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The Role of Social Physique Anxiety and Social Appearance Anxiety in the Body Checking Behaviors of Male and Female College Students

Emily Katherine White
University of Nevada, Las Vegas, emilykwhite@gmail.com

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THE ROLE OF SOCIAL PHYSIQUE ANXIETY AND SOCIAL APPEARANCE
ANXIETY IN THE BODY CHECKING BEHAVIORS OF MALE AND FEMALE
COLLEGE STUDENTS

by

Emily Katherine White

Bachelor of Arts in Psychology
Washington University in St. Louis
2008

A thesis submitted in partial fulfillment
of the requirements for the

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Master of Arts - Psychology

Department of Psychology

Cortney S. Warren, Ph.D., Committee Chair

Mark H. Ashcraft, Ph.D., Committee Member

Marta Meana, Ph.D., Committee Member

Barbara Brents, Ph.D., Graduate College Representative

Kathryn Hausbeck Korgan, Ph.D., Interim Dean of the Graduate College

August 2013

ABSTRACT

The Role of Social Physique Anxiety and Social Appearance Anxiety in the Body Checking Behaviors of Male and Female College Students

by

Emily Katherine White

Dr. Cortney S. Warren, Examination Committee Chair
Associate Professor of Psychology
University of Nevada, Las Vegas

Body checking is defined as behavior aimed at monitoring changes in one's weight or shape, such as measuring or pinching certain body parts, repeatedly checking one's shape in the mirror, trying on clothes to gauge fit, feeling for protruding bones, or frequently weighing one's self. Theoretically, body checking may be the behavioral manifestation of a core feature of eating disorders: overevaluation of body weight and shape. Although the nature and correlates of body checking in female and male college students without eating disorders are understudied, one recent study by Haase and colleagues (2007) found that social physique anxiety mediated the relationship between body checking beliefs and behaviors in women. To expand on these findings, the goals of this study were: (1) to test the fit of Haase and colleagues' (2007) foundational model in a nonclinical sample of college women and men; (2) to test the fit of an expanded model that included the additional constructs of social appearance anxiety, trait eating pathology, and clinical impairment; and (3) to explore potential sex differences in the fit of this expanded model. Results from path analyses conducted with a sample of 337 men and 567 women did not support Haase and colleagues' (2007) model, suggesting that social physique anxiety may not mediate the relationship between body checking cognitions and behaviors as predicted. Furthermore, the fit of the expanded path model

was poor in both men and women, suggesting that the added constructs did not influence body checking behavior in the predicted way. However, re-specified models did fit the data well for women and reasonably well for men. Contrary to hypotheses, social physique anxiety appeared to be more salient to the prediction of body checking behaviors in women than men. Aside from this finding, there were few sex differences in the final path models. Overall, the results of this study provide a preliminary model for understanding the correlates of body checking behaviors in male and female college students. Additional research is needed to expand our understanding of sex differences and to clarify the independence of social physique and social appearance anxiety.

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CHAPTER 1

INTRODUCTION

Clinically diagnosed eating disorders and subclinical levels of eating pathology are rampant in college populations (Schwitzer, Bergholz, Dore, & Salimi, 1998). *Eating pathology* is a term used to describe general eating disorder symptoms, such as highly restrictive eating, binge eating, or engaging in compensatory behaviors to offset eating (e.g., vomiting). *Subclinical level eating pathology* describes clinically concerning symptoms that do not satisfy the diagnostic criteria for an eating disorder. Although the prevalence of clinical eating disorders in American college samples is less than 2 percent (Hoek & van Hoeken, 2003), subclinical level eating pathology among female college students is much higher, estimated to be between 8 and 17 percent (Kirk, Singh, & Getz, 2001; Prouty, Protinsky, & Canady, 2002; Reinking & Alexander, 2005). For instance, in a study of 1,620 students, nearly 11 percent of women and 4 percent of men scored above the subclinical-level cutoff (Hoerr, Bokram, Lugo, Bivins, & Keast, 2002). Similarly, in a recent study of 2,822 college students, Eisenberg and colleagues (2011) found that 9.3-13.5 percent of women and 3.1-3.6 percent of men reported subclinical-level eating pathology (Eisenberg, Nicklett, Roeder, & Kirz, 2011). Furthermore, engaging in disordered eating, even among students who do not report subclinical-level eating pathology, is more common in college samples: a recent study of 186 undergraduate women found that nearly half (49 percent) engage in a minimum of one disordered eating behavior per week (Berg, Frazier, & Sherr, 2009).

One way that eating pathology manifests is through body checking behaviors.

Body checking includes measuring or pinching certain body parts, trying on certain

clothing to gauge fit, weighing one's self repeatedly, or constantly checking one's appearance in the mirror (Shafran, Fairburn, Robinson, & Lask, 2004). These behaviors are thought to be the manifestation of a core eating-disordered cognition: the overevaluation of weight and shape. Theoretically, individuals who engage in body checking exaggerate the importance of weight and shape to their self-concept (Shafran et al., 2004). As such, individuals who engage in body checking report greater dissatisfaction with their body and more eating disorder symptoms than those who do not engage in body checking (Reas, Whisenhunt, Netemeyer, & Williamson, 2002; Shafran et al., 2004).

Given the saliency of body checking to eating pathology, Haase, Mountford, and Waller (2007) proposed a model to explain this phenomenon in college samples. According to cognitive behavioral theory, body checking behaviors are driven by underlying beliefs about the utility of these behaviors. For example, college students often believe that body checking will reduce anxiety; failure to body check will result in negative consequences (e.g., weight gain); and body checking will facilitate control over weight and eating (Mountford, Haase, & Waller, 2006). Theoretically, these rigid beliefs sustain body checking through a process of reinforcement whereby underlying beliefs about body checking are supported by engaging in body checking behaviors. For example, an individual who believes that the failure to body check will result in negative consequences must engage in body checking to avoid these consequences. Both confirmatory (e.g., "I was right, my thighs *are* bigger today") and disconfirmatory (e.g., "My thighs are actually the same size as yesterday") information gleaned from body checking strengthens the cognitions that support these behaviors (e.g., "If I don't body

check, I won't be able to tell that I gained or stayed at the same weight"; "Checking is an effective way to monitor for weight gain; therefore, I must body check constantly").

While fear and anxiety are often mentioned as motivators for body checking, there is limited understanding of how affective factors influence the connection between *body checking cognitions* (i.e., beliefs about the function or utility of body checking behaviors) and behaviors. Some authors suggest that *social physique anxiety*, or the anxiety about one's body composition, shape, or size, that one experiences in a social context (Hart, Leary, & Rejeski, 1989), may mediate the link between cognitions about one's appearance and body checking behavior. Haase and colleagues (2007) proposed that social physique anxiety resembles the anxiety an individual experiences when body checking behaviors fail to reassure one's fears about his or her body shape. Moreover, social physique anxiety and body checking cognitions may be related concepts, as both anxiety about one's physique and beliefs about the consequences of body checking may intensify body checking behaviors in an effort to relieve anxiety. To test this model, Haase and colleagues (2007) measured body checking cognitions, body checking behaviors, and social physique anxiety in a sample of 292 female undergraduates who did not meet criteria for an eating disorder. Results suggested that social physique anxiety partially mediated the relationship between cognitions and behaviors, and that social physique anxiety was significantly associated with all cognitive and behavioral aspects of body checking. The authors concluded that incorporating affect in the form of social physique anxiety lead to greater understanding of the factors that influence body checking behavior in female college students.

Despite the utility of the model proposed by Haase and colleagues (2007), additional research is needed in at least three primary areas. First, in addition to social physique anxiety, other affective factors may influence the relationship between body checking cognitions and behaviors. Recent research suggests that the construct of *social appearance anxiety* may be more salient to eating disorder symptoms than social physique anxiety (Levinson & Rodebaugh, 2012). While social physique anxiety describes concerns specific to one's body structure and composition, social appearance anxiety encompasses overall appearance evaluation. Appearance evaluations tend to be based on more than just physique or body composition (Cunningham, 1986); therefore, it is important to measure social appearance anxiety as well as physique-related anxiety. Second, the original model was developed using one sample of female undergraduate students. Consequently, it is unknown whether this model holds for men or whether these results will replicate to other college samples. Based on the extant literature on sex differences in body image (Demarest & Allen, 2000; Furnham, Badmin, & Sneade, 2002), men tend to be more concerned with musculature and attaining low body fat (Olivardia, 2002). Women, on the other hand, tend to be more concerned with thinness and low body weight (Fallon & Rozin, 1985). As such, many men report wanting to gain weight (in the form of muscle) whereas most women report wanting to lose weight (Olivardia, Pope, Mangweth, & Hudson, 1995), which are often labeled a *drive for muscularity* versus a *drive for thinness* (Smolak & Murnen, 2008). As a result of these sex differences in body image concerns, different forms of social anxiety may be salient to men and women.

Finally, Haase and colleagues (2007) did not evaluate the extent to which trait level eating pathology influences body checking cognitions and behaviors or test the consequences of body checking (e.g., impaired psychosocial functioning) in college samples. Emerging research suggests that engaging in body checking behaviors has a detrimental impact on quality of life (Latner, Mond, Vallance, Gleaves, & Buckett, 2012; Vallance, Latner, & Gleaves, 2011) and overall functioning (White & Warren, submitted for publication). Given that eating pathology is an established predictor of body checking behaviors (Haase, Mountford, & Waller, 2011), incorporating this construct, along with degree of clinical impairment, into the revised model is critical.

Consequently, building on previous research, the purpose of this study was three-fold. The first aim was to test the fit of the model proposed by Haase and colleagues (2007) in a new sample of undergraduate women and men to examine whether social physique anxiety mediates the relationship between body checking cognitions and body checking behaviors (see Figure 1). I hypothesized that the inclusion of social physique anxiety would explain a significant proportion of the variance in body checking behaviors.

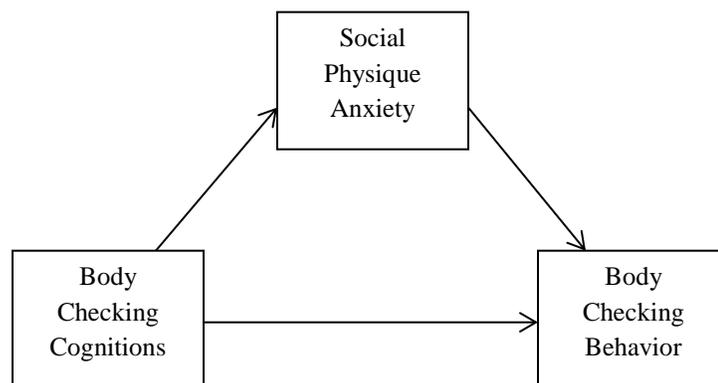


Figure 1. Foundational mediation model proposed by Haase, Mountford, & Waller.

The second aim was to expand upon the work of Haase and colleagues (2007) by testing an expanded model (see Figure 2) that included: (1) social appearance anxiety in addition to social physique anxiety, since social appearance anxiety may be more salient to the relationship between anxiety and disordered eating (Levinson & Rodebaugh, 2012); (2) trait level eating pathology as a predictor of body checking behavior, as existing research demonstrates that eating pathology reliably predicts engaging in body checking (Haase et al., 2011); and (3) clinical impairment predicted by body checking behavior, since several preliminary studies suggest that body checking is associated with decreased quality of life and increased ratings of impairment (Latner et al., 2012; Vallance et al., 2011).

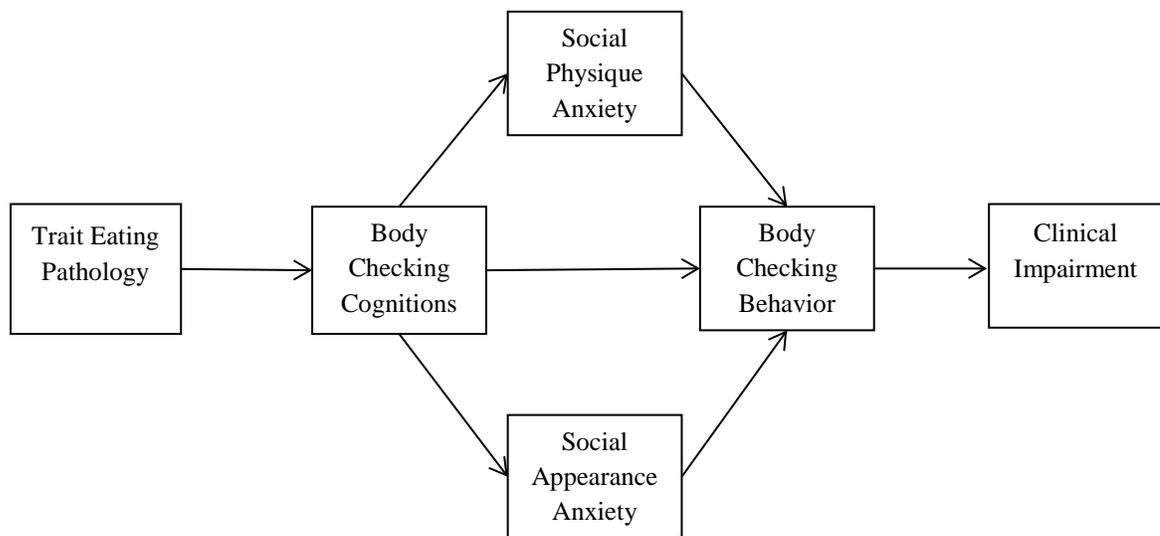


Figure 2. Hypothesized path model of the relationship between eating pathology, body checking cognitions, social appearance anxiety, social physique anxiety, body checking behavior, and clinical impairment.

The final aim was to conduct a rudimentary examination of possible sex differences. Specifically, I hypothesized that social physique anxiety may be more salient to the relationship between body checking cognitions and behaviors in men, whereas social appearance anxiety would be applicable to the female data, given the demonstrated sex differences in drive for muscularity versus drive for thinness.

CHAPTER 2

LITERATURE REVIEW

Although eating pathology is rampant in college samples of women (and men, to a lesser but increasing degree), body checking behavior and the mechanisms theorized to influence these behaviors (e.g., social physique anxiety) are understudied in this population. To introduce this study, the purpose of this section is to review literature on body checking behavior in women and men; affect, anxiety, and body checking – including Haase and colleagues' (2007) model of social physique anxiety and body checking behavior; and sex differences in body checking and body image.

Body Checking Behaviors in Women and Men

Clinically diagnosable eating disorders and subclinical eating pathology are common in female college samples (Mintz & Betz, 1988). While epidemiological studies suggest that between 1 and 5 percent of undergraduate women are diagnosed with an eating disorder (Kurtzman, Yager, Landsverk, Wiesmeier, & Bodkurka, 1989; Schotte & Stunkard, 1987), the prevalence of subclinical eating pathology is much higher. One recent study of female undergraduates ($N = 186$) found that nearly 50 percent reported engaging in at least one disordered eating behavior (such as binge eating, restrictive eating, or purging) at least once a week (Berg, Frazier, & Sherr, 2009).

While eating disorders are less frequently diagnosed in men, substantial eating pathology exists in this population (Woodside et al., 2001). In one study, 16 percent of undergraduate men reported behaviors consistent with an eating disorder, such as binge eating and excessive exercise (Mintz, O'Halloran, Mulholland, & Schneider, 1997). A study by Hoerr and colleagues (2002) comparing the prevalence of disordered eating in a sample of 1,620 undergraduates suggested that more women met criteria for at-risk status

by scoring in the clinical range on a measure of eating pathology than men (10.9% versus 4.0%). However, men endorsed substantial eating pathology, particularly a history of weight cycling and adhering to a restrictive, low-fat diet (Hoerr, Bokram, Lugo, Bivins, & Keast, 2002).

Given that eating pathology is prevalent in female and male college students, it is critical to understand the factors that predict the development or serve as indicators of an existing eating disorder. One of the core features of eating disorder pathology is the *overevaluation of weight and shape*, or the extent to which an individual exaggerates the importance of one's weight or shape on their self-evaluation (Fairburn, Cooper, & Shafran, 2003; Fairburn, Shafran, & Cooper, 1999). This overevaluation may manifest as *body checking behaviors*, through which an individual behaviorally "checks" for any potential changes to one's weight or shape. Although varied in type, common body checking behaviors include measuring or pinching specific body parts, monitoring overall body shape, excessively scrutinizing one's body in the mirror, trying on certain clothes to gauge fit, feeling for protruding bones, and repeatedly weighing oneself (Mountford, Haase, & Waller, 2007; Reas, Whisenhunt, Netemeyer, & Williamson, 2002; Shafran, Fairburn, Robinson, & Lask, 2004).

Body Checking Behavior in Women With Eating Disorders

Though originally identified as a feature of restricting-type eating disorders like anorexia nervosa (AN), body checking has been documented in individuals with bulimia nervosa (BN), binge eating disorder (BED), and eating disorder not otherwise specified (EDNOS). Research suggests that body checking is common across eating disorder diagnosis (Calugi, Dalle Grave, Ghisi, & Sanavino, 2006; Fairburn, Shafran, & Cooper,

1999; Grilo, Reas, Brody, Burke-Martindale, Rothschild, & Masheb, 2005; Mountford et al., 2007; Reas, Grilo, Masheb, & Wilson, 2005; Reas et al., 2002; Waller, Sines, Meyer, & Mountford, 2008). Prevalence studies suggest that anywhere between 50 and 90 percent of women with eating disorders engage in body checking on a regular basis. For instance, in one study by Mountford and colleagues (2006), over half of the 84 participants diagnosed with AN, BN, BED, or EDNOS reported body checking over the past month. In a qualitative study of 64 women with AN, BN, and EDNOS, 92% endorsed engaging in body checking on a regular basis (Shafran, Fairburn, Robinson, & Lask, 2004).

