MALE BODY IMAGE: TESTOSTERONE'S RESPONSE TO BODY COMPARISONS

A Dissertation

by

JOSHUA D. BROWN

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

May 2006

Major Subject: Psychology

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Co-Chairs of Committee,	David H. Gleaves
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ABSTRACT

Male Body Image: Testosterone's Response to Body Comparisons.

(May 2006)

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Although there have been only a few etiological studies that have examined the development and maintenance of body image in males, research fairly consistently reports that exposure and presumed comparison to images of ideal male bodies increases body dissatisfaction. Social comparison provides individuals with a mechanism by which to evaluate their body appearance to those around them. When individuals compare their bodies to those of others, they are attempting to gauge their standing or status relative to those around them, the results of which have inherent status implications. There is increasing empirical evidence that suggests perceived increases in status result in increased testosterone levels, whereas testosterone decreases when status is perceived as having been diminished. Thus, the core of the present study: can the process of comparing the appearance of one's body to that of others affect the testosterone levels, body satisfaction, and mood of males?

To examine the above research questions, a two-part study was designed. A pilot study was conducted with 117 male undergraduates primarily to examine the psychometrics of measures to be used in the main study. The measures appeared

psychometrically sound and were thus used in the main study. In the main study, 129 male undergraduates were exposed to photographs of one of three male body types (i.e., lean/muscular, skinny, average) to determine whether or not exposure to the different body types differentially affected participants' testosterone levels, body satisfaction, and mood. Results indicate that testosterone levels decreased over the course of the experiment in each of the three groups; however, the body type to which participants were exposed did not differentially affect participants' testosterone levels. Body dissatisfaction was greater among participants who viewed lean/muscular bodies than those who viewed average bodies. Lastly, mood was not differentially affected by viewing different types of male bodies. Implications and possible explanations for these results are discussed.

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INTRODUCTION

It was said long ago, “beauty is in the eye of the beholder” (Napoleon Bonaparte). Central to this insightful statement is the notion that beauty is more a subjective determination than an objective reality. The concept applies even when the target of judgment is one’s own aesthetic qualities, with self-evaluations and the judgments made by others not necessarily being consistent. When the focus of self-evaluation is the appearance of one’s body, this is what is generally referred to as *body image*. Body image is regarded as multidimensional, having perceptual, cognitive, affective, and behavioral components (Cash & Green, 1986; Gardner & Tockerman, 1992). People often harbor discontent with the internal and subjective images they have of their bodies, regardless of how their bodies are perceived and evaluated by external observers. This experience is commonly termed *body image dissatisfaction*, and appears to be increasingly prevalent among both males and females.

Body Image

Historically, the prevailing notion has been that body image disturbance is something that affects primarily females, with the vast majority of males being content or unconcerned with the appearance of their bodies. In a landmark study, Fallon and Rozin (1985) reported that female college students exhibited significantly more dissatisfaction with the appearance of their bodies than did their male counterparts, the latter of which showed no dissatisfaction. Since this study, it has been referenced 335 times (as of September 12, 2003) in the psychological literature, and many subsequent

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This dissertation follows the style of *Social Science & Medicine.*

investigations have echoed the authors' conclusion that males tend to be satisfied with their bodies while body dissatisfaction among females is widespread.

Although a great number of studies have supported the notion that males are satisfied with their bodies while females are generally dissatisfied, there are methodological reasons to question the accuracy of this conclusion (see Brown & Gleaves, 2003). Primary among the methodological problems is the way male body image has been measured. Many of the early studies failed to measure the body areas or aspects with which males were and are most concerned (e.g., muscularity, body fatness, height, etc.) (Harmatz, Gronendyke, & Thomas, 1985; Jacobi & Cash, 1994). More recently, when males received two different measures of body image, one that measured a nonspecific size dimension, similar to those historically used (e.g., Figure Rating Scale; Stunkard, Sorenson, & Schlusinger, 1983), and a measure that assessed both muscularity and body fatness, males appeared satisfied with their bodies on the former but dissatisfied on the latter (Brown & Gleaves, 2003).

Owing largely to the generally accepted conclusion that males were satisfied with the appearance of their bodies, the majority of body image research focused exclusively on females. However, as the male body has recently become more prominent in the media (see Pope, Phillips, & Olivardia, 2000), interest and activity in the area of male body image has undergone a recent flourish. With the relatively recent increase in empirical attention, along with improved methodology, the scientific community is increasingly discovering that males are concerned and often dissatisfied with the appearance of their bodies.

For instance, a study using the Somatomorphic Matrix (SM; Gruber, Pope, Borowiecki, & Cohane, 2000), a recently developed figure-rating measure that assesses both muscularity and body fatness, found that American, Austrian, and French men chose an ideal body figure that was significantly more muscular than the figure they selected as their current body (Pope, Gruber, et al., 2000). Additionally, the men idealized a male figure that was 27 to 29 pounds more muscular than their actual (i.e., as measured) bodies. Jacobi and Cash (1994) also found that men's self-perceived current body sizes were significantly different from their more mesomorphic personal and perceived other-sex ideals, with 65 percent choosing a larger ideal and 23 percent choosing a smaller ideal. No male participant selected a less (than current) muscular personal ideal, whereas 91 percent chose a more muscular personal ideal.

Although it has been suggested that low to moderate levels of body image dissatisfaction may be healthy/functional, possibly motivating participation in healthy diet and exercise behaviors, body image discontent at higher levels has been associated with adverse effects. For instance, body image dissatisfaction has consistently been shown to relate to the development and maintenance of eating disorders (Rosen, 1990). Consequently, body discontent/distortion has been a criterion for anorexia and bulimia in the last three editions of the Diagnostic and Statistical Manual of Mental Disorders (i.e., DSM-III, DSM-III-R, DSM-IV; American Psychiatric Association [APA], 1980, 1987, 1994) (Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999). Although males account for less than 10 percent of cases of anorexia and bulimia nervosa (APA, 1994), research has demonstrated that steroid use is a much more common (than eating disorders)

sequela of body image disturbance in males. In fact, Spitzer, Henderson, and Zivian (1999) reported that the prevalence of steroid use among men and boys is higher than the rate of anorexia nervosa among girls and women and equal to the rate of bulimia nervosa in girls and women.

Several researchers have postulated that male steroid abuse results from the desire to transform one's body to more closely resemble the evasive lean and muscular ideal projected in media (McCreary & Sasse, 2000; Mishkind, Rodin, Silberstein, & Striegel-Moore, 1986; Pope, Katz, & Hudson, 1993). Research has shown that males who desire to be more muscular are at increased risk of using anabolic androgenic steroids (Blouin & Goldfield, 1995; Komoroski & Rickert, 1992). Pope and colleagues have done considerable research in the area of male body image and steroid abuse. Over years of studying steroids, these researchers described an alleged condition that is characterized by fears of being too small, with self-perceptions as small and weak, even when the affected might be objectively very muscular. Now referred to as *muscle dysmorphia* (initially termed "reverse anorexia"), this condition is thought to be associated with significant morbidity, especially steroid abuse (Pope et al., 1993).

Steroid use is believed to carry many health consequences, psychological and physical, ranging from aggression, delusions, and mania to left ventricle enlargement of the heart. Other problems linked with male body image dissatisfaction include, but are not limited to, lowered self-esteem, depression, and various athletic injuries resulting from overexertion (McCaulay, Mintz, & Glenn, 1988). Thus, it is critically important to

gain a better understanding of the developmental and maintenance underpinnings of male body image.

Only relatively recently have researchers begun to systematically examine the factors that potentially underlie the development and maintenance of body image (Thompson et al., 1999). Consequently, researchers are only beginning to paint a picture of the intricacies that contribute to the formation of body image; and because the vast majority of this research has been limited to females, male body image is even less well understood. Acknowledging that the etiology of body image is undoubtedly multifactorial, sociocultural factors, under which social comparison processes fall, have arguably received the healthiest portion of empirical attention.

