI = confidence interval; AIC = Akaike's information criterion. All S-Bχ^2 values $p < .001$.

Comparing Internal Consistency and Means of the MSPAS and SPAS in Samples 1 and 2

Internal consistency. After evaluating the factor structure of the MSPAS, I examined the internal consistency reliability of scores on the measure. Since there is research support for several different factor structures of the SPAS, I calculated the internal consistency reliability associated with each of the corresponding scoring systems for both the MSPAS (i.e., Sample 1) and SPAS (i.e., Sample 2). As shown in Table 6, internal consistency was comparable for the total score (12 item) scoring method of both questionnaires. However, internal consistency was lower for the truncated (9 and 7 item) scoring systems of the MSPAS.

Table 6

Internal Consistency Reliability Associated with Scoring Systems of the SPAS and MSPAS

	MSPAS – Sample 1		SPAS – Sample 2	
	Coefficient alpha	Qualitative description	Coefficient alpha	Qualitative description
12 item	.89	Good	.90	Excellent
9 item	.73	Good	.88	Good
7 item	.75	Good	.87	Good

Mean scores. Prior to conducting the MGCFA, I tested my hypothesis that men would earn significantly higher scores on the modified version of the SPAS. Contrary to

my hypothesis, scores on the MSPAS from Sample 1 ($M = 31.22$, $SD = 6.23$) were not significantly higher than scores on the SPAS ($M = 31.75$, $SD = 9.93$) in Sample 2, $t(324) = .96$, $p = .34$.

Comparing the Factor Structure of the MSPAS and SPAS in Samples 1 and 2

Establishing baseline models. The first step for a MGCFA is to establish the baseline factor structure for each group. I used goodness-of-fit and relative fit indexes to identify the optimal factor structure for the MSPAS in Sample 1 and the SPAS in Sample 2.

Given the acceptable to good fit indexes for the 7-item 1-factor model of the MSPAS, I selected this as the baseline model for Sample 1. I followed the same process (see "Confirmatory factor analysis" section, above) to select the baseline model of the SPAS in Sample 2. This entailed examining the fit of models with: (a) 12 items loading on 1 factor, (b) 12 items loading on 2 factors, (c) 9 items loading on 1 factor, and (d) 7 items loading on 1 factor. Unfortunately, fit indexes were poor for each of these *a priori* models, as seen in Table 7. Although the 7-item, 1-factor model had the lowest AIC value – and thus the best trade-off between model fit and complexity – the goodness-of-fit indexes indicated a poor fit for all models.

Table 7

Confirmatory Factor Analysis Fit Statistics for Structural Models of the SPAS

Model	*df*	S-Bχ^2	CFI	IFI	NCI	RMSEA	90% CI RMSEA	AIC
12 items, 1 factor	53	461.36	.771	.773	.534	.154	.141, .167	355.36
12 items, 2 factors	53	483.01	.759	.761	.516	.158	.145, .171	377.01
9 items, 1 factor	27	273.78	.772	.774	.686	.167	.149, .185	219.78
7 items, 1 factor	14	209.99	.756	.758	.743	.206	.182, .231	181.99
7 items, 1 factor, 1 error covariance	13	53.23	.950	.950	.941	.097	.071, .125	27.23

Note. S-Bχ^2 = Satorra-Bentler scaled chi-squared statistic; CFI = comparative fit index; IFI = incremental fit index; NCI = McDonald's non-centrality index; RMSEA = root-mean-square error of approximation; CI = confidence interval; AIC = Akaike's information criterion. All S-Bχ^2 values $p < .001$.

Given the poor fit of all existing models, I consulted modification indexes to identify parameters to add or remove (Byrne, 2006) to identify a baseline model with acceptable fit for the SPAS in Sample 2. Results of the Wald test (Wald, 1943) did not suggest the removal of any parameters whereas results of the Lagrange Multiplier (LM) test (Breusch & Pagan, 1980) suggested the addition of one correlation between the error terms for Items 3 and 6. An examination of these items ("I wish I wasn't so up-tight about my physique or figure" and "Unattractive features of my physique or figure make me nervous in certain social settings") suggested some overlap and similar wording that would justify adding the error covariance to the model. Additionally, the LM test predicted that values of the robust RMSEA and CFI would increase significantly after adding this parameter. Thus, I tested the 7-item, 1-factor model that included a correlation between the error terms between Items 3 and 6. As predicted, the resulting fit indexes improved substantially. As shown on Table 7, CFI and IFI values satisfied the criteria for good fit, while the RMSEA and NCI values were acceptable. Therefore, I selected this as the baseline factor structure for Sample 2.

Taken together, the baseline models for Samples 1 and 2 were similar. Both were optimally represented by a 7-item, 1-factor structure. The main difference between models was that the SPAS factor structure included a covariance between the error terms for Items 3 and 6, while this covariance was not included in the MSPAS factor structure.

Testing for configural invariance. After selecting the baseline models for both measures, I tested the configural invariance of the MSPAS and SPAS using Samples 1 and 2. Overall, goodness-of-fit statistics suggested an acceptable fit of the configural model to the data (CFI = .956, IFI = .957, NCI = .946, RMSEA = .091). Therefore, the

structure of the MSPAS and SPAS is optimally represented as 1-factor model with the specified pattern of factor loadings. Item factor loadings for the 7-item, 1-factor scoring of the MSPAS and SPAS are provided in Table 8.

Table 8

Factor Loadings for 7-Item, 1-Factor Scoring System

Item	MSPAS Factor 1	R^2	SPAS Factor 1	R^2
3	.66	.43	.66	.43
4	.79	.63	.79	.62
6	.80	.64	.83	.69
7	.82	.67	.74	.55
8	.53	.28	.49	.24
9	.75	.56	.78	.61
10	.69	.47	.68	.46

Testing for measurement invariance. After establishing configural invariance, I tested for metric invariance by imposing equality constraints on all factor loadings. This resulted in a significant deterioration in fit, with extremely poor goodness-of-fit statistics (CFI = .526, IFI = .529, NCI = .547, RMSEA = .267). These values, along with the substantial decrease in fit compared to the configural model (Widaman & Reise, 1997), do not support metric invariance of the SPAS and MSPAS.

Next, I examined which parameters were not equivalent between the SPAS and MSPAS. Eight error covariance terms were not group invariant, indicating that these error terms are not operating equivalently across versions of the measure.

In sum, results to this point suggest partial measurement invariance, since factor loadings were not invariant across groups. Based on Byrne's (2006) discussion of this

issue, it is appropriate to continue testing for structural invariance if there are: (1) multiple indicators measuring more than one latent construct and (2) at least one invariant measure, the remaining noninvariant measures can be freely estimated or specified as unconstrained across groups. While these data satisfy the second condition, the first condition is not met. As such, it is not appropriate to continue testing for structural invariance at this juncture as results established neither metric nor scalar invariance. Further tests of invariance (i.e., factor covariance, factor variance and error variance) are irrelevant.

Testing Primary Study Goals

Suitability of the Sample 1 Data

Prior to conducting the main study analyses in Sample 1, I computed descriptive statistics to assess the normality of total scores on the six study measures. Table 9 presents these results. In general, data were not excessively skewed. However, EDAM and CIA total scores were highly kurtotic (values > 3.00; Tabachnick & Fidell, 2007). An examination of the histograms for these scores demonstrated that men in Sample 1 tended to score on the extremes of these measures (i.e., reporting either very few or very many symptoms of eating disorders or clinical impairment).

Table 9

Descriptive and Normality Statistics for Study Measures

Measure	Mean (SD)	Range	Skewness	Kurtosis
MBCQ	36.86 (15.49)	19-95	1.08	.80
DMS	44.05 (15.31)	15-90	.30	-.32
MDDI	29.13 (8.83)	13-65	.36	.18
EDAM	57.61 (26.39)	0-187	1.44	4.79
CIA	6.93 (8.30)	0-48	1.88	4.18
MSPAS	31.22 (6.23)	15-60	.68	2.01

Note. MBCQ = Male Body Checking Questionnaire; DMS = Drive for Muscularity Scale; MDDI = Muscle Dysmorphic Disorder Inventory; EDAM = Eating Disorder Assessment for Men; CIA = Clinical Impairment Assessment; MSPAS = Modified Social Physique Anxiety Scale.