Investigating body checking is of clinical importance because the frequency and duration of body checking practices appear to be influenced by eating disorder symptom presentation and severity (Mountford et al., 2006; Shafran, Fairburn, Robinson, & Lask, 2004; Vocks, Kosfelder, Wucherer, & Wachter, 2008). Somewhat surprisingly, women with AN appear to be least likely to endorse body checking. For instance, in a study of 151 women with eating disorders, women with BN scored significantly higher on a standard measure of body checking behavior compared to women with AN (Calugi et al., 2006). Similarly, in their study of 84 women with eating disorders, Mountford and colleagues (2007) found that those with AN or BED scored lowest on measures of body checking while women who met criteria for EDNOS reported the highest levels. In fact, many researchers have suggested that the nature of body checking may shift over time in women with AN, such that they begin to endorse more body avoidance (behaviors such as refusing to be weighed, avoiding mirrors or window reflections, disguising one's shape

with ill-fitting clothing, and avoiding body exposure) rather than body checking (Calugi et al., 2006; Fairburn et al., 1999; Mountford et al., 2007).

Body checking is also highly associated with other forms of eating pathology. For instance, in a study comparing college women with ($n = 16$) and without eating disorders ($n = 149$), body checking was associated with higher body dissatisfaction, greater fear of fatness, more frequent body avoidance, and more overall eating disturbance for all women (Reas, Whisenhunt, Netemeyer, & Williamson, 2002). Another study comparing women with ($n = 55$) and without ($n = 55$) eating disorders revealed that women who endorse more eating disorder pathology engage in body checking behaviors more frequently and for longer periods of time than women with fewer eating disorder symptoms. Moreover, the severity of these eating disorder symptoms was positively correlated with body checking frequency (Shafran, Fairburn, Robinson, & Lask, 2004).

In a sample of 64 women with AN, BN, and EDNOS, Shafran and colleagues (2004) yielded important results about the nature of body checking in women with eating disorders. Within this sample, body checking most frequently occurred in the forms of socially comparing one's body size with others, touching or measuring one's stomach and thighs, and examining one's stomach and thighs in the mirror (Shafran et al., 2004). Furthermore, the onset of body checking frequently coincided with the onset of weight loss or dieting, and body checking was significantly associated with increased eating pathology and the overevaluation of weight and shape. The authors concluded that body checking is associated with significant eating pathology and is a manifestation of the overevaluation of weight and shape (Shafran et al., 2004).

Numerous other studies have demonstrated that overevaluation of weight and shape (as measured by standard assessments) is significantly related with increased body checking in women with eating disorders. For example, in a sample of overweight women ($n = 297$) with BED, those who engaged in body checking were more likely to express overevaluation of weight and shape and to endorse eating disorder symptoms (e.g., high dietary restraint, binge eating) than those who did not report body checking (Reas, Grilo, Masheb, & Wilson, 2005).

Finally, although body checking behavior is well documented across the eating disorders, less is known about the ability to distinguish various eating disorder diagnostic groups from each other based on body checking. Mountford and colleagues (2007) sought to determine whether body checking behaviors appeared to be more closely related to diagnostic category or specific symptom presentation in women with eating disorders (Mountford, Haase, & Waller, 2007). The researchers concluded that body checking had some diagnostic and symptomatic specificity. Body checking could be used to distinguish between eating disorder diagnoses such that AN was associated with the lowest body checking scores and EDNOS was associated with the highest scores. Additionally, body checking and related cognitions were associated with symptom presentation such that women who believed that body checking allowed for objective verification of their body size were more likely to engage in binge eating and purging behaviors than women who did not endorse such cognitions. Based on these results, body checking behaviors are differentially associated with eating disorder diagnosis and symptom presentation.

Body Checking Behavior in Women Without Eating Disorders

As stated above, body checking is broadly associated with eating pathology. Specifically, body checking is positively correlated with body dissatisfaction, overevaluation of weight and shape, and cognitions about perceived degree of control over one's weight and shape. Based on clinical data using samples of women with eating disorder diagnoses, body checking is an indicator of severe eating pathology and, consequently, an area of clinical concern. Given these associations, body checking was originally thought to be uniquely experienced by individuals with eating disorders (Fairburn et al., 1999; Rosen, 1997). Only recently are researchers investigating body checking practices in men and women without eating disorders.

Existing research examining women without eating disorders suggests that body checking occurs but at a lower frequency compared to women with eating disorders. One study of college women revealed that women with eating disorders scored significantly higher on items measuring body checking than control individuals (Shafran et al., 2004). Similarly, in a sample of 149 college women, Reas and colleagues (2002) found that women without eating disorders reported significantly less body checking than women with an eating disorder diagnosis. In a comparison of women with ($n = 151$) and without ($n = 422$) eating disorders, Calugi and colleagues (2006) found that scores on a standard questionnaire of body checking could reliably discriminate clinical participants from controls, as women without eating disorders engaged in significantly less body checking than women with an eating disorder.

In addition to being less frequent, body checking appears to be experienced in a qualitatively different way in women without eating disorders. With regards to the type of body checking, Shafran and colleagues (2004) found that checking one's face in a mirror

was most commonly reported in a sample of control women, while the clinical sample of patients with eating disorders were more likely to focus on other body parts (e.g., stomach, thighs). Eating disorder patients tended to focus their body checking on areas that have commonly been identified as being associated with the highest levels of dissatisfaction for women (Garner, Olmstead, & Polivy, 1983). For instance, in a national survey of 803 American women, nearly 48 percent of participants expressed significant dissatisfaction with their lower torso (e.g., thighs, hips, buttocks) while only 11.7 percent of women were dissatisfied with their face (Cash & Henry, 1995). As such, higher levels of body dissatisfaction in the eating disorders likely lead these women to body check in different areas than control women.

Despite these differences in frequency and location, body checking in women without eating disorders is associated with increased weight-related concerns and eating pathology. Women without eating disorders who report body checking score higher on measures of body dissatisfaction, eating disorder pathology, and the overevaluation of weight and shape than women who do not engage in body checking (Reas et al., 2002; Shafran et al., 2004). Body checking and body dissatisfaction may be mutually reinforcing, as demonstrated by a study of 45 women with high weight and shape concerns. Women in this study reported a significant decrease in body dissatisfaction when they stopped body checking and instead engaged with their bodies more neutrally (Delinsky & Wilson, 2006).

Body checking behaviors can also be used to distinguish women with weight and shape concerns from women without such concerns. For instance, a study comparing the body checking behaviors of women with and without eating disorders revealed that

scores on a measure of body checking can reliably distinguish individuals with eating disorders from non-eating disorder cases (Calugi et al., 2006). Body checking scores can also reliably distinguish women who are dieting from nondieters (Calugi et al., 2006), as college-aged women who are currently dieting report more body checking behaviors than women who are not dieting (Reas et al., 2002). Moreover, body checking can differentiate between women who score high and low on a measure of body size concern (Reas et al., 2002). Overall, these results indicate that body checking is associated with increased eating pathology and weight-related concerns for women without eating disorders.

In a recent study, Haase and colleagues (2011) clearly demonstrated the relationship between body checking and pathological eating behaviors in a sample of 342 college-age women without eating disorders. Results indicated that binge eating, purging, excessive exercise, and restrictive eating were all more common in those who endorsed body checking. Therefore, body checking emerged as a discriminant factor in predicting pathological eating behavior. Furthermore, women who endorsed body checking scored significantly higher on a measure of body checking cognitions, indicating that these women believed that body checking behaviors provided an objective verification of their shape, promoted feelings of safety, provided reassurance, and aided in bodily control. As a result of this relationship between body checking thoughts and behaviors, the authors concluded that for women without eating disorders, body checking may function as a safety and control measure (Haase, Mountford, & Waller, 2011). These safety and control beliefs are characteristic of women with eating disorders (Mountford et al., 2006);

therefore, such beliefs in a sample of women without eating disorders are suggestive of significant eating pathology.

Recent work from Meyer and colleagues (2011) expands upon these results by suggesting that body-related safety behaviors, like checking, are strongly associated with disordered eating attitudes and behaviors. In a sample of 250 women without eating disorders, body checking was predictive of increased eating pathology, independent of the effects of anxiety or depression (Meyer, McPartlan, Rawlinson, Bunting, & Waller, 2011). Therefore, the authors suggested that body checking may maintain eating pathology and poor body image.

Although the majority of research examining body checking practices in nonclinical women has been conducted with samples of normal weight college students, studies of overweight women demonstrate that body checking is prevalent in this population as well. Grilo and colleagues (2005) reported in a study of 216 women and 44 men seeking bariatric surgery that body checking was frequent, with 20% of the sample reporting that they “always” engage in body checking, and was significantly associated with overevaluation of weight and shape (Grilo, Reas, Brody, Burke-Martindale, Rothschild, & Masheb, 2005). Similarly, Latner’s (2008) study of 185 overweight individuals participating in behavioral weight loss treatment found that the majority of participants reported body checking behavior, which was positively correlated with overevaluation of weight and shape, body dissatisfaction, and fear of fatness (Latner, 2008). These results suggest that overweight individuals without eating disorders suffer from significant eating disorder symptoms, including body checking and overevaluating the importance of weight and shape on one’s self-concept. As such, body checking may

contribute to the maintenance of eating disorder symptoms, per the behavioral theory posed by Fairburn and colleagues (Fairburn et al., 1999; 2003). To further understand the association between body checking and eating pathology, one recent study examined the impact of eating disorder symptoms like body checking on health-related quality of life. Vallance, Latner, and Gleaves (2011) conducted a community-based survey of eating disorder pathology in a sample of 214 young women. Body checking frequency was negatively correlated with quality of life such that increased body checking was associated with poorer quality of life (Vallance et al., 2011). Moreover, using regression analyses, general eating disorder pathology was a significant predictor of lowered health-related quality of life. These results suggest that women who engage in body checking are experiencing reduced quality of life. This relationship between increasing eating pathology and reduced quality of life has been previously reported in clinical samples (de la Rie, Noordenbos, & van Furth, 2005); however, this study is one of the first to replicate this finding with a community-based sample of women without eating disorders.

In sum, normal weight (i.e., college students) and overweight women without eating disorders (i.e., patients seeking bariatric surgery or weight loss treatment) endorse substantial body checking. As with clinical samples, body checking in those without eating disorders is associated with greater overevaluation of weight and shape, poorer body image, and body dissatisfaction (Grilo et al., 2005; Latner, 2008; Reas et al., 2002; Shafran et al., 2004). These associations suggest that body checking in nonclinical samples, regardless of weight status, is a manifestation of one of the cognitions central to eating disorders. Even when the full diagnostic criteria for an eating disorder are not met, the presence of body checking is clearly a cause for concern.

Body Checking in Men

Men comprise a relatively small proportion of individuals with clinical level eating disorders, with current estimates suggesting that up to 90% of eating disorders occur in women (Hudson, Hiripi, Pope, & Kessler, 2007). While this disparity in frequency of diagnosis has been well documented (Hoek, 2006; Hudson et al., 2007; Woodside et al., 2001), men do experience significant eating disorder symptoms (Anderson & Bulik, 2004; Lewinsohn, Seeley, Moerk, & Striegel-Moore, 2002; Striegel-Moore, Rosselli, Perrin, DeBar, Wilson, May, & Kraemer, 2009). However, because eating pathology is more common in women than men (Woodside et al., 2001), the majority of body checking research has been conducted with female samples yielding a dearth of literature on male body checking practices. To date, there have been no studies comparing the body checking practices of clinical men to men without eating disorders, although several more recent studies have sought to investigate the nature of body checking in men without eating disorders.

One of the first studies that included a male sample examined body checking in a sample of overweight individuals seeking bariatric surgery (Grilo et al., 2005). Over 20% of the 44 male participants in this study reported engaging in body checking *usually* or *always*. Body checking was also significantly associated with the overevaluation of weight and shape and restrained eating. Given the association with overevaluation of weight and shape, the authors concluded that body checking is a behavioral expression of a core attitudinal feature of the eating disorders. Latner (2008) found similar results in a sample of 185 overweight participants (30 men, 155 women) enrolled in a behavioral weight loss program. Men who engaged in body checking reported greater overevaluation

of weight and shape, lower self-esteem, less body satisfaction, and higher fear of fatness than men who did not report body checking (Latner, 2008). The degree of body dissatisfaction also emerged as a significant predictor of body checking in this sample such that men who were more dissatisfied with their body were more likely to engage in body checking. Moreover, body checking was negatively correlated with weight loss during treatment and positively correlated with perceptions that one was struggling in weight loss treatment, indicating that men who engaged in more pathological behaviors like body checking had poorer treatment outcomes.

Two more recent studies examined body checking behaviors in normal weight men. In a community-based sample that included 88 men, Meyer and colleagues (2011) explored the associations between eating pathology and body checking. Body checking was positively correlated with overall eating pathology, including elevated weight concerns, shape concerns, eating concerns, and restrained eating. Moreover, body checking was associated with exercising to control weight and objective binge eating episodes. None of these associations between eating pathology and body checking could be explained away by affective factors (i.e., depression and anxiety). These results indicate that body checking maintains eating pathology in men without eating disorders.

Additionally, Walker and colleagues (2009) examined the prevalence of body checking in a sample of undergraduate males ($N = 550$), in addition to investigating the relationships among body checking, mood, depression, muscle dysmorphia, weight and shape concerns, and use of appearance- and performance-enhancing drugs. Results indicated that men reported frequent body checking and that body checking was highly correlated with weight and shape concerns, muscle dysmorphia, depression, negative

affect, and desire for body mass index (BMI, kg/m²) increase (Walker, Anderson, & Hildebrandt, 2009). Men who reported body checking were more likely to experience eating disorder related symptoms, such as body dissatisfaction, muscle dysmorphia, and weight and shape concerns than men who do not engage in body checking (Walker et al., 2009). Notably, body checking emerged as the only significantly predictor of performance-enhancing drug use.

Walker and colleagues' (2009) study was the first to report on the nature of body checking in a sample of normal weight undergraduate males without eating disorders. In addition, this study was the first to specify the various behavioral and emotional correlates of body checking in men. The results of this study are clinically concerning, suggesting that men who engage in body checking are more likely to experience significant eating disorder symptoms, report symptoms of depression, and use performance-enhancing drugs to modify their appearance. Therefore, further investigation of the nature and correlates of body checking practices in men is crucial.

Theories of Body Checking

Several theories have been proposed to explain the onset and maintenance of body checking behaviors. These theories can broadly be divided into two categories: behavioral or cognitively-based. In general, there is limited empirical support for one theory over another, as neither has been subjected to rigorous examination to determine its applicability. Moreover, the research upon which these models are developed has been conducted exclusively on women with eating disorders. Therefore, it is unknown whether such explanations may be relevant for men or those without eating disorders.

Behavioral. Primary among these theories is a behavioral theory proposed by Fairburn and colleagues (1999; 2003; 2008), which posits that body checking serves to reinforce eating pathology. As stated above, body checking was originally proposed as a maintaining mechanism of AN (Fairburn, Shafran, & Cooper, 1999). In Western societies where thinness is valued, self-worth is largely influenced by one's body weight and shape. Therefore, any mechanisms that are used to monitor for potential weight and shape changes (i.e., body checking) will be valued and reinforced. Behaviorally, body checking has the potential for either confirmation or disconfirmation. Noticing that one's body has not gotten any bigger would disconfirm any perceived feelings of weight gain. On the other hand, body checking can result in confirmation of weight gain. In either scenario, body checking is reinforced and therefore becomes highly resistant to extinction. Body checking reinforces the vicious cycle of confirmation bias in AN (Fairburn et al., 1999).

Specifically, body checking represents a safety measure through which any subjective changes to weight or shape can be identified. Negative information gathered from engaging in body checking can thereby be used to justify eating disorder symptoms. For instance, weight gain as determined through scrutiny of one's body in the mirror can reinforce the need for restrictive food intake, as the information gained from body checking is used to assess self-control. Any perceived failures of self-control (i.e., increased weight) lead to intensified eating disorder behaviors, such as increased restriction efforts and drive for thinness, greater shape concerns, and body dissatisfaction (Fairburn, Shafran, & Cooper, 1999). Furthermore, body checking is a variably reinforced behavior, as checking can produce either positive or negative results based on minimal fluctuations in weight or shape. Both positive and negative information gathered

from body checking will confirm the continued necessity of this behavior: perceived weight loss must continue to be monitored to maximize results; perceived weight gain must be monitored to reverse the trend. Eating pathology is thus maintained through a pattern of behavioral reinforcement, whereby checking can become excessive and resistant to extinction (Alfano et al., 2011).

Cognitive. An alternate cognitive theory states that body checking represents a cognitive bias towards body-related information (Williamson, 1990; Williamson, 1996; Williamson, Muller, Reas, & Thaw, 1999; Williamson, White, York-Crowe, & Steward, 2004). According to this theory, body checking is a manifestation of selective attention towards disliked parts of the body (Williamson, 1990). Engaging in body checking reinforces this selective attention, which serves to ultimately increase preoccupation with weight and shape. This theory is supported by anecdotal evidence that preoccupation with weight and shape increases in some eating disorders patients after body checking (Shafran et al., 2004) and that women with eating disorders exhibit a cognitive bias towards weight-related information (Williamson, 1990).

Selectively attending to certain body parts may serve to reinforce distorted cognitions and negative self-evaluation, which may perpetuate eating pathology (Mountford et al., 2006; Reas et al., 2005; Fairburn et al., 1999). In support of this assertion, studies conducted with clinical samples suggest that body checking behaviors are associated with specific beliefs about the function of these behaviors. Mountford, Haase, and Waller (2006) proposed that the key cognitions underlying body checking can be classified as *objective verification beliefs* (e.g., “Body checking helps confirm what the scale says”), *reassurance beliefs* (e.g., “Body checking makes me feel better”), *safety*

beliefs (e.g., “If I resist body checking, I will feel worse”), and beliefs about *body control* (e.g., “Body checking helps me control my weight”). In this study, women with eating disorders ($n = 84$) were significantly more likely to endorse these cognitions than women without eating disorders ($n = 130$). Three of these beliefs in particular (reassurance, safety, and body control) were highly salient to eating pathology. Based on these results, the authors hypothesized that there may be a causal connection between *body checking cognitions* and body checking behaviors in women with eating disorders.