Heinberg, Wood, and Thompson (1995) suggested that the power of sociocultural factors to influence body image has received generally strong empirical support in the literature, although the majority of the literature has been limited to female participants. The primary tenet of the sociocultural theory of body image is that society/culture conveys messages, primarily via media, that proclaim the male and female body ideals, which place tremendous pressure on its members to adhere to and evaluate themselves against these difficult-to-achieve idealized male and female forms (i.e., lean and muscular for males, thin for females). Just as the societal endorsement of thinness as the feminine body ideal is ubiquitous, sociocultural messages conveying the lean and muscular male as the ideal masculine physique have become increasingly prominent (e.g., Pope, Olivardia, Gruber, & Borowiecki, 1999; Pope et al., 2000; Salusso-Deonier, et al., 1993). Given the ubiquity of sociocultural messages conveying

the current appearance standards, if the prevalence of these messages led directly to body dissatisfaction (and its concomitants), it would be expected that almost everyone would be dissatisfied with their bodies. However, this is simply not the case. This disparity between the rate of exposure to these sociocultural appearance messages and rates of body dissatisfaction led researchers to begin examining the respective effects of awareness and internalization of socioculturally sanctioned standards of appearance on body image and associated (e.g., eating) behavior.

Facilitating the examination of awareness and internalization of sociocultural standards of appearance was the development of the Sociocultural Attitudes Towards Appearance Questionnaire (SATAQ, Heinberg, Thompson, & Stormer, 1995). The SATAQ measures cognizance (awareness) and personal incorporation (internalization) of sociocultural standards of appearance. Although awareness and internalization have both been associated with body dissatisfaction and eating pathology in women, internalization of societal appearance norms has been found to be a stronger predictor of eating disturbances (Heinberg, Thompson, et al., 1995). For instance, Cusumano and Thompson (1997), in investigating the relative effects of media exposure, and awareness and internalization of sociocultural standards of appearance, reported a distinct lack of relationships between exposure and multiple indices of body image, eating behavior, and self-esteem. Internalization of sociocultural appearance standards, on the other hand, was found to account for substantial variance, above and beyond awareness, in predicting disturbances in body image, eating behavior, and self-esteem.

Whereas the literature investigating the role of sociocultural factors on body dissatisfaction in women is growing, comparable research with males is virtually nonexistent. At present there appears to be only one published study of the role of awareness and internalization of sociocultural standards of appearance on body image in males. Using a sample of middle-school boys, internalization significantly predicted use of muscle-building techniques (e.g., use of food supplements, lifting weights, etc.) (Smolak, Levine, & Thompson, 2001). Data from a yet unpublished study found that internalization of the societal appearance ideals mediated the relationship between awareness of these ideals and body dissatisfaction in both males and females (Fingeret, Brown, Pearson, & Gleaves, 2004). Given that males often do harbor discontent with their bodies, it is imperative that researchers examine further the respective effects of awareness and internalization of society's standards of appearance on male body image and the correlates thereof.

Given the degree to which males, young and old, have been found to identify a lean and muscular physique as their personal ideal and the ideal of females (e.g., Jacobi & Cash, 1994; Tucker, 1984), there appears to be little doubt that males are at least aware that a lean and muscular physique represents the sociocultural male body appearance ideal. Therefore, the socioculturally promoted body ideal provides a readily available benchmark against which males can compare themselves. It is reasonable to expect that males are interested in, not only how close their bodies are to the coveted male body ideal and its sociocultural advantages (see Gillett & White, 1992; Mishkind, et al., 1986), but also how their bodies compare to those of males in their environment,

using the ideal male body as the comparison criterion. This process of evaluating oneself by comparing one's own characteristics to those of others is the essential feature of social comparison theory, which falls under the general rubric of sociocultural theory.

Social Comparison

Background of Social Comparison

The theory of social comparison, introduced by Festinger (1954), holds that individuals are driven to develop an accurate assessment of their opinions and abilities, which is functional in that it prepares them to competently navigate their lives (Goethals & Klein, 2000). Festinger (1954) noted, "The holding of incorrect opinions and/or inaccurate appraisals of one's abilities can be punishing or even fatal in many situations" (p. 117). As the theory goes, individuals are motivated to self-evaluate, and in the absence of objective standards, they will appraise their opinions and abilities based on their relative standing within given sociocultural contexts. Since its conception, this theory has stimulated an abundance of research. Some of this research (e.g., Marsh & Parker, 1984) has suggested that, even when objective comparison standards are available to comparers, they will oftentimes refer to their relative standing within their social environment in formulating their self-evaluations. Thus, relative standing within a given social environment may be more personally relevant than absolute standing, which certainly seems plausible from an evolutionary perspective.

Social comparison processes have been found to play a contributive role in how individuals evaluate themselves on, not only opinions and abilities, but also a variety of different personal dimensions (Suls & Wheeler, 2000). How are social comparison

processes relevant to body image? The answer to this question may be readily apparent, and there is considerable research demonstrating that social comparison processes do influence the way people think and feel about their bodies. However, as with the body image literature in general, much of this research has been conducted only with females. Before discussing the literature examining the effect of social comparison on body image, it is important to first review some of the basic concepts of social comparison theory.

Factors That Influence the Process of Comparison

When individuals are unsure of where they stand with respect to a particular self-relevant attribute, they will choose a comparison target that they perceive as similar on attributes related to the comparison-attribute (Festinger, 1954; Lockwood & Kunda, 1997; Miller, Turnbull, & McFarland, 1988; Wheeler et al., 1969). If the comparer perceives that the target is better off with respect to the attribute of comparison, this is what is referred to as an "upward comparison." On the other hand, if the comparer perceives that he/she is better off than the person to whom he/she is making the comparison, this is referred to as a "downward comparison." One might think that upward and downward comparisons would naturally lead to negative and positive self-evaluations, respectively; however, social comparison processes are not that simple. An abundance of recent research indicates that the nature of self-evaluations (i.e., positive or negative) is not intrinsic in the direction of comparison (e.g., Brewer & Weber, 1994; Buunk, Collins, Taylor, VanYperen, & Dakof, 1990; Lockwood & Kunda, 1997).

In addition to the direction of the comparison, perceived control over the ability to either increase, decrease, or maintain the discrepancy between the self and the comparison target on the attribute of comparison has been shown to influence the comparer's emotional reaction in response to upward or downward comparisons (Major, Testa, & Bylsma, 1991; Testa & Major, 1990; Wood & Vanderzee, 1997). To illustrate, if an individual compares him/herself to someone that he/she perceives to be a more skilled musician (upward comparison), but is confident that he/she can simply practice more to reduce the skill discrepancy, then this upward comparison would not lead to a negative emotional response, but would promote positive feelings (e.g., admiration, inspiration); this feeling of "among the better ones" (Collins, 2000, p. 159) is referred to in the social comparison literature as "upward assimilative comparison." However, if the comparer already practices six hours everyday, he/she would likely feel quite pessimistic that he/she could close the skill gap, and thus the upward comparison would result in negative feelings about the self (e.g., sadness, failure); this effect is referred to as "upward contrast comparison."

To summarize the factors involved in the process of social comparison, individuals choose as comparison targets those in their environments that they perceive as or expect to be similar on attributes related to the self-relevant attribute on which they are unsure of their relative standing. Note that, embedded in the foregoing description of comparison target selection, individuals are simply not motivated to compare themselves to others on attributes they do not deem as relevant to their self-concept. Comparers may make upward or downward comparisons with respect to the target, but the effect of the

comparison on self-evaluation and emotional response will depend largely on the degree to which they feel they are able to alter or control the attribute in question. To more easily understand the possible outcomes of a social comparison, see Figure 1.