In addition, I examined the relationships among study measures to determine whether it was appropriate to include all proposed variables in the hypothesized path models. All variables were significantly, positively correlated (see Table 10), with the exception of body checking and social physique anxiety, $r(320) = .08$. Nonetheless, I retained all proposed variables when testing the path models.

Table 10

Zero-order Correlations among Study Measures

Measure	1	2	3	4	5	6
1. MBCQ	--	.71**	.54**	.54**	.23**	.08
2. DMS		--	.67**	.50**	.30**	.22**
3. MDDI			--	.59**	.57**	.55**
4. EDAM				--	.57**	.33**
5. CIA					--	.58**
6. MSPAS						--

Note. MBCQ = Male Body Checking Questionnaire; DMS = Drive for Muscularity Scale; MDDI = Muscle Dysmorphic Disorder Inventory; EDAM = Eating Disorder Assessment for Men; CIA = Clinical Impairment Assessment; MSPAS = Modified Social Physique Anxiety Scale.

**$p < .01$.

Path Analyses in Sample 1

After establishing the optimal scoring for the MSPAS and comparing the factor structures of the MSPAS and SPAS, I tested the main study goal. That is, I examined the fit of several models of the hypothesized relationships among body dissatisfaction, body image, eating disordered behaviors, and clinical impairment in men using data from Sample 1. Fit indexes for models 1 and 2 were very poor and did not meet the criteria for acceptable fit. However, CFI, IFI, and NCI fit statistics indicated good fit for model 3, and the RMSEA value indicated acceptable fit for model 3.

In addition to evaluating goodness-of-fit indexes, I compared AIC values for each model to determine the best fitting, most parsimonious model. Of the three tested models,

model 3 had the lowest AIC value. Thus, based on the strong fit indexes and lowest AIC, I selected model 3 as the best fitting model for these data. The final path model with standardized coefficients and error terms is depicted in Figure 5.

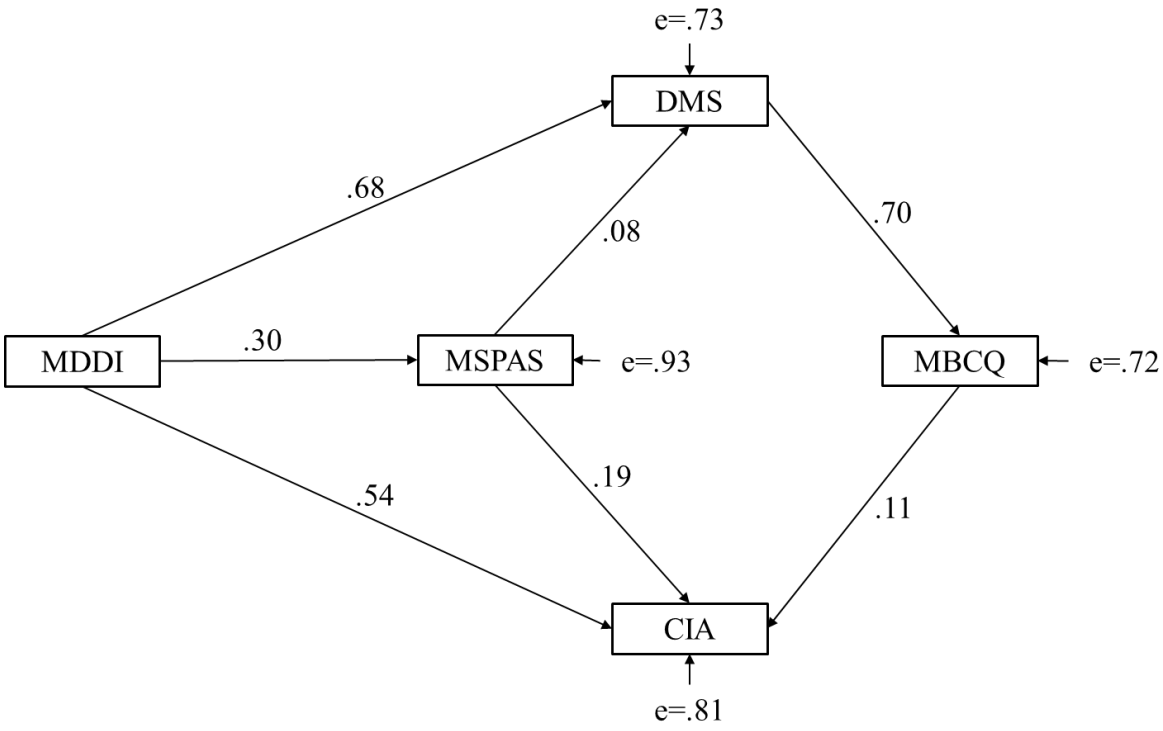

Figure 5. Final path model with coefficients.

In this model, muscle dysmorphia predicted drive for muscularity, social physique anxiety, and clinical impairment; social physique anxiety predicted drive for muscularity and clinical impairment; drive for muscularity predicted body checking; and body checking predicted clinical impairment. The standardized path coefficients were all positive, indicating that higher levels of muscle dysmorphia were predictive of higher

levels of drive for muscularity, social physique anxiety, and clinical impairment; higher levels of social physique anxiety were predictive of higher levels of drive for muscularity and clinical impairment; higher levels of drive for muscularity were predictive of higher levels of body checking; and higher levels of body checking were predictive of higher levels of clinical impairment. Fit statistics for the three models are provided in Table 11.

Table 11

Fit Statistics for Path Models

Model	*df*	S-Bχ^2	CFI	IFI	NCI	RMSEA	90% CI RMSEA	AIC
Model 1	7	217.15	.493	.503	.675	.336	.297, .374	203.15
Model 2	6	65.14	.857	.860	.895	.192	.151, .235	53.14
Model 3	3	17.06	.989	.989	.993	.067	.000, .133	1.07

Note. S-Bχ^2 = Satorra-Bentler scaled chi-squared statistic; CFI = comparative fit index; IFI = incremental fit index; NCI = McDonald's non-centrality index; RMSEA = root-mean-square error of approximation; CI = confidence interval; AIC = Akaike's information criterion. All S-Bχ^2 values $p < .001$.

CHAPTER 5

DISCUSSION

The overarching goal of this study was to improve our understanding of eating pathology correlates in an understudied population. Specifically, this study examined the relationships among anxiety, body image, and eating pathology in college men. After examining the psychometric properties of the MSPAS and SPAS, which provided support for the 7-item scoring method in this population, I tested three theoretically-informed path models. Although my original path model (i.e., model 1) did not represent the data well, one model did represent the data well (i.e., model 3). Model 3 indicated that *global* eating pathology was less salient to the model than hypothesized; one *specific* form of eating pathology – body checking – emerged as salient to the model; muscle dysmorphia and drive for muscularity were strongly associated, as were drive for muscularity and body checking; and three constructs predicted clinical impairment in this nonclinical sample of men.

These findings have important implications for future research and clinical practice. The primary findings are: (1) the relationships theorized in model 1 did not represent the data well; (2) poor-fitting relationships in model 1 can improve our understanding of male body image; (3) the relationships theorized in model 3 fit the data well and offer some information with clear clinical implications; (4) global eating pathology was less salient to these constructs than hypothesized; and (5) the SPAS and MSPAS can both be used to measure social physique anxiety in men. Each of these themes is discussed in detail below.

Model 1 Poorly Fit the Data: Previous Relationships are Not Supported

Contrary to my hypothesis, model 1 did not represent the data well. As such, one of the key findings of this study is that some relationships described in previous research did not adequately describe the relationships between body image, eating pathology and anxiety in this sample of men. This is somewhat surprising, given that existing studies supported elements of this model – that drive for muscularity predicts social physique anxiety (Brunet et al., 2010) and social physique anxiety predicts eating pathology in men (McCreary & Saucier, 2009). However, the fit of a path model based on these relationships was extremely poor (CFI = .493, RMSEA = .336) in the current sample.