Expanding on this cognitive theory, Shafran and Robinson (2004) proposed that *thought-shape fusion* motivates body checking behavior in women with eating disorders. Thought-shape fusion theorizes that one’s thoughts can directly influence an external event (Shafran & Robinson, 2004). For example, merely thinking about forbidden foods (i.e., those that are calorically dense or high in fat) leads to thoughts of gaining weight and experiencing one’s body as fatter (Shafran & Robinson, 2004). This cognitive distortion is more characteristic of individuals with eating disorders than those who do not have an eating disorder, as was demonstrated in a study comparing 42 clinical cases with 42 age-matched controls in which thought-shape fusion was significantly related to eating pathology even after controlling for the effects of depression (Shafran & Robinson, 2004). Thought-shape fusion likely reflects the overevaluation of weight and shape that is characteristic of eating disorders and highly associated with body checking.

In order to further investigate the cognitions that may underlie eating pathology, Waller and colleagues (2008) examined the role of narcissism in driving body checking behaviors in a sample of 138 women. Previous research proposed that trait narcissism may be implicated in poor body image (Davis, Claridge, & Cerullo, 1997) such that high

narcissism may lead individuals to engage in certain cognitions and behaviors (i.e., body checking) to assess their physical self and to support their perceived perfection (Waller et al., 2008). Results of this study indicated that narcissistic defenses (e.g., “poor me”/martyred self and “bad you”/poisonous pedagogy), rather than core narcissism (e.g., personality characteristics of grandiosity and entitlement), were more closely associated with body checking in women with eating disorders ($n = 68$). Therefore, the authors concluded that body checking in the eating disorders may emerge from a defensive strategy to preserve self-esteem than as the product of feelings of grandiosity (Waller et al., 2008). This study supported previous work by Mountford and colleagues (2006) that suggested that there are unique cognitions associated with body checking, which can reliability distinguish women with eating disorders from those who do not have an eating disorder.

Experimental Studies of Body Checking

To test these theories, several recent studies have sought to experimentally manipulate body checking in samples of women without eating disorders. First among these was the work of Shafran, Lee, Payne, and Fairburn (2007), who examined the impact of manipulating body checking on body dissatisfaction and estimations of body size. After completing baseline measures of eating pathology, body checking, depression, and body dissatisfaction, 60 participants were randomly assigned to either a high or low body checking condition. In both conditions, women were asked to undress to their underwear in an empty room and examine their body in a full-length mirror for 30 minutes. In the low body checking condition, participants were asked to describe all body parts, starting from the top of her body and moving all the way to the bottom, using

neutral, nonjudgmental language. Participants were to focus on all body parts equally and not devote extra attention to areas of discontent. Conversely, in the high body checking condition, participants were told to focus their attention on areas of dissatisfaction. They were also given suggestions to encourage body checking; for instance, they were told to scrutinize their bodies from different angles in the mirror, to touch, feel, or grab their flesh while looking in the mirror, and to sit down on a chair to determine how their thighs spread out upon sitting (Shafran et al., 2007).

After the body checking manipulation, participants dressed; completed measures of body dissatisfaction; and estimated the size of their own body using a “mirror-size” projected image of themselves. Body size estimation was used as an outcome because women with eating disorders estimate their bodies to be significantly larger than women without eating disorders (Shafran & Fairburn, 2002) and there is a significant positive correlation between body size estimation and eating pathology (Farrell, Shafran, & Fairburn, 2003). Results indicated that women in the high body checking condition reported more body dissatisfaction and estimated their body as significantly larger than its actual size when compared to the low body checking condition. The duration of these effects was minimal, as a second follow-up measure administered 30 minutes later revealed that body dissatisfaction had returned to baseline levels. The authors concluded that in nonclinical cases, the process of body checking may only influence body dissatisfaction for a brief period of time, perhaps reflecting natural fluctuations in body dissatisfaction and feelings of fatness that occur during the day (Shafran et al., 2007).

Overall, results support the existing theories demonstrating a link between body checking

and overevaluation of weight and shape, as experimentally inducing body checking led to heightened shape concerns (Shafran et al., 2007).

To test the cognitive bias towards body-related information theory proposed by Williamson and colleagues (1996; 2004), Smeets and colleagues (2011) sought to examine how manipulating body checking may influence cognitive processing. Specifically, the authors were interested in measuring speeded detection (i.e., hypervigilance for body-related stimuli) and distraction (i.e., increased distraction from body-related stimuli) across three conditions: body checking, body exposure, and control. Nonclinical, female participants ($N = 66$) were randomly assigned to one of the three conditions and completed a visual search task to measure degree of speeded detection and distraction. Participants were presented with a matrix of 20 words and were asked to determine if the matrix contained all words from the same category or whether it contained one word from a different category. Matrices included the target stimuli of body-related words and neutral stimuli (names of musical instruments and countries). Speeded detection for body-related stimuli would be evidenced by a participant responding faster when there was one body-related word imbedded within 19 country names versus being slower to respond when there was one musical instrument imbedded within 19 countries. Distraction is evidenced by participants being slower to detect one neutral word imbedded within a matrix of 19 body-related words as compared to the detection speed for one neutral word imbedded within a matrix of 19 neutral words from a different category.

Results demonstrated speeded detection for the body checking condition such that participants were able to detect a body-related word among neutral distractors faster than

participants in either the body exposure or control conditions. There were no significant differences in response latencies between the body exposure and control conditions. No significant distraction effect was detected: participants in the body checking condition were not more distracted by body-related information than participants assigned to the body exposure or control conditions. Notably, body dissatisfaction was associated with body checking such that participants in the body checking condition reported feeling less satisfied with their bodies than women in either of the other two conditions. These group differences could not be accounted for by pre-existing trait level differences in body dissatisfaction, indicating that the experimental manipulation had measurable effects on body dissatisfaction. The authors concluded that experimentally inducing body checking in women without eating disorders “results in a pattern of information processing that generally resembles that of eating disorder individuals” (Smeets et al., 2011, p. 55). These results also lend support for Williamson’s (1996) theoretical model by demonstrating a link between body checking and cognitive biases (Williamson et al., 2004).

Anxiety, Eating Pathology, and Body Checking

Eating pathology and anxiety disorders are highly comorbid. This section will review data on the co-prevalence of social anxiety and disordered eating. In addition, this section will detail two specific facets of social anxiety that have been associated with disordered eating in the extant literature: *social physique anxiety* and *social appearance anxiety*. Finally, this section will include a description of the model to be tested in this project.

Body Checking and Anxiety

Social anxiety, or fear of social situations due to perceived negative evaluation from others (Hinrichsen, Wright, Waller, & Meyer, 2003), manifests in a large percentage of women with eating disorders (Godart, Flament, Lecrubier, & Jeammet, 2000). The lifetime prevalence of social anxiety disorder is disproportionately higher in women with eating disorders compared to the general population (Ruscio, Brown, Chiu, Sareen, Stein, & Kessler, 2008). For example, one study found that 20% of women with eating disorders also met criteria for social anxiety disorder (Kaye, Bulik, Thornton, Barbarich, & Masters, 2004).

Recent theoretical models suggest that fear of negative social evaluation leads to significant stress, which may perpetuate disordered eating behaviors (Hinrichsen et al., 2003). In terms of body checking, significant anxiety related to social evaluation fears (e.g., “I fear that other people on the bus will judge me”) may be temporarily reduced through the use of body checking behaviors to verify how one looks (e.g., “I will check to see how my thighs spreading as I sit down”). The information gained from body checking becomes reinforcing (e.g., “My thighs aren’t taking up too much room, maybe people aren’t judging me as much as I thought”) and failure to engage in body checking can lead to more stress and anxiety. Therefore, disordered eating behaviors like body checking become necessary to reduce anxiety. However, they may also cause a significant amount of anxiety on their own if, for instance, body checking reveals substantial changes to one’s weight or shape (e.g., “Upon sitting, I realized how huge my thighs are”). Through this process, fears of negative social evaluation may partially explain the common co-occurrence of social anxiety fears and eating pathology (Rieger, Van Buren, Bishop, Tanofsky-Kraff, Welch, & Wilfley, 2010).

Although there is a conceptual link between eating pathology and anxiety, little research has examined overlap between body checking behavior and anxiety. Theoretically, body checking may represent a compulsive behavior used to manage anxiety related to one's body and can be either positively or negatively reinforced through the confirmation or attenuation of fears (Williamson, 1994). Exposure to feared body parts during checking may represent a threat similar to those seen in anxiety disorders, which are associated with hypervigilant awareness and a bias in detecting the feared stimuli (Rosen & Schulkin, 1998). As such, negative feelings about one's weight or shape produce extreme anxiety that can be managed through body checking as a method to verify that one has not gained weight and therefore help temporarily reduce anxiety and body dissatisfaction (Rosen, 1997). In this way, body checking is akin to compulsive checking seen in obsessive compulsive disorder in which such behaviors prevent or undo the distress resulting from preoccupation with body weight and shape. In both cases, compulsive behaviors are used to moderate affect.

To that end, several studies have investigated the broad role of affect in body checking behaviors. Body checking in the eating disorders has been associated with a heightened experience of negative emotions. For instance, Vocks and colleagues (2008) investigated how 21 women with eating disorders reacted to a body exposure task. Although the resulting regression analysis failed to reach significance, the authors concluded that habitual body checking was predictive of increased negative emotion during body exposure, at a trend level. Insufficient sample size likely limited the power of this study, yet results tentatively suggested that exposure to one's body may initiate negative body-related schemas and, correspondingly, a high level of negative emotions

(Vocks, Kosfelder, Wucherer, & Wachter, 2008). According to the authors, results of this study support the idea that body checking behaviors are dependent upon factors like mood.

Affective factors may also be related to the expression of body checking behaviors in women without eating disorders. For instance in a study of 254 undergraduates, women who endorsed symptoms of alexithymia (e.g., difficulty identifying and describing feelings; Taylor, 1984) were more likely to engage in body checking than women without alexithymia (De Berardis et al., 2007). Moreover, alexithymia was found to be associated with lower self-esteem and body dissatisfaction and the combination of these factors (along with body checking) was related to elevated eating disorder risk (De Berardis et al., 2007). Women without eating disorders also tend to estimate their body size as larger when in a negative mood (Baker, Williamson, & Sylve, 1995); therefore, negative affect may also be associated with increased frequency of body checking if women perceive that their weight or shape has increased (Farrell, Shafran, & Fairburn, 2003). These results suggest that further studies examining the role of affect in body checking behaviors are warranted.

Social Physique Anxiety and Eating Pathology

In research examining affect and eating pathology, one construct that has received substantial attention in the extant literature is social physique anxiety. *Social physique anxiety* refers to concerns about one's physique that manifest in social contexts (Hart, Leary, & Rejeski, 1989). *Physique* refers to one's body form or structure, including body fat, muscle tone, and general body proportions (Hart et al., 1989). In their original article, Hart and colleagues (1989) distinguish social physique anxiety from related concepts of

body image and body esteem. *Body image* has been defined as “the picture of our body which we form in our mind” (Schilder, 1935, p. 11) and is a multidimensional construct with various components, including the attitudinal and perceptual experience of one’s body (Cash & Pruzinsky, 1990). *Body esteem*, on the other hand, relates to the degree of satisfaction one has with her body. These concepts are distinct from social physique anxiety, which describes individuals’ concerns about *other’s* perceptions of their body. While considerable research has examined individual’s own perceptions of or feelings about their body, there is limited research in the domain of other’s perceptions (Hart et al., 1989). Therefore, the construct of social physique anxiety was introduced to address this gap in the literature.

To that end, Hart and colleagues (1989) developed the Social Physique Anxiety Scale (SPAS) as a brief measure of anxiety resulting from perceived perceptions of one’s physique by others. Validation studies demonstrate that social physique anxiety (as measured by the SPAS) is distinct from general social anxiety (Hart et al., 1989). In a sample of 56 undergraduate women – half of whom scored in the upper third on the SPAS and half of whom scored in the lower third on the SPAS – social physique anxiety was associated with increased body-related concerns. Women who scored highest on the SPAS experienced more anxiety during a physique exam that included an assessment of muscle tone and adiposity. These women also reported more negative thoughts about their body during the exam as opposed to women with low social physique anxiety. Those who scored highest in social physique anxiety were also more likely to be heavier, have a higher percentage of body fat, and rate their body size as significantly larger than women with low social physique anxiety. The authors conclude that the SPAS is a useful

measure for identifying highly physique anxious individuals, who are more likely to experience negative weight-related consequences as a result of this anxiety.

Social physique anxiety in women. Many studies investigating the relationship between disordered eating and social physique anxiety for women have been conducted within the fitness and exercise science domain. Research in this area suggests that social physique anxiety is associated with attitudes toward exercise settings, selection of and preferences within exercise settings, preferences in exercise attire, and motives for exercise participation (Eklund, Mack, & Hart, 1996). For example, women with high social physique anxiety are more likely to endorse more self-presentational motivations for exercising, such as desire to exercise for increased muscle tone, physical attractiveness, and weight control (Crawford & Eklund, 1994; Eklund & Crawford, 1994). Moreover, motives for exercising that were unrelated to one's body (i.e., for health benefits rather than to lose weight) did not appear to be related to social physique anxiety (Eklund et al., 1996).

Overall, these studies of social physique anxiety in female athletes suggest significant associations with disordered eating and weight related concerns. Among female athletes, social physique anxiety tends to be related to greater eating pathology. One of these early studies compared eating disorder symptoms in a sample of female athletes ($n = 75$) with a nonathletic control group of high school women ($n = 39$) (Hausenblaus & Mack, 1999). While there were no significant differences in eating disorders symptoms between the athletic and nonathletic women, the groups did differ in terms of social physique anxiety scores, with the athletic group scoring higher on this measure than the nonathletes. Regression analyses revealed that the eating disorder

symptoms like body dissatisfaction and extreme dieting were significant predictors of social physique anxiety. Moreover, social physique anxiety was significantly predicted by feelings of ineffectiveness, a psychological correlate of eating disorders.

Haase and colleagues (2002) studied the relationship between social physique anxiety, disordered eating, and perfectionism in a sample of 316 elite athletes. Women who scored high on perfectionism were more likely to report high social physique anxiety, and the combination of social physique anxiety and perfectionism predicted a large amount of the variance in disordered eating (Haase, Prapavessis, & Owens, 2002). For women who scored highest on the SPAS, perfectionism was strongly predictive of disordered eating. Furthermore, in a study of 136 elite female athletes, higher social physique anxiety was associated with more disordered eating behaviors (Haase, 2011). Notably, this relationship was moderated by weight perceptions, such that women who perceived themselves as overweight were more likely to report high social physique anxiety and eating pathology than women who perceived themselves as normal weight, even when controlling for body mass index (BMI).

One limitation of this research with athletes is that women who are involved in sports may already have a heightened sensitivity for weight and shape-related concerns. It is likely that female athletes differ from the typical undergraduate student in terms of their physique-related concerns. Outside of the exercise science literature, there is a clear connection between social physique anxiety and disordered eating in women (Diehl, Johnson, Rogers, & Petrie, 1998). Given that women with high social physique anxiety are more likely to be dissatisfied with their bodies (Crawford & Eklund, 1994) and that body dissatisfaction is a robust risk factor for eating disorder development, it is important

to understand the extent to which social physique anxiety is predictive of disordered eating. Reel and Gill (1996) suggested that social physique anxiety may be related to the development of tendencies toward eating disorders, as the authors uncovered strong associations between social physique anxiety and eating disordered behaviors in a sample of high school and college cheerleaders.

Frederick and Morrison (1998) sought to test this risk-factor hypothesis using path modeling to examine the relationship between social physique anxiety, disordered eating behaviors, and eating disordered traits identified by Garner (1991): maturity fears, ineffectiveness, and perfectionism. A path model with social physique anxiety predicting eating disordered personality traits, as mediated by eating disordered behaviors, was tested in a sample of 79 college women without eating disorders. The resulting mediational model was significant; thus, the authors surmised that high social physique anxiety may represent a significant risk factor for eating disorder development (Frederick & Morrison, 1998).

A study by Diehl and colleagues (1998) indicated that social physique anxiety was highly correlated with bulimic symptomatology in a sample of 160 female undergraduates. Overall, social physique anxiety emerged as the strongest predictor of eating pathology in this sample; to that end, the authors concluded that social physique anxiety may represent a risk factor for eating disorder development. Similarly, Haase and Prapavessis (1998) found that social physique anxiety was predictive of increased disordered eating and less healthful eating attitudes in a sample of 85 college students. Furthermore, the authors found an interactive moderator effect, such that the social physique anxiety-disordered eating relationship was strongest for females of low BMI.

In further support of this risk-factor hypothesis, Thompson and Chad's (2002) study of 77 normal weight girls (ages 7 to 16) indicated that social physique anxiety scores were correlated with increased body dissatisfaction and body weight and shape concerns. Moreover, social physique anxiety was a strong predictor of body dissatisfaction and drive for thinness. Given that body dissatisfaction and drive for thinness are two of the most robust risk factors for disordered eating (Stice, 2002) Thompson and Chad (2002) concluded that social physique anxiety put young girls at risk for developing an eating disorder.

Social physique anxiety in men. At the time that the SPAS was developed, physique concerns were believed to be more pronounced in women than men. Therefore, Hart and colleagues (1989) did not include men in their standardization sample. Since that time, the consensus has shifted to acknowledge that men do have substantial physique-related concerns. Therefore, more recent studies have sought to investigate social physique anxiety in men as well as women.

Early studies in this domain suggested that men experience significantly less social physique anxiety as compared to women (Haase & Prapavessis, 1998; Martin & Mack, 1996; McAuley, Bane, & Mihalko, 1995) and recent studies suggest that these effects are consistent across age groups (Hagger & Stevenson, 2010). Nonetheless, studies of social physique anxiety in men demonstrate associations with disordered eating. For instance, one recent study conducted in a sample of undergraduate men indicated that drive for muscularity and tendency to engage in frequent body comparison with others were predictive of higher levels of social physique anxiety (McCreary & Saucier, 2009). Similar results were obtained in a study of 384 adolescent boys, which

demonstrated that those with higher levels of social physique anxiety reported more disordered eating behaviors and greater body dissatisfaction than those with low-level social physique anxiety (Caglar, Bilgili, Karaca, Ayaz & Aşçi, 2010). Finally, Cox, Lantz, and Mayhew (1997) conducted a study examining the role of social physique anxiety in predicting the eating behaviors of male and female college students ($N = 180$). Social physique anxiety was moderately correlated with sex, such that women tended to score higher on this measure than men. Moreover, of the variables measured, social physique anxiety was the strongest predictor of disordered eating in both men and women (Cox et al., 1997).