	Upward Comparison	**Downward Comparison**
High Perceived Control	*Upward Assimilation*	*Downward Contrast Comparison*
Low Perceived Control	*Upward Contrast Comparison*	*Downward Assimilation*

Figure 1. Comparison direction and perceived attribute control in prediction of self-evaluation.

If an upward comparison is combined with high perceived control, the result is upward assimilation (and positive emotions). If an upward comparison is combined with low perceived control, upward contrast (and negative emotions) results. On the flip side, if a downward comparison is combined with high perceived control, then downward contrast occurs (and positive emotions). When downward comparisons occur in conjunction with low perceived control, the result is downward assimilation or "among the worse ones" (and negative emotions).

Social Comparison and Body Image

The body is the most tangible manifestation of the self. Thus, the formation of self-concept is naturally based, at least to some extent, on the appearance (and function) of one's body. Given that body appearance is a dimension relevant to self-concept, how does one evaluate this dimension? Removing the sociocultural context, it would be very

difficult to gauge the appearance of one's body. After all, what makes a body objectively attractive or unattractive? There is research that suggests the existence of some universally attractive features (e.g., facial symmetry, female waist-to-hip ratio), but much of what defines bodily attractiveness is socioculturally specified. The fact that different cultures and epochs have emphasized different characteristics in defining body attractiveness underscores the fact that there are relatively few objective standards by which to evaluate the appearance of one's body. Following the tenets of social comparison theory, in the absence of objective standards of bodily attractiveness, people are forced to compare their bodies to those of others around them, using the socioculturally portrayed body-ideals as the units of measurement.

Most of the data relating social comparison processes to body image are with females and there are only a handful of studies that have investigated the effect of social comparison on male body image. Grogan, Williams, and Conner (1996) exposed male (and female) participants to either magazine pictures of same-sex ideal models or magazine pictures of various landscapes. The authors reported that body esteem decreased among males in response to viewing pictures of the ideal male physique. Leit, Gray, and Pope (2002), using the SM (Gruber et al., 2000) found that exposing male participants to magazine images of the ideal male body resulted in a significantly greater discrepancy between the muscularity of their current and ideal body selections than males exposed to neutral images (non-body-focused). It is unclear from their report, however, if the difference in muscularity discrepancies was due to differences in

perceived current, ideal, or both. Notably, no differences were found between the bodyfat discrepancies of the two groups.

In another study, with Japanese male (and female) college students, Kowner and Ogawa (1993) exposed participants to sets of photographs that varied with respect to attractiveness (i.e., low, medium, high) and similarity (American vs. Japanese). These researchers reported that males' self-evaluations were higher when they viewed highly attractive male photographs than when they viewed either low- or medium-attractiveness stimuli. The authors interpreted these results as indicative of an attempt at self-enhancement when confronted by threatening stimuli. However, another possible explanation is that the medium-attractiveness stimuli were regarded as more similar and a more relevant comparison group, and thus the male participants were not as easily able to dismiss them as irrelevant targets of comparison.

Although studies with males, albeit only a handful, have consistently shown that exposure and comparison to ideal male images increases body dissatisfaction, studies with females have reported somewhat inconsistent findings. Correlational data, which examine the relationship between body dissatisfaction and exposure to and tendency to compare oneself to the bodies of others, have been more consistent than results of experimental studies and generally find that higher levels of exposure and social comparison are related to more negative body-evaluation (Thompson et al., 1999).

Numerous randomized experimental studies have reported that exposure to images of the sociocultural standard of female attractiveness decreases body satisfaction (e.g., Cattarin, Thompson, Thomas, & Williams, 2000; Stice & Shaw, 1994). For

instance, a creative study conducted by Lin and Kulik (2002) suggests that females' viewing and comparing themselves to an image of a thin woman can have deleterious effects. To establish a social comparison (competitive) context, female undergraduates were told (individually) that they would partake in a mock "dating game" where they would be paired and compete with another female participant for a date with a male participant. The participants were told that the pair would meet and get acquainted with the male in another room, and from this encounter, he would decide with which of the two women he would prefer to go on a date. The participants were also told that the male would receive a photograph of them, that they would receive a picture of the male, and those *not* in the control condition were additionally told that they would receive a photograph of their competitor. There were three social comparison conditions. Participants in the control condition were not shown photographs of her peer (competitor). Participants in the thin-peer condition were shown a photograph of a slender woman, said to be their competitor; and women in the oversize-peer condition were shown a digitally altered photograph of the same woman, to make her look overweight. The authors found that participants exposed to the thin-peer photographs rated their own bodies as less attractive, were less satisfied with their own bodies, expressed more negative self-evaluations, and were less confident (that they would "win" a date) than participants in the other two conditions.

On the other hand, several studies have found little or no immediate effect of exposure and presumed comparison to thin-ideal images on body self-evaluation (e.g., Martin & Kennedy, 1993; Irving, 1990). Champion and Furnham (1999), for example,

examined the effect of exposure to images of varying same-sex body types on body satisfaction among three age groups (i.e., 12-13, 14-15, 16-17 yrs) of adolescent girls. These researchers found no significant differences in body contentment, as measured by several visual analogue scales, between participants who were exposed to pictures of thin, neutral, or overweight female.

In an attempt to make sense out of the convoluted state of affairs in the literature examining the effects (or no) of exposure to images of slender ideal beauty on female body, Groesz, Levine, and Murnen (2002) conducted a meta-analysis. They reported a small, but relatively consistent and statistically significant effect size (Cohen's d = -0.31), indicating that viewing thin media images leads to more negative body image than viewing average- or plus-size models, or control images (e.g., cars, houses). The finding of comparable effect sizes consequent exposure to average-size models and inanimate objects suggests that the making of upward contrast comparisons accounts for the deleterious effects, as opposed to self-enhancement from exposure to the former two types of images. The authors also found effect sizes to be larger in studies that used between-groups designs, that is, studies that did not expose participants to both the experimental and control images. The negative effects of exposure to thin images were also found to be stronger when participants reported greater levels of pre-exposure body dissatisfaction and internalization of the thin ideal. The mean effect size was also somewhat larger when participants were younger than 19 years old. Their last major finding, counter to their hypothesis, was that the effect size was largest with one to nine exposures and decreased as the number of exposures increased beyond nine (Groesz et

al., 2002). Due to the methodological diversity in the literature, results of Groesz et al. may help explain at least some of the inconsistent findings.

Social comparison theory, in its expanded version, suggests that several variables might affect the social comparison process or moderate the effects on body image. Namely, perceived similarity with the comparison target (target-relevance), pre-comparison mood and self-evaluation, amount of perceived control over altering the comparison-attribute, and self-relevance of the attribute of comparison might influence how individuals compare themselves to others. The male body image literature does not shed any light on the effects of these potential moderating variables, primarily because there is so little research that has been done with males. However, there is some evidence in the female body image literature that these variables might influence social comparison processes and influence the relationship between these comparison and body image.

Regarding the importance of perceived similarity between comparer and comparison target, Cash, Cash, and Butters (1983) found that participants exposed to pictures of attractive women gave lower ratings of their own physical attractiveness than participants exposed to pictures of women rated to be “not attractive” (i.e., combined photographs of average-looking and unattractive persons). However, when the same pictures of “attractive” women were presented as professional advertisements (i.e., brand names were added to the pictures), participants appeared to dismiss the images as irrelevant targets of comparison, as evidenced by significantly higher self-attractiveness ratings than participants who were *not* led to believe the women in the photographs were

professional models. Heinberg and Thompson (1992) found that female participants tended to rate their peers (i.e., friends, classmates, and same-university students), with whom they certainly share similarities, as more important appearance-comparison targets than other, more removed (i.e., celebrities and American citizens) and arguably less-similar (i.e., family members) potential targets. These two studies suggest that the effect of exposure to images of society's male and female ideal may vary as a function of perceived similarity to and relevance of the comparison target.