In that vein, one possible explanation for the lack of model fit and the lack of significant relationships between these variables is that the inclusion of additional unstudied constructs in model 1 may have accounted for some of the variance in relationships. For instance, perhaps including body checking as a moderator of the social physique anxiety—eating pathology relationship reduced the strength of the relationship. Another explanation is that the directionality of these relationships might have been inaccurate. This is one major limitation of path modeling in general; the researcher hypothesizes the direction of the associations ahead of time and a non-significant finding may reflect an incorrectly specified order of variables rather than truly a lack of relationship (Lleras, 2005). For example, muscle dysmorphia may predict social physique anxiety (a man who has an obsessive preoccupation with his muscularity may then experience anxiety due to how others perceive his muscularity) rather than the reverse order that I hypothesized.

A third explanation is that some of the proposed variables were not salient to the overall model. Accordingly, the final best fitting model did not include eating pathology.

While there are several possible explanations for this finding (which are discussed below in "Is Eating Pathology Less Relevant to Body Image in Nonclinical Men?" section), it is likely that eating pathology was infrequent within this nonclinical sample and thus not strongly associated with social physique anxiety, body checking, or drive for muscularity, as I predicted. A fourth is that we don't know enough about these relationships in men to have a strong fitting model at this time. As this is one of the first studies that investigated relationships among several aspects of male body image simultaneously and few existing studies have used path modeling, there was not strong theoretical support for which constructs to include or the direction of relationships. Given the limited research on men, it may be that we are missing or over-valuing variables that are key to describing these relationships for men. For instance, researchers may overvalue the importance of eating pathology. Alternately, other variables that were not included in this study may be relevant to male body image. Variables such as mood/affect, weight, body mass, body fat, and ethnicity may influence male body image. Results highlight the need for additional research to isolate and identify factors that impact men's body image.

Finally, the current sample of undergraduate men may differ significantly from participants in the original two studies on key demographic variables, such as ethnicity. The present sample is much more ethnically diverse than the samples used in the two previous studies, in which nearly all participants identified as European American/White. Research on ethnic group differences suggests that non-White men engage in more disordered eating behaviors than White males (Ricciardelli, McCabe, Williams, & Thompson, 2007). For instance, Black, Asian, and Hispanic men all report engaging in more binge eating than White men. Since minority men comprised a large proportion of

the current sample, previous path analysis relationships modeled on data from White men may not fit the data in the present study. In fact, one notable limitation of existing research is that there is very little research examining ethnic differences in body image, eating pathology, or social physique anxiety among nonclinical college men. Factors that often co-vary with ethnicity, such as internalization of the muscular body ideal, body build, media exposure, and socio-economic status, may all influence disordered eating in men (Ricciardelli et al., 2007).

Body Image, Eating Pathology, and Anxiety: How Much Do We Really Know?

Although model 1 did not fit the data well, results provide some information to improve our understanding of body image, eating pathology, and anxiety in men. Specifically, results suggest the relationships between (1) drive for muscularity and eating pathology; (2) drive for muscularity, social physique anxiety, and muscle dysmorphia; and (3) social physique anxiety and body checking were all weak and contributed to poor model fit. Implications of these non-significant relationships are discussed below.

First, drive for muscularity was not significantly associated with eating pathology. McCreary and Sasse (2000) first described drive for muscularity as the male equivalent of the drive for thinness that is associated with disordered eating in women. Therefore, researchers supposed that drive for muscularity was likely associated with disordered eating in men as well. If men value muscularity or bulk over thinness, men should be more likely to engage in types of disordered eating that contribute to weight gain rather than weight loss. In support of this theory, men who aspire to be more muscular are more likely to engage in binge eating without compensatory behaviors to offset weight gain

afterward (Moore, 1990). Perhaps the connection between drive for muscularity and eating pathology was weak in the current study because the measure of eating pathology was too heavily focused on restrictive eating behaviors. Men who want a more muscular physique are unlikely to go days at a time without eating or vomit after a meal.

Alternately, these results raise the question of whether drive for muscularity is concerning in men. Studies suggest that drive for muscularity is becoming more common, likely due to increased exposure to the male body ideal in the media (Pope et al., 2000). While the occurrence of drive for muscularity has increased, rates of eating pathology remain less than 1% in men (Woodside et al., 2001). This discrepancy suggests that not all who have a drive for muscularity develop an eating disorder. Furthermore, this study suggests that drive for muscularity may not be as strongly associated with eating pathology than previously conceptualized. The question for future researchers to investigate is when, why, and for whom this attitudinal stance of drive for muscularity escalates into concerning disordered eating behaviors, such as steroid or APED use, excessive exercise to build muscle, extreme dieting to reduce body fat, or overeating to increase bulk.

A second finding relates to the associations among drive for muscularity, social physique anxiety, and muscle dysmorphia. In model 1, I hypothesized that drive for muscularity would predict social physique anxiety, which would predict muscle dysmorphia. However, these paths were not significant. These constructs may influence each other in a different order or the relationships between them may be cyclical rather than linear. For instance, numerous studies illustrate a correlational relationship between drive for muscularity and muscle dysmorphia, although results are mixed as to the

directionality of this influence (Cafri et al., 2005; Pope et al., 2000). Thus, I specified models in which drive for muscularity predicted muscle dysmorphia (models 1 and 2) and vice versa (model 3). Because model 3 fit the data best, underlying muscle dysmorphia may contribute to heightened drive for muscularity, rather than the other way around.

In addition, with the exception of McCreary and Saucier's (2009) foundational study, no other researchers have studied the interplay of drive for muscularity, social physique anxiety, and muscle dysmorphia. While I hypothesized that theoretically men with a strong drive for muscularity may experience unpleasant psychological states, like social physique anxiety, and as a result have a highly dissatisfied or dysmorphic view of their appearance, this order may not reflect the relationships among constructs. It is also possible that other affective variables than social physique anxiety may have influenced drive for muscularity and muscle dysmorphia. For instance, McCreary and Sasse (2000) found that heightened drive for muscularity was associated with lower self-esteem and more depressive symptoms among men. Low self-worth or depressed mood – rather than social physique anxiety – may mediate the relationship between drive for muscularity and muscle dysmorphia.

A third finding is that social physique anxiety did not significantly predict body checking. Again, to date there is no published research that provides an empirical foundation for this relationship. Theoretically, one who is very concerned about how his body or muscularity appears to others may be more likely to hypervigilantly monitor his appearance through body checking. Body checking may also be used as a safety behavior to manage anxiety: It can either provide confirmation of one's muscularity or motivate

efforts to improve muscularity if checking renders an unfavorable assessment of one's muscularity. However, the non-significant relationship between social physique anxiety and body checking did not support either of these hypotheses. This may be because men with very high social physique anxiety are more likely to avoid their body than check it. According to Fairburn and colleagues (1999), body checking and avoidance often co-occur and may reflect the severity of pathology. For example, body avoidance may indicate more severe eating pathology than checking (Fairburn et al., 1999).

Overall, these results suggest several areas where our understanding of these relationships in men remains poor. Is drive for muscularity a negative prognostic indicator of eating pathology? Are certain manifestations of eating pathology more common in those with a strong drive for muscularity? How are drive for muscularity and muscle dysmorphia related? Is there a temporal relationship between them? How does social physique anxiety influence this relationship or is it not relevant at all? Finally, how are social physique anxiety and body checking related in men? Future research that aims to address these questions will help improve our understanding of vulnerability factors for poor body image in men.

Muscle Dysmorphia, Drive for Muscularity, Body Checking, and Clinical Impairment are Strongly Associated

Despite the fact that model 1 did not fit the data well, model 3 evidenced acceptable to good fit. Based on this model, another key finding from this study was that there are strong relationships are between muscle dysmorphia and drive for muscularity; drive for muscularity and body checking; and muscle dysmorphia and clinical

impairment. Specifically, the magnitude of path coefficients in model 3 indicated large effect sizes between these variables.