In conclusion, these studies indicate that men report social physique anxiety, although at significantly lower levels than women. When present, social physique anxiety is associated with greater body dissatisfaction and is predictive of increased eating pathology. Therefore, social physique anxiety appears to be a key determinant of eating pathology in both sexes.

Social Appearance Anxiety and Eating Pathology

Debate over the underlying factor structure of the SPAS has called into question the unidimensionality of the measure originally described by Hart and colleagues (1989). Several validation studies have proposed a more complex factor structure and argued that not all of the SPAS items load sufficiently on the overall factor and therefore should be removed from the scale (McAuley & Burman, 1993). Cramer-Hammann and colleagues (1993) found that a two-factor model fit the data on 205 undergraduate students more appropriately than the original one factor model. This result echoed those of Jackson, Kambis, and Jackson (1991). Overall, the two factors that appear to fit the data best are:

(1) expectations of negative evaluation of one's physique by others, and (2) feelings of discomfort about the presentation of one's physique (Cramer-Hamman et al. 1993). Eklund and colleague's (1996) factor validation of the SPAS on 760 undergraduate women strongly suggests a model with two first order factors (physique presentation comfort and expectations of negative physique evaluation) subsumed under one second order factor (social physique anxiety) and that this model is clearly superior to a unidimensional model of social physique anxiety.

Hart and colleagues (2008) acknowledge that one potential limitation of the SPAS is its focus on the physique rather than general appearance concerns. While physique (i.e., muscle tone, height, weight) is an important component of appearance, the authors argue that other aspects of overall appearance (i.e., facial features, complexion) should be assessed as well (Hart, Flora, Palyo, Fresco, Holle, & Heimberg, 2008). Given these arguments over the factor validity of the SPAS, in addition to its narrow definition of appearance, many researchers have shifted their attention to the construct of social appearance anxiety. *Social appearance anxiety* is defined as the fear that arises when one's overall appearance is being evaluated, including, but not limited to, body shape (Hart et al., 2008).

To this end, the Social Appearance Anxiety Scale (SAAS; Hart et al., 2008) was created to measure evaluation fears related to overall appearance, rather than with physique alone. The SAAS was rationally derived through the inclusion of items from existing body dissatisfaction, social anxiety, and body dysmorphic disorder questionnaires. Based on the extant literature, there is significant overlap between negative body image and social anxiety in women with eating disorders (Claes, Hart,

Smits, Van den Eynde, Mueller, & Mitchell, 2011); accordingly, the SAAS was designed to tap into both constructs simultaneously (Hart et al., 2008). Items were selected to measure anxiety related to general overall aspects of appearance as opposed to specific aspects like facial features or hair. The resulting scale is composed of 16 items which measure anxiety in situations where one's overall appearance may be evaluated.

The SAAS was validated on three samples of undergraduate students, both male and female (total $N = 1,906$). Data from the first sample ($N = 512$) was used to perform exploratory factor analysis and data from the second sample ($N = 853$) was used for confirmatory factor analysis. A second confirmatory factor analysis was performed with the final sample, in order to independently confirm the factor structure obtained with the initial confirmatory factor analysis. Data from the third sample ($N = 541$) was also used to determine the convergent validity and test-retest reliability of the SAAS. Structural equation modeling (SEM) was used to determine the nature of the relationships between social appearance anxiety and related measures. Two latent factors were identified in this model: social anxiety and negative body image. The final model that best fit the data allowed the SAAS to correlate with both social anxiety and negative body image. Both correlations were significant ($r = .76$ for social anxiety; $r = .56$ for negative body image), which implies good convergent validity with related measures of social anxiety and body image. This finding was anticipated, as the SAAS was designed to simultaneously tap into both these concepts.

The SAAS demonstrated excellent internal consistency in all three validation samples (average $\alpha = .94$). Furthermore, the SAAS was positively correlated with measures of social anxiety, social physique anxiety (SPAS), and body image

dissatisfaction. These scores suggest convergent validity of the SAAS with existing measure of anxiety and body image disturbance. SAAS scores were also associated with increased eating pathology; in particular, restrained eating, dieting, weight concern, and fear of fatness. The SAAS also demonstrated good test-retest reliability in this sample ($r = .84$). The authors concluded that the SAAS is a valid, reliable measure that addresses the previously unexplored intersection of social anxiety and body image disturbance through the measurement of social appearance anxiety (Hart et al., 2008).

Results of these validation studies also indicated that social appearance anxiety is a construct unique from general fears of negative evaluation (Hart et al., 2008), although it may fall into the general class of social anxiety. SEM suggests that social physique anxiety is best subsumed under general body dissatisfaction, while social appearance anxiety is more closely related to general social anxiety. Therefore, the authors suggested that the SPAS and the concept of social physique anxiety may be largely redundant with existing measures of body dissatisfaction (Hart et al., 2008). To that end, Hart and colleagues suggest that the SAAS, which taps into social anxiety and negative *overall* body image – rather than negative *physique* body image – has high utility as a measure. Moreover, the SAAS appears to account for much of the overlap between social anxiety and body image disturbance, as it accounts for a significant amount of variance in this relationship (Hart et al., 2008).

Social appearance anxiety in women. Hart and colleagues (2008) found significant associations between negative body image and social appearance anxiety in women without eating disorders. Aside from this initial study, few studies have examined the role of social appearance anxiety in disordered eating. One of these studies was a

recent validation of the SAAS in a sample of women with eating disorders (Claes et al., 2011). A total of 60 women with AN, BN, and EDNOS completed the SAAS and standard measures of eating pathology. In this study, the SAAS demonstrated strong convergent validity with existing measures of eating pathology and anxiety. Women who endorsed greater social appearance anxiety reported higher body dissatisfaction and drive for thinness (Claes et al., 2011). Overall, the SAAS appears to be a valid and reliable measure of social anxiety about one's appearance in women with eating disorders (Claes et al., 2011), in addition to undergraduate students (Hart et al., 2008).

Koskina and colleagues (2011) recently conducted a study comparing social appearance anxiety and disordered eating in a sample of women with 30 BN and 40 controls. As expected given the existing research on social anxiety and disordered eating, the women with BN scored significantly higher on the SAAS than controls and SAAS scores were significantly correlated with increased dietary restraint and overall eating pathology in women with BN. For the comparison group of healthy controls, higher SAAS scores were associated with increased shape, weight, and eating concerns, in addition to higher overall eating pathology. While women without eating disorders displayed less social appearance anxiety than the women with BN, this anxiety was significantly related to greater eating pathology. These results indicate that social appearance anxiety may be a key factor in the onset or maintenance of eating pathology, as it was significantly higher in women with BN than in control participants. The authors posited that in women without eating disorders, social appearance anxiety may be associated with eating-related concerns but that these concerns may not translate into disordered eating behaviors (Koskina et al., 2011).

Given that social appearance anxiety is a relatively new construct, research on the association between social appearance anxiety and disordered eating in women without eating disorders is limited. One recent study suggests that social appearance anxiety is associated with increased eating pathology for without eating disorders. Using SEM, Levinson and Rodebaugh (2012) examined how various domains of social anxiety were predictive of eating pathology. To test these associations, 118 men and women completed various measures of anxiety and eating pathology. Among the various aspects of social anxiety examined in this study, social appearance anxiety was the most salient predictor of increased eating pathology. Specifically, scores on the SAAS were predictive of increased body dissatisfaction, weight concerns, shape concerns, eating concerns, and bulimic symptomatology. The authors concluded that elevated social appearance anxiety may be a risk factor for eating disorder development through increased body dissatisfaction (Levinson & Rodebaugh, 2012). However, the authors stressed that future research in this area should examine the effects of social appearance and social physique anxiety on disordered eating simultaneously to better understand the relationship among these constructs.

Social appearance anxiety in men. To date, research examining the relationship between social appearance anxiety and disordered eating in men is even more limited. The original SAAS validation study conducted by Hart and colleagues (2008) included a total of 764 men across three different samples, yet there were no significant sex differences in SAAS scores. Thus, associations between social appearance anxiety and eating pathology were not examined by sex in this sample. Levinson and Rodebaugh (2012) included men ($n = 45$) in their study of the associations between social anxiety,

social appearance anxiety, and disordered eating, yet due to limited power the authors did not examine the data by sex. However, there were no significant interactions between social appearance anxiety and sex on each of the outcome variables. Though the research on social appearance anxiety in men is extremely limited, there does not appear to be appreciable differences in how this construct is measured in men versus women (Hart et al., 2008). Given the limited existing literature in this area, the current study will test for any significant sex differences in terms of social appearance anxiety.

A Model of Body Checking and Social Physique Anxiety

As social appearance anxiety has only recently emerged as a construct of interest within the eating disorder literature, there are no theoretical accounts of how social appearance anxiety may influence disordered eating behaviors. Thus I will begin by examining an existing model that includes social physique anxiety as a mediator of the relationship between eating disorder thoughts and behaviors (see Figure 1). This model was proposed by Haase, Mountford, and Waller (2007) to elucidate the link between beliefs about the function of body checking behaviors and actually engaging in these behaviors. To date, this is the only study to examine the relationship between social physique anxiety and body checking behaviors in women without eating disorders.

As previously described, body checking cognitions are beliefs related to the utility of body checking; for instance, that body checking will reduce anxiety, promote control over one's body or eating, and that not engaging in body checking may result in negative consequences (Mountford, Haase, & Waller, 2006). Previous work by Mountford and colleagues (2006) suggests that body checking cognitions are associated with body checking behaviors for both women with and without eating disorders. To further

investigate this cognition-behavior link, the authors hypothesized that anxiety may influence this relationship. Due to the established connection between anxiety and disordered eating, the authors proposed that social physique anxiety may mediate the relationship between body checking cognitions and behaviors. While there is limited research on the role of emotions or affective factors in body checking, the authors surmised that social physique anxiety may be especially salient for several reasons. First, social physique anxiety has been shown to be associated with disordered eating in individuals without eating disorders (Diehl et al., 1998; Haase & Prapavessis, 1998; 2001; Hausenblas & Mack, 1999). Second, the processes involved in social physique anxiety and body checking appear to be a somewhat analogous: in both scenarios, information gained from the social environment is used to verify information about one's body shape or physique (Haase et al., 2007).

The first aim of Haase and colleagues' study was to determine the nature of the bivariate relationships between body checking cognitions, body checking behavior, and social physique anxiety. Second, the authors tested a mediational model positing that social physique anxiety may mediate the relationship between body checking cognitions and behaviors. These hypotheses were tested in a sample of female college students ($N = 292$) without eating disorders. Participants completed measures of demographics, body checking cognitions (Body Checking Cognitions Scale [BCCS]), body checking behaviors (Body Checking Questionnaire [BCQ]), and social physique anxiety (Social Physique Anxiety Scale [SPAS]).

Data analysis sought to determine the nature of the relationships between the three variables of interest through the use of Pearson's r correlations. Body checking

cognitions, body checking behaviors, and social physique anxiety were all significantly positively correlated, indicating underlying connections between thoughts, emotions, and behaviors. As a result of these significant correlations, all three measures were incorporated into the mediational analysis.

Per Baron and Kenny's (1986) guidelines for mediation, the authors first tested the association between the independent variable (body checking cognitions) and the mediator variable (social physique anxiety). Body checking cognitions were significant predictors of social physique anxiety, with BCCS scores predicting 48% of the variance in SPAS scores; thus satisfying the first requirement for mediation. Second, social physique anxiety was a significant predictor of body checking behaviors, satisfying the second requirement for mediation. These associations remained significant when each of the three subscales of the BCQ were examined independently. SPAS scores were most predictive of overall appearance body checking (adjusted $R^2 = 0.35$), followed by specific body parts body checking (adjusted $R^2 = 0.32$), and idiosyncratic body checking (adjusted $R^2 = 0.23$).

Each of the four subscales of the BCCS (objective verification, safety, body control, and reassurance) were specified as independent variables and each of the three subscales of the BCQ (overall appearance, specific body parts, and idiosyncratic checking) were specified as dependent variables in a series of multiple regression analyses. Each of the body checking cognitions subscale scores significantly predicted body checking behavior scores, indicating a significant relationship between the independent and dependent variables. To test for mediational effects in the final step, the authors examined whether the inclusion of social physique anxiety reduced the

contribution of body checking cognitions to variance in body checking, by BCQ subscale. For the overall appearance subscale of the BCQ, the addition of SPAS scores lead to a significant reduction in the contribution of BCCS scores, demonstrating a significant partial mediation. The prediction of BCQ specific body parts subscale scores was also partially mediated by the inclusion of SPAS scores. Finally, SPAS partially mediated the relationship between body checking cognitions and idiosyncratic body checking (see Figure 1).

In sum, Haase and colleagues (2007) found that social physique anxiety partially mediated the relationship between body checking cognitions and behaviors in a sample of women without eating disorders. The mediation effects unveiled in this study were partial; therefore, Haase and colleagues (2007) suggested that other factors may explain the remaining variance in the relationship between body checking cognitions and behaviors. One potential candidate, as identified by the authors, is eating pathology. Therefore, in the present study, I assessed participant's trait level eating pathology to determine if it was a significant contributor to this relationship.

Sex Differences in Body Checking

Although there is no clear consensus as to which theory best accounts for body checking behavior, an increasingly large body of literature is investigating the nature and correlates of body checking in various populations. In particular, significant sex differences appear in eating pathology, including body image and body checking behavior.

There is limited research on sex differences in body checking for individuals with eating disorders because the majority of studies with clinical samples have only included

women. Of these studies with clinical samples, most indicate that body checking does not differ by sex. For instance, in one study of overweight individuals (80 men and 297 women) with binge eating disorder (BED), there were no significant sex differences in the frequency of body checking (Reas, Grilo, Masheb, & Wilson, 2005). Additional studies with BED patients have echoed this finding of similar rates of body checking for men and women (Reas, White, & Grilo, 2006). While these studies of clinical samples are limited to overweight individuals, there appear to be no significant sex differences in terms of body checking within this population.

Similarly, studies of overweight men and women without eating disorders do not indicate significant sex differences in body checking. In a sample of 260 obese individuals seeking bariatric surgery, men and women did not differ significantly in terms of body checking behaviors (Grilo, Reas, Brody, Burke-Martindale, Rothschild, & Masheb, 2005), with over 20% of men and women reporting *usually* or *always* body checking. These results were echoed in a sample of 185 overweight behavioral weight loss participants: there were no significant sex differences in body checking (Latner, 2008).

Conversely, several studies of normal weight individuals without eating disorders report that women engage in body checking more frequently than men. In one study, Striegel-Moore and colleagues (2009) analyzed data from a large community sample of male ($n = 1,808$) and female ($n = 3,714$) HMO prescribers to determine the prevalence eating disorder symptoms. In this study, women were significantly more likely than men to report body checking. To that end, over 20% of women endorsed checking their body *very frequently* over the past three months, while less than 10% of men reported a similar

level of body checking over this time period. A recent comparison of body checking behaviors in normal weight undergraduate men ($n = 88$) and women ($n = 162$) echoed these results. In this study, both men and women endorsed body checking, yet women reported significantly more of these behaviors than men (Meyer et al., 2011).

In sum, results suggest that there are no significant sex differences in body checking for overweight individuals with (Reas et al., 2005; Reas et al., 2006) or without an eating disorder (Grilo et al., 2005; Latner, 2008), while studies of normal weight individuals without eating disorders suggest that men are less likely than women to engage in body checking (Meyer et al., 2011; Striegel-Moore et al., 2009). Sex differences in body checking frequency appear to be inconsistent across diagnosis and weight status.

While men report body checking with some frequency, these behaviors tend to differ qualitatively from women such that men focus on musculature instead of adiposity while body checking (Alfano, Hildebrandt, Bannon, Walker, & Walton, 2011; Hildebrandt et al., 2010; Walker et al., 2009). In order to assess these qualitative sex differences, Hildebrandt and colleagues (2010) developed a male-specific body checking measure: the Male Body Checking Questionnaire (MBCQ). The MBCQ includes items related to the frequency of checking muscle size, shape, definition, and symmetry (Hildebrandt, Walker, Alfano, Delinsky, & Bannon, 2010), as opposed to BCQ items, which are considered largely irrelevant to men due to their focus on adiposity (Alfano et al., 2011). Alfano and colleagues (2011) used a differential item functioning approach to confirmatory factor analysis to determine whether there are systematic differences between men and women on measures of body checking. By comparing item loadings for

the MBCQ and BCQ, the authors determined that there were two distinct global latent factors, one for female body checking severity and one for male body checking severity. Furthermore, differences on these items could not be accounted for by sex alone, suggesting that men and women qualitatively differ in terms of body checking.

Some have suggested that socialization processes and divergent appearance ideals underlie sex differences in body checking (Alfano et al., 2011). For women, the dominant body ideal is an extremely thin physique, while for men the appearance ideal emphasizes extreme musculature with very little body fat (Fallon & Rozin, 1985; Olivardia, 2002). Thus men and women are fundamentally concerned with different aspects of their appearance, which likely influences body checking behaviors. Women tend to be more concerned with monitoring adiposity, as opposed to men who are more concerned with muscle appearance. Motivations for similar body checking behaviors (e.g., weighing one's self) may differ as well because many women are motivated to lose weight whereas men desire to gain weight through increased muscle mass (Phillips & Diaz, 1997). Due to the different body ideals for men and women, it is likely that men and women seek different information about their body while checking.

Consequently, it is possible that the model of body checking proposed by Haase and colleagues (2007) would differ by sex, such that men would be more likely to endorse social physique anxiety due to heightened concerns over musculature, whereas women would be more likely to report social appearance anxiety due to greater concerns with overall leanness and body shape.