Evidencing the potential moderating effects of pre-comparison self-evaluation, Durkin and Paxton (2002) found that pre-comparison body dissatisfaction, body comparison tendency, and internalization of the thin ideal predicted negative impact (i.e., body dissatisfaction and depressed mood) of exposure to ideal female images in adolescent girls. Posavac et al. (1998) divided their participants into body-satisfied and body-dissatisfied (as measured pre-comparison) and found that weight concern was higher after dissatisfied participants were exposed to thin media images than after they were exposed to images of automobiles. On the other hand, participants who reported (pre-exposure) being satisfied with their bodies displayed a trend indicative of upward assimilation, i.e., higher body satisfaction in response to thin images than to images of cars. Stice, Spangler, and Agras (2001) reported that exposure to thin-ideal images increased negative affect only for adolescent girls who reported pre-comparison elevations in perceived pressure to be thin (from family and peers) and body dissatisfaction. These adverse effects of exposure were only seen among vulnerable adolescent girls. These studies suggest that pre-comparison self-evaluations (i.e., body

satisfaction) may influence whether or not an individual makes an upward or downward comparison when exposed to male body images.

Perceived control over the comparison-attribute has been implicated as an important variable when considering the potential influence of social comparison (Major et al., 1991; Testa & Major, 1990; Wood & Vanderzee, 1997). In a three-part study, Mills et al. (2002) experimentally manipulated body appearance control and found that, when exposed to thin-ideal images, women who read excerpts emphasizing that thinness could be attained through diet and exercise (high-attainability) were less anxious and reported less negative affect than participants who read excerpts that emphasized that weight is genetically determined (low-attainability). The authors also found evidence of upward assimilation, as the participants in the high-attainability condition reported less negative affect (e.g., anxiety, depression) and greater state self-esteem when they were exposed to thin-ideal images than when they were exposed to neutral (i.e., product ads) images. These findings evidence the power of perceived control. When an individual thinks/feels that a particular attribute is under his/her volition, upward comparisons on this particular dimension tend to result in positive reactions (e.g., admiration and inspiration). However, when an individual is discouraged and pessimistic that he/she will be able to "close the gap" on a particular attribute between him/herself and the target, upward comparisons lead to negative self-evaluations (e.g., depression, shame).

Although body appearance would seem to be of at least some import for most people in the evaluation of self, there are certainly those for whom it is more or less important. However, there does not appear to be any research that studied the relevance

of body appearance to self-evaluation (e.g., “How much does the appearance of your body influence the way you think and feel about yourself?”) as a potential moderator of the relationship between social comparison and body satisfaction. As would be predicted by social comparison theory, the effect of social comparison processes on body image would be strongest among individuals for whom the appearance of their bodies is a significant influence on self-concept. Self-relevance of the comparison attribute will be examined as part of the present study.

To summarize the body image literature investigating the effects of social comparison processes, the male data are comparatively absent whereas the female data are inconsistent. Numerous studies have reported that viewing societally endorsed thin ideal images has untoward effects on self-concept of females. Others have failed to find such an effect. A recent meta-analysis revealed a small but significant and consistent adverse effect of viewing thin-ideal images on female body image. Additionally, although the female body image literature provides preliminary data on the validity of some of the assertions made by social comparison theory (and expansions thereof), there remains much to explore. Relatively speaking, research has largely neglected to investigate the effect of sociocultural factors on male body image. For all these reasons, further research is warranted to advance our understanding of how sociocultural factors, in which social comparison mechanisms are inherently embedded, influence the development and maintenance of body image, especially among males.

Given that there is empirical evidence that social comparison processes influence body image and psychological well-being, along with the consensual notion that the

mind has the power to affect activities in the body, an interesting questions arises – Can the process of comparing one's body to that of another affect the physiology, specifically the endocrinology, of the comparer? There does not appear to be any research that has directly addressed this question; there is, however, literature that has demonstrated that the outcome (i.e., winning vs. losing) of various types of competitions has endocrinologic effects on competitors. If the comparing of one's body to those of others is conceptualized as a form of competition, as seems very reasonable, then this literature is quite relevant to the intersection of body image and social comparison.

Hormones and Behavior

It has long been thought that animal behavior, including that of humans, is at least in part under chemical control. Ancient farmers noted that castrated bulls were much more docile than their intact counterparts (Levine, 1972), and during the seventeenth and eighteenth centuries, male sopranos and contraltos were emasculated to maintain their prepubescent voice range (Mazur & Booth, 1998). Although our ancestors probably did not understand the exact physiological mechanisms by which removal of the testes was having its effect on subsequent behavior, they surely recognized that physiology is somehow linked to behavior. The experimental study of the effect of hormones on behavior has been attributed largely to the pioneering work of Dr. Frank Beach, who, in the late 1930s, was the first to empirically demonstrate that gonadal hormones play a significant role in regulating sexual behavior (Levine, 1972). Since Beach's (1948) publication of *Hormones and Behavior*, an abundance of research has

affirmed the pivotal role that gonadal hormones play in organizing and activating animal behavior.

Gonadal hormones are thought to act on behavior via two distinct pathways: organizational and activational. However, some researchers reference empirical evidence that raises questions as to the validity of the mutually exclusive split between the organizational and activational effects of hormones (Arnold & Breedlove, 1985). Organizational effects of hormones are thought to occur early in development, during developmentally critical periods, and are regarded as relatively permanent because they organize the architecture of the brain and body (Mazur & Booth, 1998). When hormones subsequently impinge on the already-organized neural system, they activate preexisting neural pathways, which in turn influences behavioral output. These effects of hormones on pre-existing neural mechanisms represent the activational effects of hormones, and are considered to be relatively transient and able to occur throughout life (Arnold & Breedlove, 1985). Thus, the junction of the long-term organizational and short-term activational effects of steroid hormones is thought to be the physiological force that drives behavior in many different animal species, including humans.

The androgens and their effects on human behavior have received a great deal of attention in the scientific literature. The effect on behavior of the most well known androgen, testosterone, has been found to relate to a wide range of human behaviors, among both males and females. However, this research was not possible until the 1930s, when testosterone was first isolated and identified by Koch and his colleagues (Mazur & Booth, 1998). In mashing tons of bull testicles, these researchers were able to fractionate

a few ounces of material that they discovered was sufficiently pure to make the combs (i.e., fleshy protuberance atop the head) of castrated male chickens grow bright red (de Kruif, 1945, as cited in Mazur & Booth, 1998). However, because of the minute volume of testosterone produced in the body, it was another three decades before the advent of radioimmunoassay made possible the measurement of endogenous testosterone levels (Nieschlag & Wickings, 1981, as cited in Mazur & Booth, 1998). Thus, it was not until the 1960s that researchers were technologically able to systematically examine the relationship between endogenous testosterone and behavior.

There has been a great deal of empirical interest in the relationship between testosterone and aggressive, dominant, and antisocial behavior. Mazur and Booth (1998) distinguished between aggressive and dominant behavior, defining aggressive behavior as behavior driven by intent to inflict physical injury on another person or thing. Although they did not include it in their definition, behavior that is intended to cause emotional injury should probably also be regarded as aggressive behavior. On the other hand, these researchers defined dominance behavior as that motivated by intent to achieve or maintain high status relative to other conspecifics. They note that dominance can certainly be obtained through aggressive behavior, as is true of rodents (Mazur, 1973), but among higher primates (i.e., humans), aggressiveness in present-day society is neither the only nor the most effective route to status elevation or maintenance.