These findings are consistent with the psycho-behavioral model of muscle dysmorphia (Lantz et al., 2001). This model proposes that precipitating factors such as body dissatisfaction (e.g., drive for muscularity) may contribute to muscle dysmorphia, which leads to behavioral physique concerns (e.g., body checking), and possible negative consequences (e.g., clinical impairment). In support of this model, existing studies document that individuals who report a dysmorphic view of their muscularity report a strong drive for muscularity (Robert, Munroe-Chandler, & Gammage, 2009), muscle dysmorphia and body dissatisfaction predict body checking (Dakanalis et al., 2014; Walker et al., 2009), and muscle dysmorphia correlates with reduced psychological well-being (Bergeron & Tylka, 2007) and quality of life (Pope et al., 2005). Taken together, these results suggest that drive for muscularity and muscle dysmorphia among men are concerning and associated with negative consequences. Addressing dysmorphic perceptions of one's muscularity, such as through cognitive behavioral therapy (Pope et al., 2005) may be one effective point for intervention to reduce ancillary effects of muscle dysmorphia.

In addition, the relationships between social physique anxiety and drive for muscularity; social physique anxiety and clinical impairment; and body checking and clinical impairment were all statistically significant but of small magnitude. These relatively weak relationships suggest that social physique anxiety is less salient to men's body image and eating pathology than I hypothesized. That said, social physique anxiety was associated with muscle dysmorphia and drive for muscularity. Thus, men who have a

dysmorphic view of their muscularity and fear negative evaluations of their body by others may be more likely to internalize and strive for the muscular ideal.

Is Eating Pathology Less Relevant to Body Image in Nonclinical Men?

Although the primary study goal was to test a model of the interaction of eating pathology, body image, and anxiety among college men, the best fitting path model (i.e., model 3) did not include global eating pathology.

One explanation for this finding is that perhaps overall eating pathology is not relevant to the other factors examined in these models. It is possible that muscle dysmorphia, drive for muscularity, social physique anxiety, and body checking may be somewhat normative within a college-age sample (Olivardia et al., 1995) and not necessarily indicate underlying eating pathology. For instance, several studies illustrate that male athletes have elevated social physique anxiety without elevated rates of eating pathology (Haase et al., 2002). Furthermore, ubiquitous exposure to the male muscular-ideal body may contribute to higher ratings of drive for muscularity without necessarily influencing eating pathology. For instance, Duggan and McCreary (2004) found that viewing and purchasing muscle/fitness magazines correlated with levels of body dissatisfaction in men, but not eating pathology. Researchers agree that a certain degree of body image dissatisfaction is normal in women (Rodin, Silberstein, & Striegel-Moore, 1984). This so-called "normative discontent" (p. 25) with one's weight may affect men as well (Tantleff-Dunn, Barnes, & Larose, 2011). With growing recognition that men experience body image concerns comes the growing need to further investigate these concerns.

To that end, disordered eating behaviors may occur in isolation and not necessarily indicate elevated global eating pathology in men. For instance, binge eating often occurs in the absence of a desire to lose weight or eating concerns in men (De Young, Lavender, & Anderson, 2010). Men are also less likely to report core features that are central to the eating disorders. For example, men who endorse disordered eating behaviors are less likely than women to report restrained eating or eating concerns (De Young et al., 2010). In a study of college age men, Lavender and colleagues (2010) found that while a large proportion of the sample endorsed disordered eating behaviors (31.4% excessive exercise, 25.0% binge eating, 24.0% restrictive eating), overall scores on measures of global eating pathology were low. This led the authors to conclude that certain disordered eating behaviors like binge eating may be normative in men (Lavender et al., 2010). Overall, these and the aforementioned findings highlight the need for future research to better understand what is normative in men.

Another possible explanation for the absence of eating pathology in the best fitting path model is that the measure of eating pathology used in this study (i.e., the EDAM) was not optimal for use with this sample. While the measure demonstrated acceptable internal consistency reliability in this sample, scores were highly positively skewed and kurtotic with men reporting low levels of eating pathology. Low scores may be the result of administering a measure created on a clinical sample to a nonclinical sample. Since over 97% of this sample denied a history of an eating disorder diagnosis, it is likely that men obtained low scores because they did not endorse severe symptoms of eating pathology that researchers developed the measure to capture.

It is also possible that the EDAM measures kinds of eating pathology that are less frequent in men overall, regardless of clinical status. Many of the EDAM items assess restrictive-type eating behaviors (e.g., fears of becoming overweight, using laxatives, gone days at a time without eating, dressing in ways to sweat off extra calories) even when there is substantial research indicating that overeating or binge eating behaviors tend to be more common than restriction in men (Striegel-Moore et al., 2009). Thus, the measure may not optimally address the types of disordered eating behaviors likely present in this sample.

Given the aforementioned concerns with the EDAM, one could surmise that it would have been better to use another measure of eating pathology. However, there are no other existing eating pathology measures created specifically for men. While researchers and clinicians administer questionnaires like the EDE-Q (Fairburn & Beglin, 1994) in male samples, there is relatively limited literature evaluating its psychometric properties in men (e.g., Lavender et al. 2010). In this study, I decided it was optimal to use a measure created specifically for men to adequately assess the eating concerns that are unique to this population. It is possible that administering an alternate measure of eating pathology may have changed the results of this study. Future research is certainly needed to identify effective measures of eating pathology in men, particularly in nonclinical samples.

Global eating pathology did not significantly predict clinical impairment. I hypothesized this relationship based on my thesis research in which eating pathology positively predicted clinical impairment in college men (White, 2013). However, to date there are no published studies examining the degree to which men experience clinical

impairment as a result of eating pathology. To address this paucity in the literature, I conducted a preliminary study (White & Warren, manuscript under review). Although I used a different measure of eating pathology (the EDE-Q), findings from that study may aid in interpreting the present results. First, I found that men who engaged in at least one disordered eating behavior over the past month reported more clinical impairment than those who did not report any disordered eating. Second, I found that men with clinically significant levels of eating pathology scored significantly higher on the CIA than men with low levels of eating pathology. Thus men with higher levels of eating pathology experience more clinical impairment than those who report little or no disordered eating. Extremely low levels of eating pathology in the present study may have weakened this relationship and resulted in a non-significant association with clinical impairment.

Alternately, men may not find eating disorder behavior as distressing as women. As Lavender and colleagues (2010) suggested, certain eating behaviors like binge eating may be relatively normative in men and thus cause less distress. If men do not find disordered eating behaviors problematic, they would be less likely to report clinical impairment. Also, men may not experience clinical impairment in the same way as women. Because researchers developed the CIA on a sample of women, items may not be tapping into the kinds of negative, psychosocial consequences that men experience due to disordered eating (Mond, Mitchison, & Hay, 2014).

Measurement of Social Physique Anxiety using the SPAS and MSPAS

A final key finding from these data relates to the measurement of social physical anxiety. The preliminary aim of this study was to test the utility of using a sex-specific measure of social physique anxiety. I hypothesized that introducing slight wording

changes into the SPAS (inserting "body or build" in place of "figure or physique") would make the measure more relevant to men. I predicted that this wording change would: (1) lead to higher total scores on the modified MSPAS as compared to the original SPAS, and (2) result in a different factor structure than the SPAS. However, data did not support either of these hypotheses.

To that end, average scores on the MSPAS did not differ significantly from average scores on the SPAS using the 7-item scoring system. This finding suggests that men did not report more social physique anxiety on the modified questionnaire compared to the original questionnaire. Therefore, the effect of the wording change appeared to be subtle, if any effect at all. Modifying the wording of the SPAS to be more consistent with other measures of male body image (i.e., using "body" and "build") did not appear to impact how men responded to these items. Preliminary results suggest that the original version of the questionnaire is appropriate for use with men. This is consistent with existing studies in which authors examined possible sex differences in the SPAS and found that the original measure was tenable for use in both sexes (Elkund et al., 1997).

Furthermore, I found the structure of both the original and modified SPAS was optimally represented as a one-factor model with the same pattern of factor loadings (e.g., seven items all loading on one factor). The measures were configurally invariant; that is, both measures have the same conceptual definition of social physique anxiety. Results are consistent with Motl and Conroy (2000), who suggested that the original SPAS is best represented by a 7-item, 1-factor structure. These findings also dovetail with more recent research (Martin et al., 2006; Motl & Conroy, 2000) demonstrating that truncated versions of the SPAS, with either nine or seven items counted towards the total score, are

more conceptually sound. However, results contrast with Hart and colleagues' (1989) original validation of the SPAS, in which the authors conceptualized social physique anxiety as having one underlying dimension (one factor) but found that all twelve items loaded saliently on this factor.