Current Study

Given that body checking is related to the severity of eating disorder symptoms and clinical impairment, it is important to investigate the factors that influence the expression of body checking in nonclinical samples. In particular, male and female college students are an ideal population to study because they are at-risk for eating disorder development (Taylor et al., 2006). Furthermore, improved understanding of how various forms of anxiety influence disordered eating behaviors such as body checking will have important implications for the prevention and treatment of eating disorders in this vulnerable population. While Haase and colleagues' (2007) model provided important preliminary information about the role of anxiety in body checking, there are several limitations to acknowledge. First, the authors did not report participant demographic information, including race and ethnicity; therefore it is unclear whether social physique anxiety mediates the body checking cognitions-behavior relationship for women of various ethnic backgrounds. A second limitation is that the model was based on female data only; therefore, it is unclear whether social physique anxiety mediates the relationship between body checking cognitions and behaviors in men. Finally, Haase and colleagues (2007) did not evaluate the extent to which trait level eating pathology influences body checking cognitions and behaviors or assess for the potential consequences of body checking (e.g., impaired psychosocial functioning) in college samples. In addition, Levinson and Rodebaugh (2012) suggested that it is important to examine the effects of social appearance and social physique anxiety on disordered eating simultaneously to better understand the relationship among these constructs.

Consequently, to expand on previous research, the first aim of the present study was to replicate and expand upon Haase et al.' (2007) results by demonstrating that social

physique anxiety mediates the relationship between body checking cognitions and behaviors in this diverse sample of undergraduate men and women (see Figure 1). The second aim was to test an expanded model that included both social appearance anxiety and social physique anxiety (along with other constructs that are likely relevant to body checking behaviors: trait level eating pathology as a predictor of body checking, and body checking behavior as a predictor of eating pathology-related clinical impairment) to determine whether both forms of anxiety mediate the relationship between body checking cognitions and behaviors (see Figure 2). The third aim was to test whether the fit of the expanded path model differed by sex, such that one form of social anxiety more accurately fit the data for men or women.

For the first aim, I hypothesized that social physique anxiety would mediate the relationship between body checking cognitions and behaviors, as demographic characteristics such as age and BMI in the current sample will likely resemble participants from the original study. In terms of the second aim, I hypothesized that the relatively new construct of social appearance anxiety would also mediate the relationship between body checking cognitions and behaviors in this sample, as evidenced by good fit of the proposed expanded path model. While there is some research to suggest that social appearance anxiety may be more predictive of disordered eating than social physique anxiety (Levinson & Rodebaugh, 2012), it is unknown whether this finding applies to body checking, specifically. Therefore, this study examined the relative, simultaneous contribution of social physique and social appearance anxiety as predictors of body checking behavior in the hypothesized expanded path model.

Finally, for the third aim, I hypothesized sex differences in the applicability of the expanded path model. To date, it is unknown whether social physique anxiety is implicated in male body checking; although, based on the extant research on male body image, anxiety related to one's physique would likely be more salient to men than women. I hypothesized a possible moderated mediation effect, such that sex would moderate whether social physique anxiety (or social appearance anxiety) serves as a mediator in the relationship between body checking cognitions and body checking behaviors for women and men. Given that women tend to be more concerned with adiposity than physique, I theorized that social appearance anxiety may be more salient to women and thus may fit the female data better, while social physique anxiety would fit the male data better.

CHAPTER 3

METHODOLOGY

Participants

Participants were male and female undergraduate students, at least 18 years of age, recruited from a large university in the southwestern United States. According to Kline (1998), an adequate sample size for path analysis is 10 times the number of parameters, resulting in a minimum sample size of 420 (i.e., 210 of each sex) for this study. Students received one unit of psychology research credit for their participation. Approval for this study was obtained from the university's Institutional Review Board prior to the commencement of any research procedures.

Measures

In general, it was desirable to administer the same measures to both men and women to facilitate comparison across samples. However, given that the nature of body checking behaviors differs between men and women, these behaviors were assessed by using different self-report measures for each sex. Consequently, women and men completed the same measures of eating pathology, body checking cognitions, clinical impairment, social physique anxiety, and social appearance anxiety, but completed sex-specific measures of body checking behaviors.

Demographics

Participants self-reported demographic information, including their age, race, ethnicity, height, weight, and history of an anxiety or eating disorder diagnosis. BMI (kg/m^2) was calculated from self-reported height and weight information.

Eating Pathology

Participants completed four questionnaires that measured the thoughts, behaviors, and consequences related to disordered eating.

Trait eating pathology. The Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994) is a 21-item assessment of eating disorder symptoms over the past 28 days. Seventeen items are rated on a frequency scale from *zero days/not at all/none of the time* (0) to *every day/markedly/all of the time* (6). However, four items are open-ended and measure the frequency of binge eating episodes and compensatory behaviors. A global score of overall eating pathology is calculated by averaging each of the four subscale scores, with a global score greater than or equal to four signifying clinical-level eating pathology (Fairburn & Beglin, 1994; Mond et al., 2004).

Previous research with nonclinical samples of community women indicates that the EDE-Q is an adequately reliable and valid measure of eating pathology (Mond, Hay, Rodgers, Owen, & Beumont, 2004), with excellent internal consistency (coefficient alpha = .93), test-retest reliability over a two-week period (Luce & Crowther, 1999), and adequate criterion and concurrent validity within this population (Mond et al., 2004). For nonclinical college men, internal consistency is slightly lower (coefficient alpha = .89) than similarly aged women (Reas, Øverås, & Rø, 2012) and I know of no published data on the test-retest reliability. However, according to norms published by Lavender and colleagues (2010), undergraduate men generally score significantly lower on the global scale than college women (Luce, Crowther, & Pole, 2008; Mond et al., 2004) but report similar levels of binge eating behavior (Lavender, De Young, & Anderson, 2010). In the current study, internal consistency reliability was excellent for both women (coefficient alpha = .96) and men (coefficient alpha = .93).

Body checking behaviors. Female participants (only) completed the Body Checking Questionnaire (BCQ; Reas, Whisenhunt, Netemeyer, & Williamson, 2002), which is a 23-item assessment of the adiposity-related body checking behaviors that are characteristic of women. Items are rated on a frequency scale from *never* (1) to *very often* (5). Higher scores are associated with more intense body dissatisfaction, fear of fatness, body image avoidant behaviors, and general eating disturbance (Reas et al., 2002). The BCQ has demonstrated good test-retest reliability ($r = .94$) and acceptable internal consistency within a community sample of men and women (coefficient alpha = .95; Reas et al., 2006). BCQ total scores are highly correlated with the Body Shape Questionnaire (BSQ; Cooper, Taylor, Cooper, & Fairburn, 1987) and Eating Attitudes Test (EAT-26; Garner & Garfinkle, 1979), indicating that body checking behaviors are associated with more negative attitudes toward weight and shape as well as symptoms of eating disorders (Reas et al., 2002). The BCQ has strong discriminant validity and reliably discriminates clinical women with eating disorders from nonclinical women and nonclinical women who are dieting from nondieters (Calugi et al., 2006). Internal consistency reliability was excellent in the current sample (coefficient alpha = .95).

Male participants (only) completed the Male Body Checking Questionnaire (MBCQ; Hildebrandt, Walker, Alfano, Delinsky, & Bannon, 2010), which is a 19-item assessment of muscularity-related body checking behaviors that are characteristic of men. Items are rated on a frequency scale from *never* (1) to *always* (5), with higher scores indicating more body checking behaviors. Within a sample of nonclinical college men, the MBCQ has demonstrated high test-retest reliability over approximately two weeks and the subscales appear to have good internal consistency (Hildebrandt et al., 2010).

Moreover, the MBCQ has demonstrated good convergent and divergent validity within this population, such that scores on the MBCQ are positively correlated with measures of perfectionism, eating pathology, and muscle dysmorphia symptoms (Hildebrandt et al., 2010). Internal consistency reliability was excellent in this sample (coefficient alpha = .96).

Body checking cognitions. Additionally, all participants completed the Body Checking Cognitions Scale (BCCS; Mountford et al., 2006), which is a 19-item measure of the cognitions underlying body checking behaviors. Items are rated on a frequency scale from *never* (1) to *very often* (5), with higher global scores indicating stronger beliefs regarding the function of body checking behaviors. The BCCS has demonstrated good construct and discriminant validity in sample of clinical women with eating disorders and nonclinical women (Haase et al., 2007; Mountford et al., 2006). In a recent study by Meyer et al. (2011), male and female college students completed the BCCS: no significant sex differences in terms of overall BCCS score emerged. Similarly, in the present study internal consistency reliability was excellent and did not differ significantly between sexes (coefficient alpha = .96 for women; .95 for men).

Clinical impairment. The Clinical Impairment Assessment (CIA; Bohn, Doll, Cooper, O'Conner, Palmer, & Fairburn, 2008) is a 16-item assessment of the degree of functional, psychosocial impairment associated with eating disorder symptoms. The CIA assesses the severity of impairment in personal, social, and cognitive domains over the past 28 days. Items are rated on a frequency scale from *not at all* (0) to *a lot* (3), with higher scores indicating greater general psychosocial eating disorder related impairment. Acceptable levels of validity and reliability of the CIA have been demonstrated for both

eating disorder patients (Bohn et al., 2008) and for women without eating disorders (Reas, Rø, Kapstad, & Lask, 2010). The CIA correlates well with other measures of eating disorder pathology, such as the EDE-Q (r 's = .58 - .79), in nonclinical samples (Reas et al., 2010). This relationship indicates that greater levels of eating disorder pathology are associated with more clinical impairment. While the CIA has been administered in male samples (see Wildes, Zucker, & Marcus, 2012), there are no published norms or psychometric data for men. In the current study, internal consistency reliability was excellent for both women (coefficient alpha = .95) and men (coefficient alpha = .93).

Anxiety

Participants completed two questionnaires that measured dimensions of social anxiety.

Social physique anxiety. The Social Physique Anxiety Scale (SPAS; Hart, Leary & Rejeski, 1989) is a 12-item measure of the degree to which individuals become anxious when others observe or evaluate their physiques. Items are rated 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, the SPAS has demonstrated high internal consistency (coefficient alpha = .90), adequate test-retest reliability over a two-week period ($r = .82$), and the convergent validity of SPAS scores has been supported by positive correlations with measures of social anxiety, public self-consciousness, and weight and body shape satisfaction (Motl & Conroy, 2000). Elkund and colleagues (1997) examined the skewness and kurtosis of SPAS items in exclusively male, exclusively female, and

combined samples: results indicated that the SPAS is appropriate for use in both sexes. In the current study, the SPAS appeared to be an adequately reliable measure of social physique anxiety in both women (coefficient alpha = .92) and men (coefficient alpha = .90).

Social appearance anxiety. The Social Appearance Anxiety Scale (SAAS; Hart, Flora, Palyo, Fresco, Holle, & Heimberg, 2008) is a 16-item assessment of anxiety about being negatively evaluated by others because of one's overall appearance, including body shape. Items are rated on an agreement scale from *not at all* (1) to *extremely* (5).

Research on the psychometric properties of the SAAS demonstrated high test-retest reliability, good internal consistency, good factor validity, incremental validity (e.g., it was a unique predictor of social anxiety above and beyond negative body image indicators), and divergent validity in samples of nonclinical college men and women (Hart et al., 2008; Levinson & Rodebaugh, 2011). Internal consistency reliability in the present study was excellent for women (coefficient alpha = .97) and men (coefficient alpha = .96).

Procedure

Eligible students were recruited from introductory psychology courses via the university psychology department's online subject pool. Students who met inclusionary criteria were able to register for the study through the subject pool system. Each participant was automatically assigned a unique numeric code, devoid of any personal identifiers. An individualized link containing that code was sent to the participant through email and clicking on the link allowed them to complete the study. Informed consent was obtained electronically. Before an individual could begin completing any of the surveys,

he or she must have selected "yes" to give their consent to participate. Individuals who did not consent to the study procedures were not allowed to complete the survey.

After consenting, participants were routed to the first questionnaire, and the questionnaires were presented to participants in a random order to minimize any order effects. Participants were able to log in multiple times to complete all the questionnaires, although once they completed the final questionnaire and submit their data, they were not able to log back in and change any of their responses. After a participant completed all the study measures, which took approximately 45 minutes to an hour, they received course credit for their participation within one week.

Analytic Strategy

All analyses were conducted using PASW (version 19) and EQS for Windows (version 6.1). After providing basic descriptive information about the sample and examining the data to ensure all statistical assumptions were upheld, I examined the relationships among trait level eating pathology (EDE-Q), body checking cognitions (BCCS), social physique anxiety (SPAS), social appearance anxiety (SAAS), body checking (BCQ and MBCQ), and clinical impairment (CIA). To examine the nature of these relationships, I conducted five main analyses: (1) testing Haase and colleagues' (2007) original meditational model in women (Aim 1); (2) testing the original meditational model in men (Aim 1); (3) testing the expanded path model in women (Aim 2); (4) testing the expanded path model in men (Aim 2); and (5) visually comparing model structure and standardized path coefficients for the expanded model in men and women to test for sex differences (Aim 3).

To test Aim 1, I used mediation analyses to test whether social physique anxiety partially mediated the relationship between body checking cognitions and body checking behaviors. Following the guidelines of Baron and Kenny (1986), I conducted regression analyses to test whether: (1) body checking cognitions significantly predict social physique anxiety; (2) social physique anxiety significantly predicts body checking behaviors; and (3) social physique anxiety is a significant predictor of body checking behaviors when controlling for body checking cognitions.

To test Aim 2, I used path analysis to test the goodness-of-fit of an expanded path model, which included the additional elements of trait level eating pathology predicting body checking and body checking behavior predicting clinical impairment. I conducted path analysis using maximum likelihood extraction in EQS for Windows. Model fit was evaluated using comparative fit indexes (CFI; Bentler, 1990) and root mean square error of approximation (RMSEA; Steiger & Lind, 1980) statistics. Per the guidelines of Hu and Bentler (1999), CFI values greater than .90 and RMSEA values less than .08 indicated adequate 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.

The path model was tested separately for men and women. For each path model, if data violated the assumptions of normality, as demonstrated by Mardia's (1970, 1974) coefficient values greater than 5.00 (Bentler, 2005), I used robust test statistics because normal test theory statistics do not adequately evaluate model fit under conditions of non-normality (Hu, Bentler, & Kano, 1992). When data violated the assumptions of normality, I used the Satorra-Bentler scaled chi-square statistic ($S-B\chi^2$; Satorra & Bentler, 1988), along with robust versions of the CFI, RMSEA, and RMSEA 90% confidence

interval. For each sample, missing data were analyzed using EQS missing data diagnosis to provide information about the missingness of individual variables and to test for the randomness of missing data. Given the large percentage of missing data for some variables (i.e., CIA for men), I elected to use the maximum likelihood method as recommended by Bentler (2006) for handling missing data.

To test Aim 3 examining sex differences, I visually compared the overall structure of the best fitting models in both sexes. I also compared the magnitude of the standardized path coefficients for paths that were identical between the two models to determine if the nature and strength of the relationships among various predictors of body checking differed between men and women. I chose this analytic strategy because measures of body checking for women and men (i.e., the BCQ and MBCQ, respectively) differed in the number of total items and the qualitative descriptors of the anchor points for each frequency scale. In order to retain as much data as possible, I used untransformed scores on each of the sex-specific measures of body checking behavior, which resulted in testing two path models (i.e., one for men and one for women).

CHAPTER 4

RESULTS

Descriptive Analyses

Sample Characteristics

A total of 943 students, 591 female, 349 male, and three transgender, participated in this study. Due to the small number of transgender students, they were removed from the dataset and were not included in any analyses. Additionally, students who responded incorrectly to three validity check items to test for random responding (i.e., “Answer ‘strongly agree’ if you are paying attention”) were removed from the dataset ($n = 36$), leaving a final sample of 904 students (567 female and 337 male).

On average, participants were approximately 20 years old ($M = 20.46$, $SD = 4.26$) and average to slightly above-average weight (BMI $M = 24.19$, $SD = 5.21$) according to World Health Organization guidelines (2000). Follow-up t -tests to test for sex differences on these variables revealed that men and women did not differ significantly on age, $t(886) = .21$, $p = .84$, although the average BMI was significantly higher in the male sample than the female sample, $t(891) = 3.06$, $p = .002$.

The sample was ethnically diverse: The majority of participants ($n = 286$, 32%) identified as European American, followed by Hispanic or Latino ($n = 217$, 24%), Asian or Pacific Islander ($n = 188$, 21%), African American ($n = 80$, 9%), multi-ethnic ($n = 58$, 6%), and American Indian ($n = 10$, 1%). A remaining 54 participants (6%) identified as “Other” and 14 participants (1.5%) did not report their ethnicity. A breakdown of the sample ethnicity by sex is presented in Table 1.

Table 1

Summary of Means, Standard Deviations, Numbers, and Percentages of Sample

Variable	Total N =904	Females n = 567	Males n = 337	Test statistic	p
Age	20.47 (4.63)	20.44 (5.11)	20.51 (3.68)	$t(886) = .21$	.84
BMI	24.18 (5.21)	23.79 (5.29)	24.89 (5.01)	$t(891) = 3.06$	.002
Ethnicity				$\chi^2(6) = 22.98$	.001
African American	80 (9%)	53 (10%)	27 (8%)		
American Indian	10 (1%)	9 (2%)	1 (.3%)		
Asian American	188 (21%)	92 (17%)	96 (29%)		
European American	285 (32%)	183 (33%)	102 (31%)		
Hispanic/Latino	215 (24%)	147 (26%)	68 (21%)		
Multi-ethnic	58 (7%)	39 (7%)	19 (5.7%)		
Other	54 (6%)	36 (6%)	18 (5%)		
AD Diagnosis				$\chi^2(1) = 15.94$	.001
Yes	72 (8%)	61 (11%)	11 (3%)		
No	821 (92%)	501 (89%)	320 (97%)		
ED Diagnosis				$\chi^2(1) = 12.07$	.001
Yes	25 (3%)	24 (4%)	1 (.3%)		
No	870 (97%)	539 (96%)	331 (99.7%)		
BCCS	38.76 (17.15)	40.51 (17.96)	35.78 (15.24)	$t(850) = 3.92$	.001
(M)BCQ		51.11 (20.09)	35.41 (15.17)		
CIA	8.46 (9.77)	9.71 (10.57)	6.34 (7.81)	$t(874) = 4.99$	.001
EDE-Q	2.52 (1.37)	2.79 (1.47)	2.08 (1.05)	$t(902) = 7.80$	.001
SAAS	36.25 (16.12)	38.29 (19.98)	32.85 (13.93)	$t(872) = 4.90$	.001
SPAS	35.30 (11.15)	37.42 (11.30)	31.75 (9.93)	$t(869) = 7.49$	.001

Note. BMI = Body mass index; AD = Anxiety disorder; ED = Eating disorder; BCCS =

Body Checking Cognitions Scale; BCQ = Body Checking Questionnaire; MBCQ = Male

Body Checking Questionnaire; CIA = Clinical Impairment Assessment; EDE-Q = Eating

Disorder Examination Questionnaire Global Scale; SAAS = Social Appearance Anxiety

Scale; SPAS = Social Physique Anxiety Scale.