While there is overwhelming evidence of a strong positive relationship between testosterone and aggression in non-human animals (Turner, 1994, as cited in Book, Starzyk, & Quinsey, 2001), this relationship is much more controversial in humans.

Correlational data with humans are somewhat mixed, with some studies reporting a significant positive correlation, others reporting a negative correlation, and still others that report no significant relationship between endogenous testosterone levels and aggressive behavior (Archer, 1991). Archer conducted three meta-analyses (because of different methodologies) and found a weak positive relationship between testosterone and aggression. However, each of his three meta-analyses only contained five or six studies. Because of the low number of studies in Archer's meta-analyses, Book et al. (2001) conducted another meta-analysis, this time with 45 independent studies (54 independent effect sizes). Book et al. (2001) found, consistent with Archer's findings, a weak positive relationship between endogenous testosterone level and aggressive behavior. The inconsistent results in the literature appear to be the result of methodological differences across studies, such as time of testosterone measurement, age of participants, measurement of aggressive behavior (i.e., self-report vs. observational) (Book et al., 2001). Although endogenous testosterone appears to be positively related to aggressive and dominant behavior in humans, the issue of whether or not high levels of testosterone actually cause these types of behavior is not informed by this correlational research.

There have been relatively few experimental studies that have studied the effect of exogenous testosterone administration on aggression and dominance, and even fewer that utilized sound experimental methodology (Mazur & Booth, 1998). In one of the more methodologically sound studies, Kouri, Lukas, Pope, and Oliva (1995) administered increasingly high dosages of testosterone cypionate (150 mg/week, 300

mg/week, 600 mg/week; for two weeks each) or placebo to six male participants in a double-blind, randomized, cross-over design. Each participant was then paired with a participant who was supposedly in another room (there actually was no other participant). Participants were allowed to press two different buttons; one that increased the amount of money they would get (non-aggressive), another that decreased the amount of money their counterpart would receive (aggressive). The experimenter then led each participant to believe that his counterpart was busy taking away money he (the participant) would receive. Participants pressed the money-reducing button significantly more in response to the provocation when they were being administered testosterone than when they were receiving placebo; the difference in aggressive button pushing was not due to an overall greater number of button pushes, as the number of non-aggressive button presses was no different between groups (Kouri et al., 1995). Although these findings suggest that testosterone, at least at supraphysiologic levels, can cause aggressive or dominant behavior in males, further sound research is needed before this can be firmly concluded.

While there is evidence to suggest that testosterone is associated with and might cause aggressive behavior in males, the evidence that the reverse relationship is true has actually received considerably more support in the literature, due in part to simpler methodology (e.g., no drug administration required). That is, changes in dominance behavior or social status produce changes in circulating testosterone levels. Rose, Bernstein, and Gordon (1975) investigated the effect of shifts in social status on testosterone levels in rhesus monkeys and found that when an alpha male rhesus monkey

in one group was placed into a new group where he subsequently lost his dominant status, his testosterone level decreased 80 percent (from pre-introduction level) over the course of six weeks. Additionally, the monkey that was alpha male of the newly formed group in the end showed a 238 percent increase in testosterone within 24 hours of successfully defending his dominant position.

Data with human males have echoed those with non-human primates in suggesting that changes in social status are related to changes in testosterone levels in human males (Kreuz, Rose, & Jennings, 1972; Mazur & Lamb, 1980; Rahe, et al., 1990; Thompson, Dabbs, & Frady, 1990). For illustration, Thompson et al. (1990) found significant drops in testosterone among male prisoners recently placed in a 90-day shock incarceration program, prisoners whose status was certainly demoted. Kreuz et al. (1972) reported abnormally low testosterone levels in officers in the early, most degrading stages of officer candidate school; their testosterone returned to normal levels as the officers approached graduation. Mazur and Lamb (1980) reported increased testosterone in response to elevated status when they found that testosterone increased in male medical students following their graduation from medical school. It could be viably argued that these effects on testosterone were the result of changes in stress level rather than shifts in social status, the former of which has been shown to decrease testosterone in males (Delahunt, Mellsop, & Mellsop, 1987). Regardless, these studies, along with results with non-human primates, do suggest that changes in social status potentially influence endogenous testosterone levels.

Status among humans is certainly achieved and maintained differently than that of non-human primates. In humans, status is largely the result of relative (to others) success or failure in various competitive contexts (e.g., dating scene, educational accomplishment, job market). In fact, human competition (in its various forms), with its inherent status implications, has been shown to influence testosterone levels in males. Testosterone in human males has been shown to vary in predictable ways before and after competition. Researchers have consistently found that testosterone levels rise in males just before the onset of competition, an anticipatory rise that has been hypothesized to enhance performance by making them more willing to take risks (Daitzman & Zuckerman, 1980), and improving their coordination, cognitive performance, implicit learning of competition-relevant tasks, and concentration (Kemper, 1990; Klaiber, Broverman, Vogel, Abraham, & Cone, 1971; Schultheiss & Rohde, 2002).

Several studies with males have suggested that testosterone levels are affected by the outcome of competition. Specifically, a number of studies have reported testosterone increases from pre-competition to post-competition in male competitors that end up winning their competitions, whereas testosterone of eventual losers declines (or increases significantly less than among winners); Mazur and Booth (1998) report that the resultant post-competition differences can endure for one or two hours after the competition. This basic effect has been found among a variety of competitive contexts including athletic competitions (e.g., Booth, Shelley, Mazur, Tharp, & Kittok, 1989; Elias, 1981;), a reaction time contest (Gladue, Boechler, & McCaul, 1989), an

intellectual (chess) competition (Mazur, Booth, & Dabbs, 1992), and competition in predicting the chance outcome of a coin toss (McCaul, Gladue, & Joppa, 1992). This competition outcome-testosterone effect was even found among vicarious winners and losers (i.e., fans whose team won or lost, respectively) of athletic events (Bernhardt, Dabbs, Fielden, & Lutter, 1998).

Elias (1981), for instance, examined testosterone levels among 15 male college wrestlers and found that testosterone increased more among winners than losers when *percent-changes* from 10 minutes pre-match to 10 minutes post-match levels were compared. However, he noted that because of considerable individual variation in baseline testosterone, when post-match *mean* testosterone levels were compared, there was no significant difference between winners and losers. These data suggest that pre-competition testosterone levels need to be taken into account, whether by analyzing change scores or by controlling for possible pre-existing differences in testosterone between groups, when comparing the effects of competition outcome on testosterone.

Booth et al. (1989) followed six male college tennis players through six matches during their varsity season. Saliva samples were taken the day before each match (T1), 15 minutes before each match (T2), immediately after each match (T3), and one or two days (depending on availability of the players) after each match (T4). Because eventual losers' mean pre-competition (T1 and T2) testosterone levels were actually higher (although statistically nonsignificant) than those of eventual winners, comparing post-competition means resulted in nonsignificant differences between winners and losers. However, when mean change scores were compared between winners and losers, there

was a marginally significant ($p = 0.08$) difference in testosterone changes from T2 to T3, with testosterone increasing in winners and decreasing in losers. Further, the difference (between winners and losers) in mean change scores from T2 to T4 was statistically significant ($p = 0.04$); testosterone decreased from T2 to T4, but this decrease was much greater among losers. These data, like those of Elias (1981), suggest the need to account for individual baseline variation in testosterone levels when examining the effects of winning and losing on testosterone.

Booth et al. (1989) also reported that improvements in mood predicted changes in testosterone from T2 to T3 (i.e., testosterone decreased in some winners and increased in some losers). Based on these findings, the authors suggested that mood and appraisal of one's own performance might moderate the effect of competition outcome on testosterone level. These researchers also reported that pre-match (T2) testosterone levels of winners increased over subsequent matches while testosterone levels of losers decreased over the six matches, thus offering a possible socio-endocrinologic explanation of winning and losing streaks.