Although the two measures were configurally invariant, results did not support full measurement invariance. Measurement invariance concerns the extent to which the questionnaires are measuring the same construct in the same way across samples. Complete measurement invariance would mean that group membership (i.e., those who completed the original versus modified version of the SPAS) did not affect observed scores. Instead, results suggested partial measurement invariance of the SPAS and MSPAS. This is a commonly encountered result in tests of multigroup invariance. In the current study, the pattern of items loading onto factors did not differ between samples, yet the strength of the relationships between each factor and its associated items differed between the two versions of the questionnaire (Jöreskog & Sörbom, 1999). Thus, I was unable to establish higher levels of measurement invariance – metric or scalar – in the present study.

According to Steenkamp and Baumgartner's (1998) discussion of partial measurement invariance, full measurement invariance is relatively rare. The authors state that evidence of different levels of measurement invariance may be appropriate based on the study goals (Steenkamp & Baumgartner, 1998). For instance, configural invariance may be sufficient to demonstrate that the essential meanings and structures of the construct are similar across groups. In other words, configural invariance in the present study suggests that the essential meaning of social physique anxiety did not change when

I modified the questionnaire. Thus, the modified wording of the MSPAS may not be necessary to improve the measurement of social physique anxiety in men. The modified item content does not appear to be more appropriate than the original (Chen, 2008).

Overall, findings regarding the similar mean scores and partial measurement invariance of the original and modified questionnaires indicate that subtle, sex-specific wording changes did not appear to influence the measurement of social physique anxiety. While results are preliminary, they suggest that male-specific wording of SPAS items does not have a significant impact on how men conceptualize social physique anxiety or respond to questions about their experience of social physique anxiety. Although this was not the primary study goal, results do provide some important implications for the measurement literature: Wording changes may not be necessary.

In addition to not supporting my hypotheses regarding the need for a modified, sex-specific version of the SPAS, results also highlight some concerns with the measure. First, although the 7-item scoring system exhibited the best fit to the data, internal consistency was lowest (coefficient alpha=.75). Internal consistency indicates the intercorrelations among items or the degree to which items on a scale measure the same unidimensional construct. However, as the number of items on a scale decreases (i.e., from 12 to 7), coefficient alpha typically decreases as well. Although researchers historically interpreted low values of coefficient alpha as indicating that the measure was not psychometrically sound, more recent research suggests that researchers have exaggerated the importance of coefficient alpha within the psychometric literature (Yang & Green, 2011).

Second, the MSPAS and SPAS were best described by a 7-item, 1-factor structure; thus, only seven of the twelve items are included in the scoring. The fact that nearly half of the SPAS/MSPAS items were not included is concerning. Too many items do not appear to tap into social physique anxiety concerns. An examination of the removed items (1, 2, 5, 11, and 12) reveals several general themes.

First, three of these items (1, 5, and 11) contain the modified wording tested in this study. These items may be problematic because I chose the wrong wording when modifying the questionnaire. Although other existing questionnaires developed for use with men use this wording (e.g., MDDI), alternate terms may have been more appropriate. For instance, other items on the SPAS use the term "body." These items also may have been problematic because they were confusing. Perhaps using "body" alone instead of "body or build" would have been less confusing to participants and changed how they responded to items. In general, it is best to avoid using conjunctives in questionnaire items to avoid participant confusion when responding and ambiguity when interpreting the results (Thorndike, 1997).

A second theme of these deleted items is that four of them (1, 2, 5, and 12) do not address the "social" aspect of social physique anxiety. These items do not reference the presence of others and instead focus on one's comfort with their body or appearance. Social physique anxiety as originally defined (Hart et al., 1989) requires perception that an observer is negatively evaluating one's appearance. Thus, questions that do not reference an observer do not tap into the *social* aspect of the construct of social physique anxiety. A third theme is that two of these items (2 and 12) refer specifically to one's

appearance in items of clothing. These items may tap into clothing or self-presentational concerns rather than social physique anxiety.

Overall, up to five items on the SPAS do not clearly measure social physique anxiety concerns. Results of this study, which support the use of a truncated version of the measure, suggest that researchers should substantially revise items to improve the utility of the measure. For instance, drafting additional items that are *clearly* intended to assess anxiety related to perceived negative evaluation of one's physique by others could lead to a more thorough measure of social physique anxiety. In its current form, the SPAS (and MSPAS) are brief, have low internal consistency, questionable face validity, and may not adequately address all aspects of social physique anxiety. A heavily revised or new questionnaire may improve the measurement of social physique anxiety.

Limitations

Consideration of the study limitations must temper the interpretation of these findings. The first major set of limitations concerns the analytic methods. First, I hypothesized all path analysis relationships *a priori*. I did not modify path models based on statistical recommendations. Thus, it is possible that a different order of constructs or direction of these relationships may fit the data. Second, it is likely that other constructs that were not included in these path models may influence male body image and eating pathology. Third, the models proposed and tested here were cross-sectional in nature; meaning that it is not possible to draw causal conclusions from these data. Fourth, it is not possible to identify interactions among variables over time with cross-sectional methods. For instance, high levels of muscle dysmorphia may increase levels of social

physique anxiety over time. In future research efforts, investigators can use longitudinal methods to identify the temporal relationship among constructs studied here.

A second set of limitations regards the sample used in this study. First, I conducted analyses with a convenience sample of college men. Therefore, results do not generalize to other age groups. In fact, researchers have conducted most existing research on male body image with young adult/college age samples; thus, the extant literature provides little information about body image concerns in older men. This is an area ripe for future research. Second, this sample was nonclinical and results may not generalize to a clinical population. For instance, the role of eating pathology may be more central to the relationships among these constructs in a clinical sample. I included participants who reported a prior anxiety or eating disorder diagnosis in the analyses, which may have affected the data. However, the proportion of participants with prior eating or anxiety disorder diagnoses was small ($\leq$ 3% in both samples); therefore, it is unlikely that these individuals impacted the main study analyses substantially. Third, this sample was ethnically diverse – much more so than the samples in many existing studies of body image concerns in college men. While this is certainly a strength of the present study, it is possible that ethnic group differences in body ideals/body image, acceptance of muscularity, internalization of the male muscular ideal, social anxiety, and eating pathology impacted the fit of the proposed path models. With a larger sample of minority men, it would be possible to conduct multigroup structural equation modeling to determine if the same model fits the data across ethnic groups. This is another potential area for future research.

A third set of limitations concerns the methods and measures used. First, participants completed measures online and although I used validity check items to eliminate random responding, it is possible that participants did not respond to questionnaires honestly or attend to item content consistently. Second, although researchers developed most of the measures used in this study specifically for men, one exception is the CIA. Fairburn and Bohn (2008) developed and normed the CIA on a sample of women with eating disorders. My preliminary research suggests that the CIA is appropriate for use with nonclinical men (White & Warren, manuscript under review). Yet there are no published studies supporting its use in men. A third limitation, as discussed previously, concerns the appropriateness of the EDAM for measuring eating disorder symptoms in nonclinical men. Scores were substantially positively skewed and kurtotic. While Stanford and Lemberg (2012) developed the EDAM on men, it is possible that another commonly used scale such as the Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994) is a better measure of eating pathology in this sample. Fourth, I tested only one possible SPAS wording change in this study. Other male-directed options (e.g., frame, musculature, size, body, etc.) may have had a more noticeable impact on mean scores or the underlying factor structure of the MSPAS.

Implications and Future Directions

Despite these limitations, results suggest several areas for future related studies and clinical practice. Findings from path analyses have implications for clinical work. First, the associations of drive for muscularity and muscle dysmorphia with increased clinical impairment suggest possible targets for intervention. While men who espouse a strong drive for muscularity and muscle dysmorphia may not meet criteria for an eating

disorder, they may be at elevated risk for developing eating pathology such as body checking (Walker et al., 2009). Over time, these cognitions and behaviors may reinforce each other and develop into more serious forms of eating pathology, such as a highly restrictive diet to minimize body fat and excessive exercise to enhance muscularity (Hildebrandt et al., 2010a). Without intervention, it is possible that these symptoms could eventually satisfy the criteria for USFED or OFED. Thus, interventions that reduce drive for muscularity and muscle dysmorphia may have beneficial outcomes (i.e., reducing clinical impairment or likelihood of developing a clinical eating disorder) even for nonclinical men.