In addition, a small percentage of the sample reported a history of a clinical diagnosis. A total of 25 individuals (3%) reported being diagnosed with an eating disorder and 73 participants (8%) reported being diagnosed with an anxiety disorder. Of

those who reported an eating disorder diagnosis, 13 individuals were diagnosed with AN, six individuals were diagnosed with BN, three reported being diagnosed with both AN and BN, and three reported EDNOS. Of those who reported an anxiety disorder diagnosis, 28 individuals were diagnosed with Generalized Anxiety Disorder (GAD), 13 individuals were diagnosed with Panic Disorder, five were diagnosed with Obsessive Compulsive Disorder, and two individuals were diagnosed with Social Phobia. The majority of participants who reported an anxiety disorder were unsure of the name of their diagnosis.

In general, women scored significantly higher on all study questionnaires than men. Mean levels of body checking cognitions, body checking behavior, clinical impairment, trait level eating pathology, social appearance anxiety, and social physique anxiety are presented in Table 1, along with a full description of the characteristics for the overall sample and by sex.

Zero-order Correlations

Zero-order correlations between the anxiety-related (social appearance and social physique) and disordered eating-related variables (trait eating pathology, body checking behaviors, body checking cognitions, and clinical impairment) were examined by sex to determine whether it was appropriate to include all proposed variables in the hypothesized path model. Overall, there were strong, positive associations between all anxiety-related and disordered eating variables in this study (see Table 2). Specifically, the strongest associations were social physique with social appearance anxiety; and eating pathology with clinical impairment. Furthermore, body checking cognitions were associated with higher scores on measures of body checking behaviors in both sexes. In

general, high scores on measures of eating pathology were associated with high scores on anxiety-related measures, and vice versa, for men and women in this sample.

Table 2

Correlations by Sex for Measures of Anxiety and Disordered Eating

Measure	1	2	3	4	5	6	7
1. SPAS	--	.73**	.10		.33**	.52**	.64**
2. SAAS	.79**	--	.22**		.38**	.56**	.53**
3. MBCQ			--		.55**	.26**	.27**
4. BCQ	.67**	.65**		--			
5. BCCS	.53**	.49**		.70**	--	.45**	.53**
6. EDE-Q	.68**	.64**		.69**	.62**	--	.67**
7. CIA	.76**	.66**		.76**	.72**	.79**	--

Note. Correlations for men are shown above the diagonal, while correlations for women are below the diagonal. SPAS = Social Physique Anxiety Scale; SAAS = Social Appearance Anxiety Scale; MBCQ = Male Body Checking Questionnaire; BCQ = Body Checking Questionnaire; BCCS = Body Checking Cognitions Scale; EDE-Q = Eating Disorder Examination Questionnaire Global Scale; CIA = Clinical Impairment Assessment.

** $p < .01$.

Follow-up Fisher r -to- Z transformation tests revealed significant sex differences in the strength of some of these relationships. In general, the correlations among the various measures were significantly stronger in females (p 's $< .05$) with two exceptions: The strength of the relationship between social appearance anxiety and body checking cognitions did not differ between men and women, $Z = 1.88$, $p = .06$; and the strength of the relationship between social appearance anxiety and clinical impairment did not differ between men and women, $Z = 1.76$, $p = .08$. Overall, the strength of the associations among variables suggested that all proposed constructs were appropriate for inclusion in the hypothesized path model.

Mediation and Path Analyses

As described in the Methodology section, I used regression to test whether social physique anxiety mediated the relationship between body checking cognitions and behaviors in men and women. Prior to regression analyses, I evaluated the assumptions of multivariate normality and linearity. Using PASW, I tested for possible outliers (i.e., cases with standardized residuals greater than ± 3.3 ; Tabachnick & Fidell, 2007) on each of the measured variables (EDE-Q, BCCS, SPAS, SAAS, BCQ, MBCQ, and CIA) for women and men. No likely outliers were detected; therefore, I retained all data in both samples. Variables were centered prior to regression analyses. To test for multicollinearity, I examined zero-order correlations, standardized coefficients (β), and tolerance indexes. Variance inflation factors (VIF) were also computed to test for multicollinearity, yet all values were less than the standard cutoff ($VIF < 10$).

Aim 1

To examine the first study aim, I performed a mediation analysis based on Haase and colleagues' (2007) foundational model to examine if social physique anxiety partially mediated the relationship between body checking cognitions and body checking behavior.

Women. To test for partial mediation in women, I followed Baron and Kenny's (1986) three-step procedure: In the first step, there was a significant relationship between the proposed independent variable (body checking cognitions; BCCS) and mediator (social physique anxiety; SPAS), such that BCCS scores significantly predicted 28% of the variance in SPAS scores, $F(1, 516) = 201.27, p = .001$, adjusted $R^2 = .30$. For the second step, SPAS scores significantly predicted 45% of the variance in body checking

(BCQ) scores, $F(1, 519) = 424.69, p = .001$, adjusted $R^2 = .45$. Since the independent variable (BCCS) was reliably associated with the mediator (SPAS) and the mediator was significantly associated with the dependent variable (BCQ), both initial conditions necessary for mediation were met. In the final step, I used stepwise regression with SPAS entered before BCCS to predict BCQ. Contrary to my hypothesis, the addition of SPAS scores did not reduce the relative contribution of BCCS in the prediction of body checking behavior, $R^2 = .50$ to $.62$. These data failed to support the hypothesis that social physique anxiety mediates the relationship between body checking cognitions and behaviors for women in this sample.

Men. I followed the same steps to test for partial mediation in men. In the first step, BCCS scores significantly predicted 11% of the variance in SPAS scores, $F(1, 303) = 36.97, p = .001$, adjusted $R^2 = .11$. In the second step, SPAS scores accounted for 11% of the variance in MBCQ scores, $F(1, 303) = 36.97, p = .001$, adjusted $R^2 = .11$. Since both initial necessary conditions were met, I tested for mediation in the final step. Contrary to prediction, when social physique anxiety was entered in the regression equation before body checking cognitions, there was no significant reduction in the relative contribution of BCCS to the prediction of body checking behavior, $R^2 = .32$ to $.31$. Therefore, social physique anxiety did not mediate the relationship between body checking cognitions and behaviors for men in this sample.

Aim 2

To examine the second study aim, I used path analysis to test the goodness-of-fit for an expanded model that included additional constructs of social appearance anxiety, eating pathology, and clinical impairment in men and women. However, given the lack of

support for partial mediation in this sample (Aim 1), it was not surprising that fit for the hypothesized model (Model 1; see Figure 2) was poor to marginal in both women and men. Therefore, post hoc model modifications informed by results of the Lagrange Multiplier Test (LM Test; Breusch & Pagan, 1980) and the Wald Test (Wald, 1943) were made in an attempt to develop a better fitting, yet parsimonious model. In this exploratory stage of post hoc model re-specification, I sought to overfit the model (i.e., add more parameters than may be needed) as recommended by Bentler (2006) and Byrne (2006) before considering which parameters to drop from the model.

Women. Table 3 presents a summary of the models tested in the female sample, along with the scaled chi square, CFI, and RMSEA values, and chi-square difference tests for model comparison.

Table 3

Goodness-of-Fit Statistics for Hypothesized Path Models in Women

Model	S-B χ^2	df	CFI	RMSEA	90% CI RMSEA	Δ S-B χ^2	Δ CFI
Model 1: Hypothesized model	333.03*	8	.729	.268	.243, .292	--	--
Model 2: Paths added: EDE-Q predicting SPAS, SAAS, BCQ, and CIA	153.59*	4	.882	.313	.271, .355	--	M2-M1 = .152*
Model 3: Paths dropped: BCCS predicting SPAS and SAAS	151.22*	6	.885	.252	.217, .286	--	M3-M2 = .003
Model 4: Variable dropped: SPAS	15.10*	3	.985	.102	.055, .155	--	M4-M3 = .100*
Model 5: Variable dropped: SAAS	11.23*	3	.991	.083	.035, .138	M4-M5 = .000	M5-M4 = .006

Note. S-B χ^2 = Satorra-Bentler scaled chi-squared statistic; CFI = comparative fit index;

RMSEA = root-mean-square error of approximation; CI = confidence interval; EDE-Q =

Eating Disorder Examination Questionnaire Global Scale; SPAS = Social Physique

Anxiety Scale; SAAS = Social Appearance Anxiety Scale; BCQ = Body Checking

Questionnaire; CIA = Clinical Impairment Assessment; BCCS = Body Checking

Cognitions Scale. Final, best-fitting model in bold.

* $p < .05$.

Results of the LM Test for Model 1 suggested that specifying paths from global eating pathology (EDE-Q) to social physique anxiety (SPAS), social appearance anxiety (SAAS), clinical impairment (CIA), and body checking (BCQ) would have a substantial impact on model fit. Thus Model 1 was re-specified with these added parameters. Results of the Wald Test did not suggest any parameters be removed from Model 1.

Next, I tested Model 2, which included the four suggested additional parameters listed above. Goodness-of-fit statistics revealed an improvement in model fit, although overall model fit still remained poor (see Table 3). The LM Test and Wald Test did not suggest any parameters to add or drop, respectively. Therefore, per Byrne (2006), I examined the statistical significance of all structural parameter estimates in the model. Two paths were not statistically significant: the paths that specified body checking cognitions as a predictor of social physique anxiety and body checking cognitions as a predictor of social appearance anxiety. The non-significant parameter estimates associated with these paths suggested that these parameters may be redundant or not needed in the model (Byrne, 2006). Therefore, I re-specified the model to include body checking cognitions as a predictor of body checking behavior alone.

Model 3 included the four additional paths identified in the previous iteration but removed the paths with non-significant parameter estimates (i.e., the paths from body checking cognitions to social physique and social appearance anxiety). Model fit improved slightly but overall remained below the threshold for acceptable fit (see Table 3). Again, neither the LM Test nor the Wald Test suggested the addition or removal of any parameters at this step.

As model fit remained poor with very small incremental improvements in each tested iteration and there were no further statistical recommendations as to how to modify the model to improve fit, I sought to test whether social physique anxiety and social appearance anxiety are distinct constructs. Given that limited research has examined both constructs simultaneously, I surmised that perhaps model fit remained poor because these constructs were repetitive. I therefore tested two versions of Model 3 (i.e., one including

SAAS and excluding SPAS [Model 4]; one including SPAS and excluding SAAS [Model 5]) to see if model fit was superior for either of these models. Overall model fit was good for both (see Table 3) but slightly better for Model 5. To compare the final two nested models, I computed the chi-square change value ($\Delta S-B\chi^2$; Satorra & Bentler, 2005) to test for statistically significant differences in goodness-of-fit. The $\Delta S-B\chi^2$ between Model 4 and Model 5 was non-significant, which supports the redundancy of the social physique anxiety and social appearance anxiety constructs (Byrne, 2006). As goodness-of-fit indexes were slightly superior for the model that included social physique anxiety (Model 5), I selected this as the final, best fitting model for women. The final model with standardized estimates (β) for all structural paths is depicted in Figure 3.

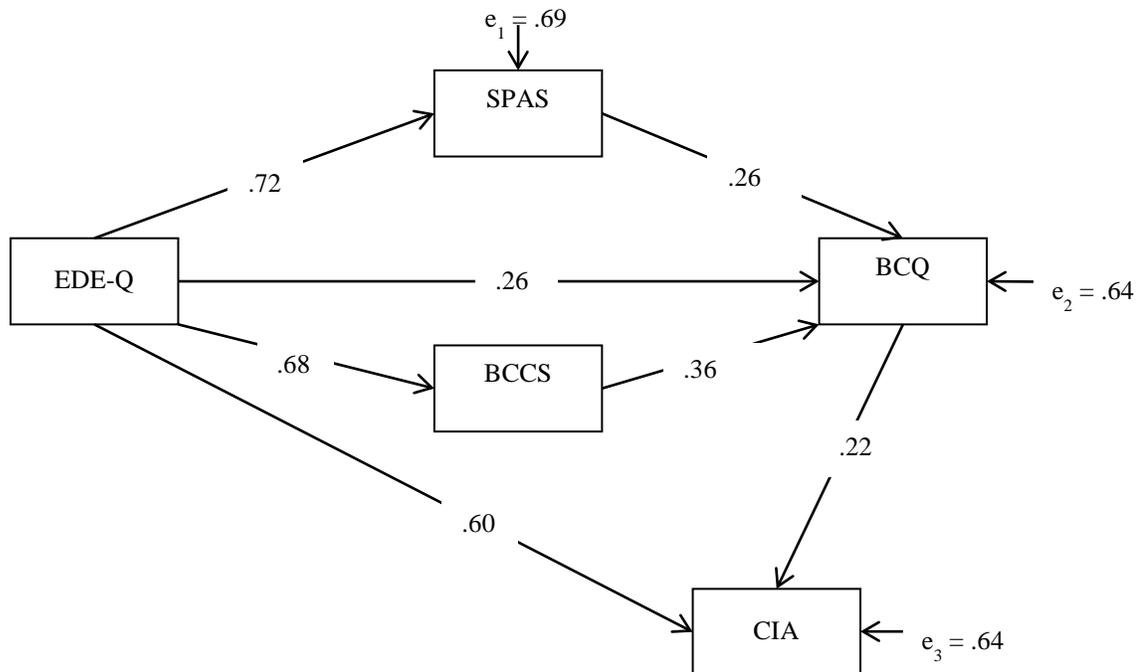


Figure 3. Final path model with standardized coefficients for women. EDE-Q = Eating Disorder Examination Questionnaire Global Scale; SPAS = Social Physique Anxiety Scale; BCCS = Body Checking Cognitions Scale; BCQ = Body Checking Questionnaire; CIA = Clinical Impairment Assessment.

Men. After selecting a model that demonstrated good fit to the female data, I repeated this process with the male data. Table 4 presents a summary of the models tested in the male sample, along with the scaled chi square, CFI, and RMSEA values.

Table 4

Goodness-of-Fit Statistics for Hypothesized Path Models in Men

Model	S-B χ^2	df	CFI	RMSEA	90% CI RMSEA	Δ CFI
Model 1: Hypothesized model	198.35*	3	.478	.348	.306, .390	--
Model 2: Paths added: EDE-Q predicting SPAS, CIA, SAAS, and MBCQ	94.60*	4	.752	.340	.281, .399	M2-M1 = .274
Model 3: Paths dropped: BCCS predicting SAAS, and EDE-Q predicting MBCQ	91.45*	6	.766	.270	.221, .318	M3-M2 = .006
Model 4: Variable dropped: SAAS	4.74	3	.993	.054	.000, .140	M4-M3 = .227
Model 5: Paths dropped: SPAS predicting MBCQ	8.50	4	.982	.075	.000, .145	M5-M4 = -.009
Model 6: Variable dropped: SPAS	24.26*	4	.903	.159	.102, .222	M6-M5 = -.079

Note. S-B χ^2 = Satorra-Bentler scaled chi-squared statistic; CFI = comparative fit index;

RMSEA = root-mean-square error of approximation; CI = confidence interval; EDE-Q =

Eating Disorder Examination Questionnaire Global Scale; SPAS = Social Physique

Anxiety Scale; CIA = Clinical Impairment Assessment; SAAS = Social Appearance

Anxiety Scale; MBCQ = Male Body Checking Questionnaire; BCCS = Body Checking

Cognitions Scale. Final, best-fitting model in bold.

* $p < .05$.

Results of the LM Test on Model 1 suggested the addition of several paths to improve model fit. As in the female sample, the suggested paths to add were from global

eating pathology (EDE-Q) to social physique anxiety (SPAS), clinical impairment (CIA), social appearance anxiety (SAAS), and body checking (MBCQ), although the estimated chi-square change for adding the final parameter was small. Nonetheless, I re-specified Model 1 with all four of these parameters added in order to overfit the model before deciding which, if any, parameters to drop using the Wald Test.

Model 2, including the four additional parameters as listed above, demonstrated significantly better fit than the previous model but still yielded an inadequate fit (see Table 4). The LM Test did not suggest the addition of any parameters to improve model fit; conversely, the Wald Test suggested that two parameters be removed.

In the next iteration, Model 3, I removed the path between EDE-Q and MBCQ along with the path between BCCS and SAAS that was specified in the original hypothesized model. Fit statistics for Model 3 indicated marginally improved fit; although, overall goodness-of-fit remained poor (see Table 4). In this iteration, the LM Test suggested re-adding the path between EDE-Q and MBCQ. The estimated chi-square change of adding this parameter was small and insignificant, so I chose not to include this path again.

Because model fit remained poor at this juncture, I examined the statistical significance of all structural parameter estimates to determine if any parameters may be redundant or not needed in the model. All parameter estimates were statistically significant, suggesting that all parameters should be retained. Thus I chose to repeat a similar process as with the female data and examine the distinctness of social physique and social appearance anxiety. I tested two versions of Model 3 (i.e., one including SPAS and excluding SAAS [Model 4]; one including SAAS and excluding SPAS [Model 5]) to

see if model fit was superior for either of these models. Model 4 met the criteria for good model fit (see Table 4) although this model demonstrated a significant reduction to the Satorra-Bentler scaled chi-square such that it was no longer statistically significant, $p = .19$. The LM Test suggested adding a parameter between EDE-Q and MBCQ but the chi-square change associated with this addition was not statistically significant, $p = .97$, so I chose not to add this parameter. The Wald Test estimated a small change in chi-square if the parameter between SPAS and MBCQ were removed, which I tested in Model 5. Similarly, goodness-of-fit statistics for Model 5 indicated good fit, although the $S-B\chi^2$ was insignificant, $p = .075$. The LM Test suggested adding a parameter from EDE-Q to MBCQ, but again the chi-square change and associated probably level were low, $p = .22$, so I elected not to re-specify this model.