The studies noted above reported differential effects of winning or losing an athletic competition on testosterone. However, most humans do not compete in athletic or physically taxing competitions on a regular basis. Therefore, there is considerable interest in investigating whether or not the reported competition outcome-testosterone effect occurs as a result of more normative day-to-day social interaction and competition. Taking a step in this direction by examining the effect of winning or losing in a non-athletic context, Mazur, Booth, and Dabbs (1992) examined the effect of

winning and losing tournament chess matches. The authors report that the overall pattern (over the course of the matches) of testosterone levels was significantly different between winners and losers; winners had higher (than losers) mean testosterone levels immediately after and the morning following the (regional) chess tournament.

Consistent with the social comparison literature, Mazur et al. (1992) reported that testosterone tended to increase from immediately pre- to immediately post-match among winners of closely matched (i.e., comparable skill ratings) contests and decrease among their opponents (losers); however, this effect did not result from matches of disparately skilled competitors (i.e., testosterone decreased among winners and losers). It appears that, in the case of disparately skilled competitors, a victory does not help the victor gauge his chess playing ability; he just knows that he is more skilled than the much lower ranked player, and thus should have been victorious. As a result, neither his mood nor his testosterone level is likely to be much affected. However, a match with a comparably skilled player is of much more personal relevance, and a victory is likely to create strong positive feelings, high self-evaluation, and a more pronounced effect on testosterone.

Although a number of studies have reported that the outcome (i.e., winning vs. losing) of various types of competition differentially influence testosterone levels, there are also studies that have either failed to find such an effect or reported that the effect is more complex than originally conceived (e.g., Gonzalez-Bono, Salvador, Serrano, & Ricarte, 1999; Mazur, Susman, & Edelbrock, 1997; Schultheiss & Rohde, 2002; Suay et al., 1999). For instance, Gonzalez-Bono et al. (1999), studying two professional male

basketball teams (Eastern Basketball Alliance), concluded that the outcome of a team sports competition did not induce different pre- to post-competition patterns in testosterone. However, this is simply not consistent with the data they reported. Specifically, they reported an increase (from pre- to post-competition) in mean testosterone in the winners but a decrease in the mean testosterone of the losers. The pre-competition mean testosterone level of the eventual losers was greater (although neither statistical significance nor standard deviations were reported) than that of eventual winners, with the post-competition means converging to nearly equal levels. It appears that these researchers, in making the above conclusion, only compared post-competition testosterone levels between groups without taking into account pre-competition testosterone levels. These researchers did note that the higher the personal contribution (objective and/or perceived) to the team, the greater the increase in testosterone.

Mazur and Lamb (1980) reported that the testosterone of decisive winners of male doubles tennis matches increased while the testosterone levels of their opponents decreased. However, when the matches were very close, the pattern (across the multiple measurements) of testosterone levels was no different between the winners and losers. The researchers noted that, while the winners were pleased that they had won, they reported being dissatisfied with their performance; thus, the winners did not experience feelings of personal triumph or elation. The second experiment of Mazur and Lamb's (1980) three-experiment study showed that winning or losing a lottery determined entirely by chance did not result in differences in testosterone between the winners and losers, a finding that contradicts the data of McCaul et al. (1992).

Taken together, the above research suggests a more complex relationship between competition outcome and testosterone in human males than was initially proposed. Specifically, they suggest that outcome attribution (i.e., degree to which the outcome is the result of his own efforts) might moderate the relationship between competition outcome and testosterone levels. The above results also point to the possible moderating effect of mood; a positive effect on mood (e.g., elation) might be required for winning a competition to affect an increase in testosterone.

Salvador, Simón, Suay, and Liorens (1987) paired judo competitors on the basis of body weight and whether or not they did or did not belong to a regional judo team, and had them compete in a five-minute judo match. These researchers reported that, overall, testosterone decreased among the participants over the course of the competition, regardless of whether they won or lost. However, testosterone was not collected until 45 minutes post-competition, and given the relatively brief competitive task (i.e., one five-minute judo match vs. after an afternoon of competitive bouts – Booth et al., 1989), possible differences in post-competition testosterone could have returned to normal by the time it was measured post-bout.

Filaire, Maso, Sagnol, Lac, and Ferrand (2001), who also examined the effect of winning and losing among judo competitors, reported that testosterone *decreased* (nonsignificantly) from five minutes before the first fight to five minutes after the last fight in winners, but testosterone actually *increased* (nonsignificantly) among losers. Notably, mean testosterone levels were higher at all six of the saliva sampling times for the eventual losers. Although this suggests the need to account for pre-competition

testosterone when comparing winners and losers, it does not explain why testosterone increased in the losers. These researchers state that their finding of an increase in testosterone among losers, which runs counter to most studies of competitive situations, might be the result of small sample size (i.e., nine winners, nine losers) or the difference in the number of matches fought by winners and losers. Specifically, competitors were labeled *winners* if they won at least three of the four matches; competitors were labeled *losers* if they lost their second fight. As a result, post-competition testosterone was, on average, measured much earlier (and much closer to the typical pre-competition anticipatory testosterone peak) in losers than in winners, which may account for the above findings.

To summarize the literature associating testosterone and behavior, evidence strongly suggests that this relationship is reciprocal. That is, testosterone affects behavior and behavior may affect testosterone. The empirical consensus appears to be that testosterone and aggressive, dominant, and antisocial behavior are significantly and bidirectionally related. Specifically, high levels of testosterone have been associated with aggression, dominance, and norm breaking, and changes in dominance or social status have been reported to effect changes in testosterone. In particular, the outcome of competitions, embedded in which there are social status implications, has been shown to influence testosterone, with testosterone increasing in winners and dropping in losers. While there are a fair number of studies supporting the validity of this effect, others have not found such an effect. In reviewing each study closely, several variables are suggested that might help explain the inconsistent findings in the literature. Specifically, pre-

competition testosterone, pre-competition body satisfaction, pre-competition mood, perceived similarity with the competitor, and post-competition mood may all have some bearing on the effect of competition outcome on testosterone levels in human males.

Body Image, Social Comparison, and Testosterone

From the literature reviewed above, it is known that males are concerned and often dissatisfied with the appearance of their bodies. Although there have been only a few etiological studies that have examined the development and maintenance of body image in males, research fairly consistently reports that exposure and presumed comparison to images of ideal male bodies increases body dissatisfaction. Social comparison provides individuals with a mechanism by which to evaluate their status relative to those around them, and given that the body is such a fundamental part of the self, it is expected that the way individuals think and feel about their bodies is influenced by these comparisons. When individuals compare their bodies to those of others, they are attempting to gauge their standing or status relative to those around them, the results of which have inherent status implications. In this way, there appears to be an implicit competition, and to the victor go the higher status and the perks therein. While there are some inconsistencies, numerous studies suggest that changes in perceived status affect subsequent endogenous testosterone levels in males. Specifically, perceived increases in status result in increased testosterone levels, whereas testosterone decreases when status is perceived as having been diminished. This brings us to the core of the present study – Can the process of comparing the appearance of one's body to that of others effect acute changes in testosterone levels of males?

The Proposed Study and Predictions

The present study attempted to merge the areas of body image, social comparison, and endocrinologic research in an effort to better understand how males are affected by comparing their bodies to others. Specifically, I have conducted an experimental project where males were exposed to pictures of male bodies, which varied with regards to how closely they approximated the sociocultural ideal male physique (i.e., lean and muscular), and measured participants' salivary testosterone, body satisfaction, and mood (only post-exposure) before and after that exposure.