One approach that has demonstrated efficacy in the treatment and prevention of eating disorders in women is dissonance-based intervention (Stice, Shaw, Becker, & Rohde, 2008). Using dissonance-based persuasion principles from social psychology, these programs aim to foster new cognitions that are inconsistent with currently held cognitions. Inconsistency leads to psychological discomfort and often motivates people to alter their cognitions or beliefs to become more consistent (Festinger, 1957). Programs such as Stice and colleagues' dissonance-based intervention (Stice et al., 2008) target inconsistent cognitions with regards to internalization of the thin body ideal for women. For instance, women with strong thin-ideal internalization complete verbal, written, and behavioral exercises that require them to argue against this idea. Theoretically, these exercises result in psychological discomfort/dissonance, which reduces one's endorsement of the thin-ideal to resolve this dissonance.

Dissonance-based interventions have demonstrated efficacy with women (Stice & Shaw, 2004), but no existing studies have examined the efficacy of similar methods to

challenge the muscular ideal in men. It is possible that creating dissonance regarding internalization of the muscular ideal can help reduce the importance men attribute to muscularity. For example, activities in which a man explains the negative consequences of extreme drive for muscularity and related behaviors (i.e., APED use or excessive exercise to increase muscle tone) to a peer may cultivate dissonance and decrease his own belief in the importance of muscularity. This may have a positive impact on body satisfaction and clinical impairment.

Alternately, Cash's (2002) cognitive-behavioral model provides a framework for conceptualizing these results. This model posits that body image concerns (e.g., drive for muscularity, muscle dysmorphia) may lead to negative body image emotions (e.g., social physique anxiety) and negative body image behaviors (e.g., body checking). A cognitive-behavioral approach also highlights potential points for intervention to reduce these behaviors. For instance, clinicians can use techniques such as identifying distorted cognitions regarding one's appearance, restructuring or thought stopping distorted thinking to reduce the cascade of negative body image concerns into negative emotions and behaviors. Future research can test the efficacy of these and other interventions aimed at improving male body image.

Results also have clinical implications for the screening and identification of at-risk men. Men who report body image concerns (i.e., drive for muscularity, muscle dysmorphia) may not necessarily earn elevated scores on measures of eating pathology, as the best fitting path model of these relationships in this study was one that did not include eating pathology. Furthermore, results of this study raised concerns about the appropriateness of one male-specific measure of eating pathology (the EDAM) for

nonclinical samples. Eating pathology screening instruments may not effectively identify men who are at risk for negative consequences like clinical impairment. While the recognition that men experience disordered eating is steadily growing, challenges remain in terms of how to properly identify at-risk individuals.

In terms of areas for additional research, future studies can elucidate the interplay of various forms of negative body image and eating pathology in men. It is especially important to continue to study these relationships among both clinical and nonclinical samples of men. Furthermore, most samples in existing studies include young men or adolescents. It is important to study these relationships in adult and older adult men to understand the nature of body image and eating pathology concerns across the lifespan.

Second, results highlight the need for future studies investigating the association between negative body image and eating pathology. Results of the present study suggest that eating pathology may be less salient to the experience of muscle dysmorphia, drive for muscularity, social physique anxiety, and body checking than predicted. However, eating pathology may influence these constructs in ways other than the three methods tested in my path models. A model development approach to path modeling may be beneficial to test different configurations of these relationships. In future studies, it will be important to use multiple measures of eating pathology, given the weaknesses of the EDAM revealed in the current study.

A third area for future research is investigating the role of alternate, sex-specific wording on questionnaires. In addition to testing cross-cultural measurement invariance, it is important for future research in the eating disorders and body image field to continue to test whether measures developed on female samples are appropriate for use with men.

Although there was no discernable effect of the SPAS wording changes in the present study, it is possible that alternate wording changes may have a greater impact on how men respond to SPAS items. I cannot definitively state that sex-specific wording changes are unnecessary; only that the wording changes tested in thus study did not have a significant impact. Future research can help clarify this issue. Specifically, additional research can be useful for improving the measurement of social physique anxiety across populations. As previously mentioned, the SPAS questionnaire would benefit from revisions, such as drafting new items that more clearly tap into social anxiety, rather than self-presentational, concerns.

Overall, results reinforce the need for a paradigm shift regarding male body image. As Leone and colleagues (2005) articulated, men have body image concerns. Although appearance-based concerns were typically conceptualized as a female problem, it is clear that they afflict men as well. At the extreme, these concerns can have negative consequences. This study reinforces the need for continued acknowledgement of men's body image concerns and commensurate research efforts investigating the nature and impact of negative body image in men.

APPENDIX A

STUDY MEASURES

Demographics

1. What is your age?
2. What is your gender?
    a. Male
    b. Female
    c. Transgender
3. What is your height?
    a. Feet
    b. Inches
4. What is your weight, in pounds?
5. What is your race?
    a. American Indian or Alaska Native
    b. Asian
    c. Black
    d. Hispanic/Latino
    e. White
    f. Multiracial/biracial (please list)
    g. Other (please specify)
6. What is your ethnicity? Please indicate how you identify yourself.
    a. African American (non-Hispanic origin)
    b. American Indian or Alaska Native
    c. Asian or Pacific Islander (includes Asian American)
    d. European American (non-Hispanic origin)
    e. Hispanic or Latino
    f. Multiethnic (please list)
    g. Other (please specify)
7. What is your marital status?
    a. Never married
    b. Married
    c. Separated
    d. Divorced
    e. Widowed
8. Do you have any children?
    a. No
    b. Yes (if yes, how many?)
9. What is your current work status?
    a. Not working
    b. Working part-time
    c. Working full-time
10. What is your current student status?
    a. Not in school
    b. Undergraduate student

c. Graduate student

11. What is the highest level of education you have completed?
    a. Did not complete high school
    b. Did not graduate from high school but obtained a GED
    c. High school diploma
    d. Some college (at least 1 year)
    e. Degree from a 2-year college
    f. Degree from a 4-year college
    g. Some graduate school (at least 1 year)
    h. Completed post-graduate degree
12. Please indicate the religion you identify with.
    a. Agnostic
    b. Atheist
    c. Buddhism
    d. Hinduism
    e. Islam
    f. Judaism
    g. Mormonism
    h. Non-religious/secular
    i. Protestant (e.g., Baptist, Lutheran, Methodist, Presbyterian, UCC)
    j. Roman Catholicism
13. What is your citizenship?
    a. I am a citizen of the United States
    b. I am a citizen of a country other than the United States
14. Please indicate how long you have lived in the United States.
    a. Less than 1 year
    b. 1-2 years
    c. 3-5 years
    d. 6-10 years
    e. 11-15 years
    f. More than 15 years
15. Please indicate how many generations your family has been in America.
    a. First generation (you were born in another country but live in the US)
    b. Second generation (you were born in the US; either parent was born in another country)
    c. Third generation (you were born in the US; both parents were born in the US and all grandparents were born in another country)
    d. Fourth generation (you and your parents were born in the US and at least one grandparent was born in another country)
    e. Fifth or more generation (you and your parents were born in the US and all your grandparents were born in the US)
16. Please indicate the primary language spoken in your family's home.
17. Have you ever been diagnosed with an eating disorder?
    a. Yes (if yes, which eating disorder?)
    b. No (if no, do you believe that you have [or have had] symptom of an eating disorder?)