Since neither of the previous models was statistically significant, I chose to re-specify Model 5 to include social appearance anxiety in place of social physique anxiety. Goodness-of-fit statistics revealed adequate fit for Model 6 (see Table 4). Results of the Wald Test and LM Test were both statistically insignificant, p 's $> .22$; therefore, I did not choose to drop or add any parameters from this model. Since the chi-square values for Models 4 and 5 failed to reach statistical significance, I was unable to compare Model 6 with any of the previous models using the chi-square change value ($\Delta S-B\chi^2$; Satorra & Bentler, 2005) to test for redundancy of the social physique anxiety and social appearance anxiety constructs. Given that Model 6 obtained adequate fit and that both previous models failed to demonstrate significant $S-B\chi^2$ values, I selected this as the best fitting model for the male data. The final model with standardized estimates (β) for all structural paths is depicted in Figure 4.

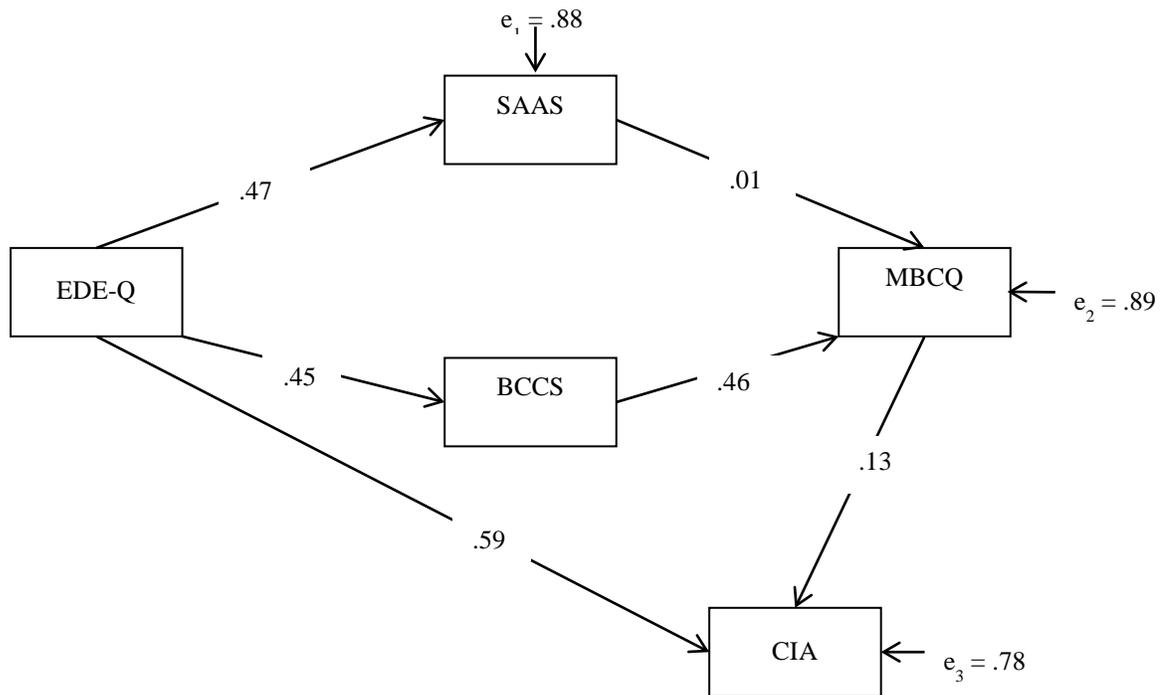


Figure 4. Final path model with standardized coefficients for men. EDE-Q = Eating Disorder Examination Questionnaire Global Scale; SAAS = Social Appearance Anxiety Scale; BCCS = Body Checking Cognitions Scale; MBCQ = Male Body Checking Questionnaire; CIA = Clinical Impairment Assessment.

Comparative Analyses

Aim 3

For the final aim, I visually compared the overall structure of the best fitting models in both sexes and also compared the magnitude of the standardized path coefficients for paths that were identical between the male and female models. In terms of overall model structure, the final best fitting models for men and women were largely similar (see Figure 5). In terms of overall structure, the most noteworthy difference is that the construct of social physique anxiety was included in the final female model, whereas

social appearance anxiety was included in the final male model (see Figure 6). This result was contrary to my initial prediction that social appearance anxiety would be more salient to women, while men would be more concerned with social physique anxiety. All other hypothesized constructs were retained in both models.

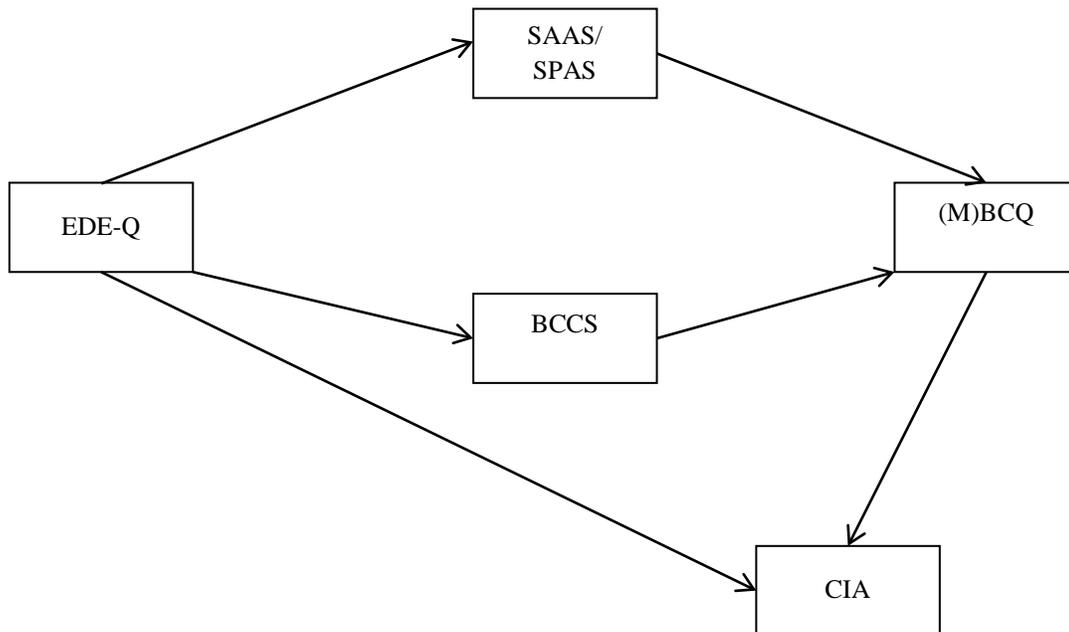


Figure 5. Sex similarities in final path models. Solid lines represent paths that were common to the final, best-fitting models for women and men.

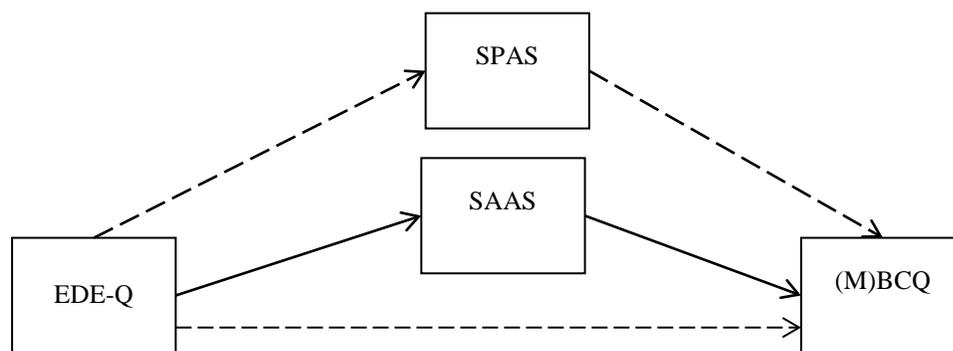


Figure 6. Sex differences in final path models. Dashed lines represent paths present in the final model for women only; solid lines represent paths present in the final model for men only.

In addition to comparing which constructs were included in the final model, I compared which paths were statistically significant in each model. Notably, the path from trait eating pathology to body checking behavior was absent in the male model but significant in the female model.

After comparing which paths were present in each model, I examined the strength of these path coefficients to compare the relative importance of each variable in the overall model and to also investigate for potential sex differences. In terms of the overall path model in women, global eating pathology was strongly predictive of social physique anxiety (standardized beta = .72), body checking cognitions (standardized beta = .68), and clinical impairment (standardized beta = .60). Body checking behavior increased as body checking cognitions (standardized beta = .36), eating pathology (standardized beta = .26), and social physique anxiety (standardized beta = .26) increased. Finally, body checking behavior increased the amount of clinical impairment reported (standardized beta = .22). For men, global eating pathology was moderately predictive of clinical impairment (standardized beta = .59), social appearance anxiety (standardized beta = .47), and body checking cognitions (standardized beta = .45). Body checking behavior increased as body checking cognitions (standardized beta = .46) and social appearance anxiety (standardized beta = .01) increased. Body checking behavior increased the amount of clinical impairment reported (standardized beta = .13).

Finally, I compared the standardized beta weights to determine if certain constructs were more salient to men or women in this sample. As shown in Table 5, of the four paths that were common to both the final male and female model, there were some significant differences in the strengths of the beta coefficients associated with each

path. First, the beta coefficient for the path of global eating pathology predicting body checking cognitions was significantly larger in the female model ($p < .001$). Second, the beta coefficient for the path of body checking cognitions predicting body checking behavior was significantly larger in the male model ($p < .05$). Third, the beta coefficient for the path of body checking behavior predicting clinical impairment was significantly larger in the female model ($p < .05$). Finally, the path of global eating pathology predicting clinical impairment was common to both models yet there was no statistically significant difference between the strength of these beta coefficients ($p = .78$). Overall, these results indicate more sex similarities than differences.

Table 5

Comparison of Standardized Path Coefficients for Final Models in Both Sexes

Parameter	Standardized Coefficient (β)		Difference	p
	Women	Men		
EDE-Q predicting SPAS	.72	--	--	--
EDE-Q predicting SAAS	--	.47	--	--
EDE-Q predicting BCCS	.68	.45	.23	.001
EDE-Q predicting CIA	.60	.59	.01	.78
EDE-Q predicting BCQ	.26	--	--	--
SPAS predicting BCQ	.26	--	--	--
SAAS predicting MBCQ	--	.01	--	--
BCCS predicting (M)BCQ	.36	.46	-.10	.05
(M)BCQ predicting CIA	.22	.13	.09	.05

Note. EDE-Q = Eating Disorder Examination Questionnaire Global Scale; SPAS = Social Physique Anxiety Scale; BCCS = Body Checking Cognitions Scale; CIA = Clinical Impairment Assessment; MBCQ = Male Body Checking Questionnaire; BCQ = Body Checking Questionnaire; SAAS = Social Appearance Anxiety Scale.

CHAPTER 5

DISCUSSION

To improve our understanding of body checking behavior in nonclinical college men and women, this study examined a theoretical model of body checking proposed by Haase and colleagues (2007) and an expanded model that included additional predictors (i.e., social anxiety and eating pathology) and consequences (i.e., clinical impairment) of body checking. Results yield three key overarching findings that have research and clinical implications. First, contrary to hypotheses, data do not lend support for the foundational model developed by Haase and colleagues (2007). Social physique anxiety does not partially mediate the relationship between body checking cognitions and body checking behaviors for men or women in this sample.

It is important to note that while the failure to replicate the foundational model is unexpected, there are several potential explanations. Haase et al. (2007) examined the influence of body checking cognitions and social physique anxiety upon the various subscales of the BCQ, rather than using BCQ total scores as in this study. Given that there is no research supporting the use or interpretation of individual BCQ subscales (Calguli et al., 2006), I chose to use total scores as they are acknowledged to be a more reliable and valid indicator of body checking behaviors (Reas et al., 2002). Furthermore, Haase and colleagues' model may have exhibited poor fit in the present study since these authors did not report the clinical characteristics of their sample. Thus there may be more variance in reported eating pathology in my sample as compared to the original study. Finally, the present sample is ethnically diverse and includes men, which may compromise the model's ability to account for body checking behaviors.

That said, a second overarching finding is that I was able to achieve good fit for a model that expanded on Haase and colleagues' (2007) research in both men and women after modifying the model based on statistical recommendations. In general, these models suggest that eating pathology is predictive of body checking cognitions and social anxiety concerns, both of which predict increased body checking behavior. Furthermore, the adequacy of model fit suggests that many of these constructs operate similarly across sexes (see Figure 5). In particular, body checking cognitions predict body checking behavior in both sexes, such that men and women who endorse more beliefs about the function or utility of engaging in body checking behavior are more likely to report body checking. This is consistent with results from Mountford and colleagues' (2006) study among a clinical sample of women: the authors hypothesized from a cognitive perspective that body checking is influenced by underlying thoughts about the function of these behaviors. The results of the present study suggest that, for both men and women without a clinical eating disorder, those who hold beliefs about the utility of body checking behavior are more likely to engage in these behaviors. While the present study does not compare individuals with and without eating disorders, these preliminary results may suggest that body checking cognitions are not unique to the eating disorders and that these connections are associated with engaging in behaviors that are characteristic of the eating disorders (i.e., body checking).

Additionally, findings of the expanded model suggest that men and women who endorse more concerns about social evaluations of their overall appearance or physique are more likely to report body checking. This result is consistent with a large body of literature demonstrating a causal relationship between social physique anxiety and

disordered eating behaviors in college women (Cox et al., 1997; Diehl et al., 1998; Haase, 2011; Haase et al., 2002; Haase & Prapavessis, 1998; Hausenblaus & Mack, 1999), and – to a lesser extent – men (Caglar et al. 2010; Cox et al., 1997; McCreary & Saucier, 2009). Although the existing research on the relationship between social appearance anxiety and disordered eating is more limited, several studies support the results of the present study in which anxiety related to one's overall appearance is causally related to disordered eating in women (Koskina et al., 2011; Levinson & Rodebaugh, 2012) and men (Levinson & Rodebaugh, 2012) without eating disorders.

As suggested by Hinrichsen and colleagues (2003), anxieties about one's appearance (whether overall appearance or body composition/physique related) may be causally related to appearance monitoring behaviors, such as body checking. This association is concerning since body checking behaviors are associated with higher levels of eating pathology, eating disorder beliefs and cognitions, and reduced quality of life in college women and men. Although directionality of this relationship cannot be determined from the present study, results provide some support for a conceptual link between anxiety and body checking (Ruscio et al., 2008): one theory is that body checking behaviors may be used to reduce anxiety (Rieger et al., 2010).

Furthermore, the revised model for both men and women suggests that body checking is predictive of increased clinical impairment. Specifically, those who endorse body checking behaviors are more likely to report negative consequences as a result of these behaviors, such as a more negative mood, self-perception, cognitive functioning, interpersonal functioning, and work performance. These results are consistent with recent literature demonstrating that among a community sample of men and women without

eating disorders, engaging in body checking is associated with a closely related concept: reduced quality of life (Latner et al., 2012; Vallance et al., 2011). While the present study is specific to college students, the results echo existing findings that individuals without diagnosed eating disorders may suffer significant impairment as a result of disordered eating symptoms, like body checking. This is concerning because while body checking behaviors do not satisfy the diagnostic criteria for eating disorders, they do seem to be associated with significant impairment that is typical of those with diagnosable eating pathology. The association between specific disordered eating behaviors and clinical impairment suggests the need for early intervention of these problems to reduce their potential impact on a group that is high-risk for eating pathology.

In addition to finding a relatively good fitting expanded model of body checking behavior in which men and women appeared largely similar, a third key finding of this study is that some aspects of the models differed by sex (see Figure 6). Specifically, the final path models differ in terms of the included constructs; namely, the final male model includes social appearance anxiety while the female model includes social physique anxiety. This result is the reverse of what I hypothesized: concern about one's body composition or musculature does not appear to be significantly more relevant to the body checking behaviors of men; and concern about one's overall appearance does not appear to be significantly more relevant to the body checking behaviors of women. Given that the nature of body checking typically differs by sex (Shafran et al., 2004; Walker et al., 2009), this result is somewhat unexpected. It is possible that the wording of items on the SPAS (i.e., referring to one's "physique or figure") may have affected how males reported concerns about their body composition. "Figure" is often associated with female

bodies, and as a result of this connotation men may have been less likely to endorse items on the SPAS. Terms like “build” may be more acceptable to men. Another potential explanation for these findings is that the constructs of social appearance and social physique anxiety are not well differentiated.

To that end, initial models that included both social physique and social appearance anxiety demonstrated poor fit. When only one form of social anxiety was included, model fit improved significantly and reached the threshold for good fit. Furthermore, correlations between these measures were high for both women and men. Although these values did not meet the criteria for multicollinearity ($r > .80$, Tabachnik & Fidell, 2007) there appears to be a strong relationship between these two constructs. There was little difference in the goodness-of-fit statistics for a model that included one construct over the other in women. Chi-square statistics to test for significant differences in model fit indexes were non-significant, indicating the fit of a model including just social physique anxiety was not appreciably superior to the fit of a model including social appearance anxiety instead.

Consequently, while results are preliminary and should be interpreted with caution because there have been no other studies directly comparing these two constructs, it is possible that the measures of social physique and social appearance anxiety used in this study (i.e., SPAS and SAAS) are tapping into the same underlying concept of appearance-based concerns. While the SAAS was originally developed to measure general appearance concerns that were not captured by the SPAS (Hart et al., 2008), the sensitivity and specificity of these measures in differentiating between physique (i.e., muscle tone, height, weight) and overall appearance (i.e., facial features, complexion)

concerns may be poor. As there are no published studies examining both constructs simultaneously to date (Levinson & Rodebaugh, 2012), future research examining the independence of these constructs and the effects of social appearance and social physique anxiety on disordered eating is warranted.