The basic predicted effect was that viewing pictures of lean/muscular males would result in upward comparisons and decreased testosterone, body satisfaction, and mood in participants. Conversely, exposure to skinny males would lead to downward comparisons and increased testosterone, body satisfaction, and mood. However, based on the body image, social comparison, and hormone literatures reviewed above, it was predicted that several variables would moderate the relationship between exposure to images of male bodies and the effect on testosterone, body satisfaction, and mood. Specifically, three two-way interactions and one three-way interaction were predicted.

Body Appearance Self-Relevance

First, it was predicted that the more participants rated the appearance of their bodies influenced their self-evaluation, the stronger the predicted effect of the exposure on testosterone, body satisfaction, and mood (i.e., downward contrast comparisons would result in increased testosterone, body satisfaction, and mood, whereas upward contrast comparisons would lead to decreased testosterone, body satisfaction, and

mood). However, because of concern about the amount of variability in body appearance self-relevance, the construct of body appearance self-relevance was examined in a pilot study, described below, before it was included in the main study.

Pre-Exposure Body Satisfaction

The second predicted two-way interaction (the first noted above) was that, at low levels of pre-exposure body satisfaction, testosterone, body satisfaction, and mood of the participants who viewed lean/muscular male bodies would decrease, and would be significantly lower than that of all other exposure groups. However, at higher levels of pre-exposure body satisfaction, viewing lean/muscular male bodies would lead to assimilation and feelings of motivation and inspiration, and thus result in increased levels of testosterone, body satisfaction, and mood, levels that would either be no different or higher than participants (with similar pre-exposure body satisfaction) that view skinny male images.

Perceived Body Appearance Control and Attitudes towards Muscularity

The third predicted two-way interaction was that, at low levels of perceived body appearance control, post-exposure testosterone, body satisfaction, and mood would be significantly lower in participants who viewed lean/muscular male bodies than in those who viewed images of skinny males. On the other hand, at higher levels of perceived body appearance control, there would be less discrepancy between the post-exposure testosterone, body satisfaction, and mood of participants who viewed lean/muscular male bodies and those who viewed skinny bodies, with exposure to both conditions resulting in comparably *increased* testosterone, body satisfaction, and mood. However, it

was further predicted that the two-way interaction described immediately above would be qualified by a significant three-way interaction. That is, the above two-way interaction would only occur for males who highly espouse positive attributes of muscularity, and it would not occur in males who did not consider a muscular body to be a positive attribute. Notably, there was concern about the amount of variability of these proposed moderators, as well as possible redundancy between them. Therefore, the psychometrics of the constructs of perceived body appearance control and attitudes towards muscularity were examined in a pilot study (detailed below), before being included in the main study.

Significance of Proposed Study

The present study, in merging research from the body image, social comparison, and endocrinologic literatures, will likely promote a better understanding of the construct of male body image. In particular, this project may help explain the obsessiveness with which a large number of males work on improving the appearance of their bodies, as well as the high rate of anabolic steroid abuse (and other potentially dangerous pro-hormones, e.g., androstenedione) among males. For instance, muscular development is not possible without the anabolic effects of testosterone, and when available testosterone decreases, the potential for muscular development decreases with it. If the present study finds that endogenous testosterone decreases in response to comparing one's body unfavorably to the bodies of others, such as might happen in a gym, then this makes much more difficult the goal shared by many males, which is to put on muscle mass. In pursuit of a lean and muscular body, a goal that is an

endocrinological implausibility without the anabolic assistance of testosterone, men and boys may resort to more extreme measures, such as using anabolic steroids. In a similar vein, this study might provide a biopsychosocial explanation of the development and maintenance of muscle dysmorphia, a recently labeled condition in which the affected individual perceives himself (or herself) to be small and weak, even if he (or she) is actually very muscular (Pope et al., 1993).

If testosterone is found to decrease in response to comparing one's body unfavorably to others, this finding might help explicate the avoidance behavior often associated with body image dissatisfaction. For instance, Dabbs, Karpas, Dyomina, Juechter, and Roberts (2002) reported that male participants whose testosterone levels were experimentally lowered experienced decreased positive affect (although not increased negative affect) and energy. Additionally, testosterone was found to produce positive affect when administered to hypogonadal men (Davidson, Carmargo, & Smith, 1979; Wang et al., 1996) and it has been shown to have rewarding affective properties in male rats (e.g., Alexander, Packard, & Hines, 1994; Packard, Schroeder, & Alexander, 1998). Thus, it is possible that lowered testosterone might decrease positive affect and energy, and possibly increase negative affect, which could in turn lead to body image avoidance behaviors. For instance, if positive affect decreases (and negative affect possibly increases) as a result of going to the gym (or generally, making body comparisons), then this study might also help partially explain the sedentary lifestyle and concomitant obesity that has grown to prevalence in the United States.

To clarify methodological issues related to the proposed moderators, as noted above, a pilot study was conducted before proceeding to the main study. Specifically, the psychometric properties of the measures of perceived body appearance control and body appearance self-relevance, both of which were developed by the first author, along with the psychometrics of the measure of attitudes towards muscularity, were examined to determine whether or not they had adequate variability and if they could be discriminated from one another. Pilot data were also used to select the two males who best represented their respective body type categories; these photographs were used in the main study.

PILOT STUDY

Method

Participants

Participants were 117 males recruited from the psychology subject pool and upper-level psychology and health/kinesiology courses at a large southwestern public university. A sample size of over 100 was chosen because it is sufficient to allow principal components analysis to be conducted with the measures of perceived appearance control, body appearance self-relevance, attitudes towards muscularity, and body satisfaction (Guadagnoli & Velicer, 1988). Subject pool participants received credit towards fulfillment of class requirements. Upper-level psychology and health/kinesiology students received extra credit in their respective course. Participation was limited to native English-speakers.

Three participants did not report their age and ethnicity. However, the average age of the sample was 19.77 (*SD* = 1.94) years, based on participants who reported age and ethnicity. The ethnic composition was 65.8% Caucasian, 3.5% African American, 18.4% Hispanic, 8.8% Asian American, 2.6% Pacific Islander, and 0.9% self-identified their ethnicity as being something other than the preceding ethnic categories.

Measures and Materials

Demographic questionnaire. Participants began by completing a brief demographic questionnaire that assessed their age, ethnicity, height, and weight.

Perceived body appearance control. From a search of the literature, there were no existing measures that would serve to assess the construct of perceived body

appearance control. Therefore, a measure was developed, with items patterned loosely after the Objectified Body Consciousness Scale (OBC; McKinley, 1995, as cited in McKinley, 1999) and the Dieting Beliefs Scale (DBS; Scotland & Zuroff, 1990) to assess this construct. The rationale for not using the OBC or DBS themselves was that they were developed for use with females, and thus, the items consistently refer to weight or thinness, as opposed to body fatness and muscularity, both of which are more pertinent (than weight per se) body image concerns for males. Perceived body appearance control was operationally defined as the degree to which an individual believes he/she can control the appearance of his/her body. The first author generated nine Likert-scale items to measure the construct of perceived body appearance control. Six fellow body image and eating disorder researchers subsequently rated these items with respect to how well they appear to assess the construct of interest.

Body appearance self-relevance. Body appearance self-relevance was operationalized as the extent to which the appearance of an individual's body influences the way he/she thinks and feels about himself/herself. There are also no existing measures that assess this construct. Therefore, the first author generated ten Likert-scale items to measure this construct. Six fellow body image and eating disorder researchers subsequently rated these items with respect to how well they appear to measure the construct of interest.