18. Have you ever been diagnosed with an anxiety disorder?
    a. Yes (if yes, which anxiety disorder?)
    b. No (if no, do you believe that you have [or have had] symptoms of an anxiety disorder?)
19. Do you currently exercise? “Exercise” includes cardiovascular or strength training.
    a. Yes
    b. No
20. What is your main reason or motivation for exercising?
    a. Improving physical health
    b. Improving physical appearance
    c. Improving endurance
    d. Improving strength
    e. Other (please specify)
21. How many days per week do you typically exercise?
22. On days that you exercise, how many minutes do you spend doing cardiovascular training?
23. On days that you exercise, how many minutes do you spend doing strength training?
24. What is your sexual orientation?
    a. Exclusively heterosexual
    b. Predominantly heterosexual, only incidentally homosexual
    c. Predominant heterosexual, but more than incidentally homosexual
    d. Equally heterosexual and homosexual
    e. Predominantly homosexual, but more than incidentally heterosexual
    f. Predominantly homosexual, only incidentally heterosexual
    g. Exclusively homosexual
25. Are you currently sexually active? ("Sexual activity" is defined as engaging in mutual stimulation of genitals, oral sex, or sexual intercourse).
    a. Yes
    b. No
26. During the past 30 days, how often did you engage in the following activities?
    a. Viewing erotic movies/magazines
    b. Masturbation by yourself
    c. Casual kissing and petting
    d. Deep kissing
    e. Sexual foreplay
    f. Oral sex
    g. Sexual intercourse
27. In the past year, how often have you intentionally accessed visual material (e.g., magazines, videos, internet) of a sexual nature (e.g., pornography or erotica)?
    a. Every day
    b. A few times a week
    c. Once a week
    d. Once every two weeks
    e. Once a month

f. Once every few months
g. Once every 6 months
h. Once a year
i. Never

28. Do you consider your penis size to be?
    a. Below average
    b. Average
    c. Above average
    d. Way above average
29. Are you satisfied with the size of your own penis?
    a. No, I wish it were smaller
    b. Yes, I am satisfied
    c. No, I wish it were bigger

Clinical Impairment Assessment

Directions: Please choose the response which best describes how your eating habits, exercising, or feelings about your eating, shape, or weight have affected your life over the past four weeks (28 days).

Over the past 28 days, to what extent have your
...eating habits
...exercising
...or feelings about your eating, shape, or weight...

Not at all	A little	Quite a bit	A lot
0	1	2	3

1. Made it difficult to concentrate?
2. Made you feel critical of yourself?
3. Stopped you going out with others?
4. Affected your work performance?
5. Made you forgetful?
6. Affected your ability to make everyday decisions?
7. Interfered with meals with family or friends?
8. Made you upset?
9. Made you feel ashamed of yourself?
10. Made it difficult to eat out with others?
11. Made you feel guilty?
12. Interfered with you doing things you used to enjoy?
13. Made you absent-minded?
14. Made you feel like a failure?
15. Interfered with your relationships with others?
16. Made you worry?

Drive for Muscularity Scale

Directions: Please answer the questions with a response that best fits you.

Never	Rarely	Sometimes	Often	Very Often	Always
6	5	4	3	2	1

1. I wish that I were more muscular.
2. I lift weights to build up muscle.
3. I use protein or energy supplements.
4. I drink weight gain or protein shakes.
5. I try to consume as many calories as I can in a day.
6. I feel guilty if I miss a weight training sessions.
7. I think I would feel more confident if I had more muscle mass.
8. Other people think I work out with weights too often.
9. I think I would look better if I gained 10 pounds in bulk.
10. I think about taking anabolic steroids.
11. I think I would feel stronger if I gained a little more muscle mass.
12. I think that my weight training schedule interferes with other aspects of my life.
13. I think my arms are not muscular enough.
14. I think my chest is not muscular enough.
15. I think my legs are not muscular enough.

Eating Disorder Assessment for Men

Directions: Please darken the circle which best describes how often you display each of the following statements.

Never	Rarely	Sometimes	Often	Usually	Always
0	1	2	3	4	5

1. I weigh myself many times a day.
2. I find myself preoccupied with thoughts about food.
3. I think about gaining more muscle
4. I am satisfied with my upper body.
5. Use of laxatives is one way I control my weight.
6. I am terrified about becoming overweight.
7. I think about gaining muscle when considering what foods to eat.
8. I am obsessed about burning calories while working out.
9. I am satisfied with my lower body.
10. The urge to vomit after I eat is overwhelming.
11. I am embarrassed to disclose my weight.
12. I feel the need to cut my food into small pieces.
13. I get enough exercise.
14. I am satisfied with my physical appearance overall.
15. I show self control when it comes to food.
16. I spend much of the day thinking about my weight.
17. I use supplements for weight gain.
18. If I can't exercise, I feel out of control.
19. I feel as if I need to appear more muscular.
20. I eat to the point of feeling uncomfortable.
21. A five pound weight gain is acceptable to me.
22. I think about the calorie content in the food I eat.
23. The thought of not working out for a week is okay with me.
24. I wish my abdominal muscles were more defined.
25. Others are concerned about my eating habits.
26. I was overweight as a child and teased about my weight.
27. I prefer eating in the company of other people.
28. While participating in sports, I felt pressure to make or maintain a certain weight.
29. When compared to bodies shown in the media, I feel inadequate.
30. I have gone days at a time without eating.
31. I am satisfied with the amount of muscle weight I have.
32. I find myself eating very quickly.
33. I have suffered injuries from working out too hard.

34. I add layers of clothing to look larger.
35. I have used “sweat suits” and other ways to sweat off extra calories.
36. I feel that my weight will never be low enough.
37. I feel as if I cannot stop eating once I start.
38. I will allow myself to eat only if I exercise.
39. I strive to be thinner.
40. I eat with the plan of throwing up afterwards.
41. I have used water pills to control my weight.
42. I like the feeling of an empty stomach.
43. I have enhanced my workouts through the use of steroids.
44. I check my body several times a day for fatness.
45. I have used over the counter diet pills.
46. As a child, I felt I was overweight when I was not.
47. My day is planned around avoiding food.
48. My day is planned around burning calories.
49. I check my body several times a day for muscularity.
50. I have used enemas to try to control my weight.

Male Body Checking Questionnaire

Directions: Please rate to what extent the following items apply to you.

Never	Sometimes	Often	Very Often	Always
1	2	3	4	5

1. I check the hardness of my biceps to ensure I have not lost any muscle mass.
2. I look at my abdominal muscle (6-pack) in the mirror.
3. I flex my biceps when looking in the mirror to ensure the symmetry of my muscles.
4. I compare the size of my muscles to others.
5. I compare my overall leanness and muscle definition to others.
6. I compare my overall muscle mass to athletes or celebrities.
7. I compare my overall leanness mass to athletes or celebrities.
8. I ask others to feel my muscles to ensure their size or density.
9. I ask others to comment on my muscle definition or size.
10. I pinch fat around my abdomen and back (e.g., love handles) to determine my leanness.
11. I compare the leanness or definition of my chest muscle with others.
12. I compare the size of my chest muscles with others.
13. I compare the broadness of my shoulders with others.
14. I flex my chest muscles in the mirror to find lines or striation in the muscle.
15. I flex my muscles when looking in the mirror to find lines or striation in the muscle.
16. I take measurements of my muscle with a tape measure.
17. I push the fat around or pull my skin back to accentuate the muscles underneath.
18. I will check the size and shape of my muscles in most reflective surfaces (e.g., car windows, shopping store windows, mirrors, etc.).
19. I pinch or grab my muscles to check their size and density.

Muscle Dysmorphic Disorder Inventory

Directions: Please rate the following statements to best indicate how you typically think, feel, or behave on a scale from 1-5 (1 meaning never, 5 meaning always).

Never	Rarely	Sometimes	Often	Always
1	2	3	4	5

1. I think my body is too small.
2. I wear loose clothing so that people can't see my body.
3. I hate my body.
4. I wish I could get bigger.
5. I think my chest is too small.
6. I think my legs are too thin.
7. I feel like I have too much body fat.
8. I wish my arms were bigger.
9. I am very shy about letting people see me with my shirt off.
10. I feel anxious when I miss one or more workout days.
11. I pass up social activities with friends because of my workout schedule.
12. I feel depressed when I miss one or more workout days.
13. I pass up changes to meet new people because of my workout schedule.

Social Physique Anxiety Scale

The following questionnaire contains statements concerning your body physique or figure. By physique or figure we mean your body's form and structure; specifically, body fat, muscular tone, and general body proportions.

Instructions: Read each item carefully and indicate how characteristic it is of you according to the following scale.