Additionally, I found sex differences in terms of the paths between constructs that were significant and included in the male and female models. For males in this sample, global eating pathology was not predictive of body checking behavior although this relationship was significant in the female model. Potentially the type of disordered eating as measured by the EDE-Q was less salient to men. This is consistent with research suggesting that men tend to obtain lower scores on the EDE-Q (Lavender et al., 2010). As body checking in males is frequently associated with musculature (Hildebrandt et al., 2010; Walker et al., 2009), men may endorse restrictive eating less frequently than women and thus receive lower scores on measures of eating pathology that emphasize eating or weight concerns, like the EDE-Q (Fairburn & Beglin, 1994). Though the EDE-Q is frequently used with male samples, it is possible that another measure of eating pathology in men may have yielded different results in the present study.

Furthermore, I found significant differences in terms of the relative contribution of variables for three of the four paths that were identical between the two final models. In women, general eating pathology is a significantly stronger predictor of body checking cognitions, and body checking behavior is a stronger predictor of clinical impairment compared to men. As mentioned previously, it is possible that the measure of eating pathology used in this study did not fully capture male symptoms. An alternate explanation is that perhaps body checking and beliefs about the utility of body checking

occur independent of measurable eating pathology in men; therefore, men report less clinical impairment as a result of body checking. Several existing studies suggest that men who engage in body checking do report signs of eating pathology, such as body dissatisfaction and dysmorphia (Hildebrandt et al., 2010; Meyer et al., 2011; Walker et al., 2009). Nonetheless, further research in this area is needed to determine whether muscularity-related body checking as motivated by pursuit of the muscular ideal is indicative of underlying eating pathology in men.

Alternately, in men, body checking cognitions are more strongly predictive of body checking than in women. From a cognitive framework (i.e., Mountford et al., 2006), this result may suggest that there is a stronger causal relationship between body checking related beliefs and behaviors in men, although to my knowledge, potential sex differences in the strength of this association have not been tested to date. It is possible that body checking may be a somewhat more normative behavior in women and not as closely tied to holding beliefs about the utility of these behaviors as compared to men.

The overall the magnitude of path coefficients differs by sex such that the relationships among study constructs are stronger in women as compared to men. The final male model demonstrates adequate fit statistics, yet several of the path coefficients are relatively small in magnitude. Thus interpretation of these relationships should be tempered. Again, further research to investigate the relationship of body checking and eating pathology in men is needed.

Overall, these results indicate that some of the factors that contribute to body checking behaviors appear to differ between women and men. Specifically, social physique anxiety may be more salient to the prediction of body checking behavior in

women than men, although this research is preliminary and should be interpreted with caution due to the relatively smaller sample of men than women. Alternatively, body checking cognitions may be more salient to the prediction of body checking behavior for men than women. Furthermore, the relative contributions of the predictors of body checking appear to be stronger in women, suggesting that the constructs identified in this study account for a larger amount of variance in the prediction of body checking behavior for females than males. Despite these sex differences, the majority of the predictive relationships examined in this study appear to operate similarly across sexes.

Limitations

Despite the importance of these findings, results must be considered in light of the study limitations. This study used a sample of college students and thus the findings may not generalize to other populations (e.g., other age groups, non-college samples). In addition, the male sample satisfied initial power estimates but was considerably smaller than the female sample. It is possible that a larger sample of men may have resulted in better goodness-of-fit statistics for the final path model. I used different questionnaires to assess body checking behaviors in men and women, and although I did this purposefully, as a result I was unable to test the same model in both sexes. Using a sex-neutral body checking questionnaire would have allowed for a multi-group analysis to investigate sex differences in model fit statistically, rather than comparing the overall structure and independent path coefficients more qualitatively. Participant responding is another potential limitation, as this study relied entirely on self-report measures, bringing into question how accurate participants are able to report the frequency of behaviors like body checking. Although I included several validity checking items to screen for random

responding, it is possible that some students exaggerated their symptoms or did not attend to answers while completing the questionnaires online. Finally, I included all participants, regardless of clinical diagnosis, in the analyses; although excluding those with an eating or anxiety disorder diagnosis may have provided a better estimate of the tested relationships in a nonclinical sample.

Future Directions

Despite these limitations, the results provide compelling data on predictors and consequences of body checking behavior that is ripe for continued research. Currently, there is a paucity of research examining the correlates of body checking in college-age men. Although this study provided some preliminary data about the nature of these relationships, future research should continue to examine the nature, predictors, and consequences of body checking in men. In particular, it will be important for future studies to investigate the connection between eating pathology and body checking in men and whether body checking is a relatively normative behavior in males.

Additionally, as social physique and social appearance anxiety appear to be overlapping constructs, future research should continue to measure both SPAS and SAAS simultaneously to determine whether these constructs are distinct, both theoretically and in terms of measurement. It is important to note that overall, I found more similarities than differences between the final models in men and women, suggesting that many of the factors salient to body checking may operate similarly across sexes. Future research can continue to investigate for potential sex differences in these relationships in order to inform optimal screening, identification, and early intervention for eating pathology in high risk men and women.

Implications

This study has several implications for the conceptualization, assessment, and treatment of eating pathology in college men and women. First and foremost, results of this study provide compelling data that anxiety is highly salient to the body checking behaviors of both an at-risk group (i.e., college women) and an understudied population (i.e., college men). Consistent with cognitive theories of body checking (e.g., Mountford et al., 2006), anxiety and disordered eating symptoms may reinforce each other and have a potentiating effect. Consequently, simultaneously screening for anxiety and eating pathology may be important for identifying individuals who are especially at-risk. Given that disordered eating behaviors like body checking are a robust predictor of developing an eating disorder in college women (Stice, 2002), early identification of these behaviors is important. Furthermore, results indicate that it may be beneficial for clinicians to treat eating and anxiety pathology simultaneously. Interventions focused on one form of pathology in isolation may have limited efficacy, given the potentially reinforcing relationship between social anxiety and eating pathology.

Second, results suggest that beliefs about the utility of body checking behaviors are strongly associated with engaging in these behaviors. From a cognitive-behavioral perspective (e.g., Fairburn et al., 1999), diminishing acceptance of body checking beliefs may decrease the frequency of body checking behaviors. Thus even individuals without eating disorders may benefit from cognitive or cognitive-behavioral treatment approaches aimed at challenging and decreasing distorted cognitions about the function or utility of body checking. Such interventions would be beneficial within the context of college students who are at elevated risk for developing an eating disorder (Stice, 2002).

Finally, body checking behaviors are strong predictors of clinical impairment in both men and women, even in this nonclinical sample. This result suggests that individuals who endorse anxiety and some eating pathology (i.e., body checking) may be at elevated risk for experiencing detriments to their daily functioning. Consequently, combined screening efforts to identify students with both anxiety and eating pathology may be especially effective at targeting high-risk individuals. To that end, results also suggest that intervention is indicated for college men and women who report comorbid eating and anxiety pathology.

APPENDIX A

BODY CHECKING COGNITIONS SCALE

Directions: Please rate the following items using the scale provided.

Never	Rarely	Sometimes	Often	Very Often
1	2	3	4	5

1. Body checking today allows me to decide how much/little I can eat tomorrow.
2. I think body checking will reassure me about my size.
3. I think body checking will help to calm me down when I feel anxious about my shape or weight.
4. Body checking helps me to control my weight.
5. Body checking is a good thing for me to do.
6. Body checking stops me from losing control of what I eat.
7. Body checking makes me feel better.
8. By body checking I can tell how much weight I have put on.
9. Body checking helps to confirm what the scales say.
10. I have to keep checking because I can't believe it.
11. It's important for me to keep checking because I often feel so enormous.
12. I have to body check to see where the weight is going.
13. Body checking is the most accurate way to tell what I look like.
14. If I stop body checking my weight will shoot up.
15. Body checking is the most accurate way to tell what I look like.
16. I have to check that my body is hidden in the way I like before I leave the house.
17. If I resist body checking, I will feel worse.
18. I think checking my body will tell me how I feel.
19. I can't remember what I look like if I don't check.
20. I think body checking will make me more comfortable around other people.
21. Body checking tells me when I need to do more exercise.

Items 10 and 11 are omitted from total score

APPENDIX B

BODY CHECKING QUESTIONNAIRE

Directions: Chose the answer which best describes how often you engage in these behaviors at the present time.

Never	Rarely	Sometimes	Often	Very Often
1	2	3	4	5

1. I check to see if my thighs spread when I'm sitting down.
2. I pinch my stomach to measure fatness.
3. I have special clothes which I try on to make sure they still fit.
4. I check the diameter of my wrist to make sure it's the same size as before.
5. I check my reflection in glass doors or car windows to see how I look.
6. I pinch my upper arms to measure fatness.
7. I touch underneath my chin to make sure I don't have a double chin.
8. I look at others to see how my body size compares to their body size.
9. I rub (or touch) my thighs while sitting to check for fatness.
10. I check the diameter of my legs to make sure they're the same size as before.
11. I ask others about their weight or clothing size so I can compare my own weight/size.
12. I check to see how my bottom looks in the mirror.
13. I practice sitting and standing in various positions to see how I would look in person.
14. I check to see if my thighs rub together.
15. I try to elicit comments from other about how fat I am.
16. I check to see if my fat jiggles.
17. I suck in my gut to see what it is like when my stomach is completely flat.
18. I check to make sure my rings fit the same way as before.
19. I look to see if I have cellulite on my thighs when I am sitting.
20. I lie down on the floor to see if I can feel my bones touch the floor.
21. I pull my clothes as tightly as possible around myself to see how I look.
22. I compare myself to models on TV or in magazines.
23. I pinch my cheeks to measure fatness.

APPENDIX C

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 0	A little 1	Quite a bit 2	A lot 3
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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?

APPENDIX D

EATING DISORDER EXAMINATION QUESTIONNAIRE

Directions: The following 12 questions refer to the past four weeks (28 days) only. Please choose the appropriate response using the scale provided.

0 days	1-5 days	6-12 days	13-15 days	16-22 days	23-27 days	Every day
0	1	2	3	4	5	6

1. Have you been deliberately trying to limit the amount of food you eat to influence your shape or weight (whether or not you have succeeded)?
2. Have you gone for long periods of time (8 waking hours or more) without eating anything at all in order to influence your shape or weight?
3. Have you tried to exclude from your diet any foods that you like in order to influence your shape or weight (whether or not you have succeeded)?
4. Have you tried to follow definite rules regarding your eating (for example, a calorie limit) in order to influence your shape or weight (whether or not you have succeeded)?
5. Have you had a definite desire to have an empty stomach with the aim of influencing your shape or weight?
6. Have you had a definite desire to have a totally flat stomach?
7. Has thinking about food, eating, or calories made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?
8. Has thinking about shape or weight made it very difficult to concentrate on things you are interested in (for example, working, following a conversation, or reading)?
9. Have you had a definite fear of losing control over eating?
10. Have you had a definite fear that you might gain weight?
11. Have you felt fat?
12. Have you had a strong desire to lose weight?

Please fill in the appropriate number. Remember that the questions only refer to the past four weeks (28 days).

13. Over the past 28 days, how many times have you eaten what other people would regard as an unusually large amount of food (given the circumstances)?

On how many of these times did you have a sense of having lost control over your eating (at the time that you were eating)?

14. Over the past 28 days, on how many DAYS have such episodes of overeating occurred (i.e., you have eaten an unusually large amount of food and have had a sense of loss of control at the time)?
15. Over the past 28 days, how many times have you made yourself sick (vomit) as a means of controlling your shape or weight?
16. Over the past 28 days, how many times have you taken laxatives as a means of controlling your shape or weight?
17. Over the past 28 days, how many times have you exercised in a "driven" or "compulsive" way as a means of controlling your weight, shape, or amount of fat, or to burn off calories?

Please choose the appropriate response. Please note that for questions 7 to 9, the term "binge eating" means eating what others would regard as an unusually large amount of food for circumstances, accompanied by a sense of having lost control over eating.

18. Over the past 28 days, on how many days have you eaten in secret (i.e., furtively)? Do not count episodes of binge eating.

0 days	1-5 days	6-12 days	13-15 days	16-22 days	23-27 days	Every day
0	1	2	3	4	5	6

19. On what proportion of the times that you have eaten have you felt guilty (felt that you've done wrong) because of its effect on your shape or weight? Do not count episodes of binge eating.

None of the time	A few times	Less than half	Half the time	More than half the time	Most of the time	Every time
0	1	2	3	4	5	6

20. Over the past 28 days, how concerned have you been about other people seeing you eat? Do not count episodes of binge eating.

Not at all	Very little	Slightly	Somewhat	Moderately	Quite a bit	Markedly
0	1	2	3	4	5	6

Please choose the appropriate response using the rating scale below. Remember that the questions only refer to the past four weeks (28 days).

Over the past 28 days...

Not at all	Very little	Slightly	Somewhat	Moderately	Quite a bit	Markedly
0	1	2	3	4	5	6

21. Has your weight influenced how you think about (judge) yourself as a person?
22. Has your shape influenced how you think about (judge) yourself as a person?
23. How much would it have upset you if you had been asked to weigh yourself once a week (no more, or less, often) for the next four weeks?
24. How dissatisfied have you been with your weight?
25. How dissatisfied have you been with your shape?
26. How uncomfortable have you felt seeing your body (for example, seeing your shape in the mirror, in a shop window reflection, while undressing, or taking a bath or shower)?
27. How uncomfortable have you felt about others seeing your shape or figure (for example, in communal changing rooms, when swimming, or wearing tight clothes)?
28. Over the past three-to-four months, have you missed any menstrual periods? (Yes/No) If yes, how many?
29. Have you been using a birth control pill, patch, shot, etc.? (Yes/No)

APPENDIX E

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 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.

APPENDIX F

SOCIAL APPEARANCE ANXIETY SCALE

Directions: Please indicate how characteristic each statement is of you, using the response scale provided.

Not at all	A little	Sometimes	A lot	Extremely
1	2	3	4	5

1. I feel comfortable with the way I appear to others.
2. I feel nervous when having my picture taken.
3. I get tense when it is obvious people are looking at me.
4. I am concerned people would not like me because of the way I look.
5. I worry that others talk about flaws in my appearance when I am not around.
6. I am concerned people will find me unappealing because of my appearance.
7. I am afraid that people find me unattractive.
8. I worry that my appearance will make life more difficult for me.
9. I am concerned that I have missed out on opportunities because of my appearance.
10. I get nervous when talking to people because of the way I look.
11. I feel anxious when other people say something about my appearance.
12. I am frequently afraid I would not meet others' standards of how I should look.
13. I worry people will judge the way I look negatively.
14. I am uncomfortable when I think others are noticing flaws in my appearance.
15. I worry that a romantic partner will/would leave me because of my appearance.
16. I am concerned that people think I am not good looking.

APPENDIX G

SOCIAL PHYSIQUE ANXIETY SCALE

Directions: 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.

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

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

APPENDIX H
IRB APPROVAL



**Social/Behavioral IRB – Expedited Review
Continuing Review Approved**

NOTICE TO ALL RESEARCHERS:

Please be aware that a protocol violation (e.g., failure to submit a modification for any change) of an IRB approved protocol may result in mandatory remedial education, additional audits, re-consenting subjects, researcher probation, suspension of any research protocol at issue, suspension of additional existing research protocols, invalidation of all research conducted under the research protocol at issue, and further appropriate consequences as determined by the IRB and the Institutional Officer.

DATE: February 8, 2013
TO: **Dr. Courtney Warren**, Psychology
FROM: Office of Research Integrity – Human Subjects
RE: Notification of IRB Action
Protocol Title: **Emotional and Cognitive Components of Body Image**
Protocol #: 1202-4043
Expiration Date: February 5, 2014

Continuing review of the protocol named above has been reviewed and approved.

This IRB action will reset your expiration date for this protocol. The protocol is approved for a period of one year from the date of IRB approval. The new expiration date for this protocol is February 5, 2014. If the above-referenced project has not been completed by this date you must request renewal by submitting a Continuing Review Request form 30 days before the expiration date.

PLEASE NOTE:

Upon approval, the research team is responsible for conducting the research as stated in the protocol most recently reviewed and approved by the IRB, which shall include using the most recently submitted Informed Consent/Assent forms and recruitment materials. The official versions of these forms are indicated by footer which contains current approval and expiration dates.

Should there be *any* change to the protocol, it will be necessary to submit a **Modification Form** through ORI - Human Subjects. No changes may be made to the existing protocol until modifications have been approved by the IRB. Modified versions of protocol materials must be used upon review and approval. Unanticipated problems, deviations to protocols, and adverse events must be reported to the ORI – HS within 10 days of occurrence.

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

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VITA

Graduate College
University of Nevada, Las Vegas

Emily Katherine White

Degree:

Bachelor of Arts, Psychology, 2008
Washington University in St. Louis

Special Honors and Awards:

Nevada Psychological Association Annual Conference First Prize for Student
Poster Presentation (May 2013)
University of Nevada, Las Vegas Graduate and Professional Student Association
Research Forum First Prize for Oral Presentation (March 2013)
University of Nevada, Las Vegas Graduate and Professional Student Association
Research Forum Honorable Mention for Poster Presentation (March 2012)
University of Nevada, Las Vegas Graduate and Professional Student Association
Travel Grant (July 2011 & November 2012)

Publications:

- White, E. K., & Warren, C. S. (2013). Body checking and avoidance in ethnically diverse female college students. *Body Image*.
doi:10.1016/j.bodyim.2013.04.003
- Levinson, C. A., Rodebaugh, T. L., White, E. K., Menatti, A., Weeks, J. W., Iacovino, J. M., & Warren, C. S. (2013). Social appearance anxiety, perfectionism, and fear of negative evaluation: Distinct or shared risk factors for social anxiety and eating disorders? *Appetite*.
doi:10.1016/j.appet.2013.04.002
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Thesis Title: The Role of Social Physique Anxiety and Social Appearance Anxiety in the Body Checking Behaviors of Male and Female College Students

Thesis Examination Committee:

Chairperson, Cortney S. Warren, Ph.D.

Committee Member, Mark H. Ashcraft, Ph.D.

Committee Member, Marta Meana, Ph.D.

Graduate Faculty Representative, Barbara Brents, Ph.D.