Not at all characteristic of me	Slightly characteristic of me	Moderately characteristic of me	Very characteristic of me	Extremely characteristic of me
1	2	3	4	5

1. I am comfortable with the appearance of my physique or figure.
2. I would never worry about wearing clothes that might make me look too thin or overweight.
3. I wish I wasn't so up-tight about my physique or figure.
4. There are times when I am bothered by thoughts that other people are evaluating my weight or muscular development negatively.
5. When I look in the mirror I feel good about my physique or figure.
6. Unattractive features of my physique or figure make me nervous in certain social settings
7. In the presence of others, I feel apprehensive about my physique or figure.
8. I am comfortable with how fit my body appears to others.
9. It would make me uncomfortable to know others were evaluating my physique or figure.
10. When it comes to displaying my physique or figure to others, I am a shy person.
11. I usually feel relaxed when it's obvious that others are looking at my physique or figure.
12. When in a bathing suit, I often feel nervous about how well-proportioned my body is.

Modified Social Physique Anxiety Scale*

The following questionnaire contains statements concerning your body or build. By body or build we mean your body's form and structure; specifically, body fat, muscular tone, and general body proportions.

Instructions: Read each item carefully and indicate how characteristic it is of you according to the following scale.

Not at all characteristic of me	Slightly characteristic of me	Moderately characteristic of me	Very characteristic of me	Extremely characteristic of me
1	2	3	4	5

1. I am comfortable with the appearance of my body or build.
2. I would never worry about wearing clothes that might make me look too thin or overweight.
3. I wish I wasn't so up-tight about my body or build.
4. There are times when I am bothered by thoughts that other people are evaluating my weight or muscular development negatively.
5. When I look in the mirror I feel good about my body or build.
6. Unattractive features of my body or build make me nervous in certain social settings.
7. In the presence of others, I feel apprehensive about my body or build.
8. I am comfortable with how fit my body appears to others.
9. It would make me uncomfortable to know others were evaluating my body or build.
10. When it comes to displaying my body or build to others, I am a shy person.
11. I usually feel relaxed when it's obvious that others are looking at my body or build.
12. When in a bathing suit, I often feel nervous about how well-proportioned my body is.

*Modified wording is underlined.

Supplement Use Survey

Which of the following nutritional supplements are you currently taking?

	How many times per month do you take it?				Why do you choose to take this supplement?					
	0	1-10	11-15	>15	Provide energy	Enhance performance	Enhance recovery	Enhance muscle strength	Build muscle	Other
Energy / Protein/ Sport bar (i.e. Powerbar, Pure Pro, Snickers Marathon bar)										
Cereal / Fruit / Nut bar (i.e. Special K bar, Quaker Oats bar)										
Gels and other related products (i.e. GU, Clif Shots, Sport Beans)										
Sports Drinks (i.e. Gatorade Thirst Quencher, Propel Fitness Water, G2)										
Carnitine										
Chitosan										
Citrus aurantium (Bitter Orange)										
Conjugated Linoleic Acid (CLA)										
Guarana										
Hyrdoxycitric Acid (HCA)										
Ma Huang (*Ephedra sinesis,* Ephedrine)										
Pyruvate										
Caffeine										
Multivitamin/mineral supplement										
B-complex										
Ginseng										
Calcium										
Coenzyme Q10										
Ginkgo biloba										
St. John's Wort										
Beta carotene										
Green tea										
Selenium										
Vitamin C										
Vitamin E										
Echinacea										
Chromium										
Amino acids										
Glutamate										
Protein (Casein, whey, soy, colostrum)										

Androstenedione										
Branched-Chain Amino Acids (BCAAs)										
Creatine										
DHEA (Dehydroepiandrosterone)										
HMB (β-Hydroxy-β-Methylbutyrate)										
Tribulus										
NO / arginine										
Chondroitin Sulfate										
Glucosamine										
MSM (Methylsulfonymethane)										
Energy drinks (i.e. NOS, Redbull, Rockstar)										
Sugar-free drinks (i.e. Sugar-free Rockstar, 5- hour energy)										
Other (please list)										

APPENDIX B

SAMPLE CHARACTERISTICS

Table 1

Participant Demographic Characteristics for Sample 1

Variable	Mean (SD)	N (%)
Age	20.84 (4.27)	
Body mass index	24.87 (4.60)	
Ethnicity		
African American		30 (9)
American Indian		0 (0)
Asian American		80 (24)
European American		109 (32)
Hispanic/ Latino		73 (21)
Multi-ethnic		24 (7)
Other		25 (7)
Student Status		
Undergraduate		339 (99)
Graduate		4 (1)
Education Level		
High school diploma		151 (44)
Some college (>1 year)		149 (43)
Degree from 2 year college		29 (9)
Degree from 4 year college		12 (3)
Completed post-graduate degree		2 (1)
Marital Status		
Never married		320 (93)
Married		16 (5)
Separated		3 (1)
Divorced		4 (1)
Work Status		
Unemployed		136 (40)
Part-time		154 (45)
Full-time		52 (15)
Generational Status		
First		59 (17)
Second		125 (37)
Third		23 (7)
Fourth		45 (13)
Fifth or higher		90 (26)
Anxiety disorder diagnosis		
Yes		7 (2)

No	336 (98)
Eating disorder diagnosis	
Yes	0 (0)
No	343 (100)
Sexual Orientation	
Exclusively heterosexual	275 (80)
Predominantly heterosexual, only incidentally homosexual	28 (8)
Predominantly heterosexual, more than incidentally homosexual	5 (2)
Equally heterosexual and homosexual	6 (2)
Predominantly homosexual, but more than incidentally heterosexual	6 (2)
Predominantly homosexual, only incidentally heterosexual	9 (3)
Exclusively homosexual	15 (4)

Table 2

Participant Demographic Characteristics for Sample 2

Variable	Mean (SD)	N (%)
Age	20.51 (3.6)	
Body mass index	24.88 (5.01)	
Ethnicity		
African American		27 (8)
American Indian		1 (0.3)
Asian American		96 (29)
European American		102 (31)
Hispanic/ Latino		68 (21)
Multi-ethnic		19 (6)
Other		18 (5)
Student Status		
Undergraduate		333 (99)
Graduate		2 (1)
Education Level		
High school diploma		152 (45)
Some college (>1 year)		158 (47)
Degree from 2 year college		17 (5)
Degree from 4 year college		6 (2)
Completed post-graduate degree		3 (1)
Marital Status		
Never married		323 (96)
Married		9 (3)
Separated		0 (0)
Divorced		4 (1)
Work Status		
Unemployed		141 (43)
Part-time		150 (46)
Full-time		38 (11)
Generational Status		
First		45 (13)
Second		123 (37)
Third		26 (7)
Fourth		42 (13)
Fifth or higher		100 (30)
Anxiety disorder diagnosis		
Yes		11 (3)
No		320 (97)
Eating disorder diagnosis		
Yes		1 (0.3)
No		331 (99.7)

APPENDIX C

IRB APPROVAL

UNLV
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Social/Behavioral IRB – Exempt Review
Deemed Exempt

DATE: September 11, 2013

TO: **Dr. Cortney Warren,** Psychology

FROM: Office of Research Integrity – Human Subjects

RE: Notification of IRB Action
Protocol Title: Muscularity, Mood, and Body Image in College Men
Protocol # 1308-4544

This memorandum is notification that the project referenced above has been reviewed as indicated in Federal regulatory statutes 45CFR46 and deemed exempt under 45 CFR 46.101(b)2.

PLEASE NOTE:
Upon Approval, the research team is responsible for conducting the research as stated in the exempt application reviewed by the ORI – HS and/or the IRB which shall include using the most recently submitted Informed Consent/Assent Forms (Information Sheet) and recruitment materials.

Any changes to the application may cause this project to require a different level of IRB review. Should any changes need to be made, please submit a **Modification Form**. When the above-referenced project has been completed, please submit a **Continuing Review/Progress Completion report** to notify ORI – HS of its closure.

If you have questions or require any assistance, please contact the Office of Research Integrity - Human Subjects at IRB@unlv.edu or call 895-2794.

Office of Research Integrity – Human Subjects
4505 Maryland Parkway • Box 451047 • Las Vegas, Nevada 89154-1047
(702) 895-2794 • FAX: (702) 895-0805

APPENDIX D

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