Attitudes towards muscularity. The Swansea Muscularity Attitudes Questionnaire (SMAQ; Edwards & Launder, 1999) was used to measure males' attitudes and cognitions regarding muscularity. This measure consists of 20 items, responses to which

are made on a seven-point scale (i.e., “definitely,” “strongly agree,” “agree,” “neutral,” “disagree,” “strongly disagree,” and “definitely not”). Items are scored using the methods of the Eating Attitudes Test (EAT; Garner & Garfinkel, 1979), where the strongest affirmative response (“definitely”) earns a score of three, the next strongest positive response begets a two, and the third strongest response is scored a one, with the remaining responses scored as zero. Edwards and Launder (1999) reported two stable factors, “Drive for Muscularity” and “Positive Attributes of Muscularity,” with 10 items loading on each factor.

The Drive for Muscularity (DFM) subscale concerns the desire for greater, rather than lesser muscularity, and the drive to participate in the bodybuilding behaviors that represent an attempt to achieve the desired level of muscularity. The Positive Attributes of Muscularity (PAM) subscale is composed of items that assess the perceived positive attributes or benefits of muscularity, such as feeling more masculine, enhanced confidence, and greater attractiveness. This latter subscale (i.e., SMAQ-PAM) was used to assess the degree to which participants ascribe positive attributes to muscularity. Edwards and Launder (1999) report that the SMAQ is internally consistent, with Cronbach’s alphas of 0.94 and 0.91 for the Drive for Muscularity and Positive Attributes of Muscularity subscales, respectively, and that the measure is face valid. However, neither test-retest reliability nor concurrent validity have been reported.

Body satisfaction. To assess pre-exposure affective body satisfaction, the Affective Body Satisfaction scale (ABS; Brown & Gleaves, 2003) was used, which measures satisfaction with 13 non-facial body areas/aspects that have been shown to be

areas of great concern for males (e.g., muscle tone, chest, triceps, lower legs). The possible responses to each area/aspect ranged, on a seven-point Likert scale, from “Very Dissatisfied” to “Very Satisfied.” This measure has demonstrated good internal consistency, a = 0.891 (Brown & Gleaves, 2003).

Male exposure images. The males in the exposure images were selected and photographed (using a digital camera) by the researcher. The principal investigator took front- and back-view pictures of 24 males intended to represent the five body-type conditions (i.e., obese, skinny, average, lean/muscular, and hypermesomorphic); 22 Caucasian males and 2 African-American males were photographed. The males were shirtless to ensure that clothing did not unduly obscure the bodies to which the participants would be exposed.

Photo rating form. Participants used this form to assign each of the males in the photographs to one of the five body type categories. The participants then rated how representative each male was of the particular body type category into which they placed the photographed male. Lastly, participants were requested to identify the two male bodies who they would most like to look like.

Procedure

Participants were tested in large groups. Once the participants arrived for their experiment session, the experimenter explained to them the purpose and nature of the study. Participants were then told that the purpose of the study was to examine appearance thoughts and attitudes. The experimenter then explained to the participants that would complete four questionnaires that assess their appearance attitudes.

Participants then completed the measures of perceived body appearance control, body appearance self-relevance, SMAQ (Edwards & Launder, 1999), and the ABS (Brown & Gleaves, 2003). Once they had completed the four measures, participants were shown the photographs of the male bodies (with faces pixilated) and were asked to complete the photo rating form. Data from the photo rating form were used to select the pictures that were used in the main study. Participants were then fully debriefed and allowed to leave.

Data Analysis

Descriptive statistics were computed to examine the variability of the proposed moderators. To examine possible redundancy among the proposed moderators, principal components analysis was conducted with the data from the measures of perceived body appearance control, body appearance self-relevance, body satisfaction, and attitudes towards muscularity. Specifically, four factors were specified and factor loadings were examined. Bivariate correlations, internal consistency, and item-total correlations were also examined. To analyze data from the photo rating form, descriptive analyses were conducted and percent agreement (of body type category assignment) was examined, which was cross-referenced with the category "fit" ratings.

Results

Based on all the analyses conducted on the measures of perceived body appearance control, body appearance self-relevance, body satisfaction, and attitudes towards muscularity, they appear to be appropriate for use in the main study. Specifically, each measure had adequate variability. Additionally, principal components analysis, specifying four factors (one for each measure), revealed clean factor (measure)

separation (i.e., high intra-measure loadings and low cross-loadings), which indicates that they are relatively non-redundant measures/constructs. Internal consistency and item-total correlations were also examined, but only for the two measures developed for the present study (PBAC and BASR). The 9-item PBAC revealed good internal consistency, a = 0.82, with item-total correlations ranging from 0.39 to 0.64; the 10-item BASR also demonstrated good internal consistency, a = 0.89, with item-total correlations ranging from 0.44 to 0.76. Bivariate correlations between measures were in the expected directions, and none were suggestive of collinearity.

In selecting the male photos that best represented the five body-type categories, percent agreement among category assignments was examined, as well as the "fit" ratings for each male photo. There was high agreement between participants, and at least two photographed males were identified as good representatives of each body-type category; the two males from each category with the highest "fit" ratings were retained for use in the main study. As anticipated, the two males identified as best representing the lean/muscular body-type category were also unanimously identified as having the bodies that the participants would most like their bodies to look like.

MAIN STUDY

Method

Participants

Participants were 129 males recruited from the psychology subject pool, upper-level psychology courses, and health and kinesiology courses, all at a large southwestern public university. Subject pool participants received credit towards fulfillment of class requirements and were entered into a drawing for two 25 dollar cash prizes. Upper-level psychology students and health/kinesiology students were entered into the same cash drawing. Some participants, at the discretion of course instructors, also received extra credit in the class from which they were recruited. Participation was limited to native English-speakers. Additionally, participants were requested to refrain from tobacco use, eating, and oral hygiene (i.e., brushing and flossing) for at least two hours prior to participation, as these behaviors can result in impurities that could affect results of the salivary testosterone assays. Because exercise and sexual activity have also been shown to acutely increase levels of unbound testosterone (e.g., Durand et al., 2003), which is found in saliva, participants were requested to refrain from these activities for at least three hours prior to participation.

The average age of the 129 participants was 19.80 years (*SD* = 1.83). Regarding ethnicity, 80.6% identified as Caucasian, 12.4% Latino, 3.9% Asian American, 1.6% African American, and 1.6 Other ethnicity. Several anthropometric measurements were obtained or calculated. The average height was 70.43 inches (*SD* = 2.94); average weight was 183.18 (*SD* = 37.58); average body mass index (BMI) was 25.93 (*SD* = 4.97);

average body fat percentage was 17.77% (*SD* = 6.94); average FFMI was 21.19 (*SD* = 2.62). Only one participant indicated that, at the time of data collection, he was using a pro-hormone or anabolic steroid; his data were excluded from the analyses.

Measures and Materials

Questionnaires from pilot study. Participants completed a demographic questionnaire, which among other things, assessed whether or not participants had used tobacco products, eaten, brushed and/or flossed their teeth, exercised, or engaged in sexual activity in the three or four hours prior to the experiment. The questionnaire also assessed whether or not participants had any endocrinologic conditions, if they were being medically treated with hormones, and if they were taking steroids, pro-hormones, and other nutritional supplements. Participants completed the measures of perceived body appearance control (PBAC), body appearance self-relevance (BASR), the SMAQ (Edwards & Launder, 1999), and ABS (Brown & Gleaves, 2003), all of which were identical to those used in the pilot study.

Body satisfaction. Two additional (to the ABS) measures of body satisfaction were administered after the exposure. Three visual analogue scales (VASs) were used to assess satisfaction with three body image aspects (i.e., muscularity, body fatness, and overall body attractiveness). Participants placed a vertical mark on a 10-centimeter line to represent their level of satisfaction with these three body dimensions; responses were later converted to scores ranging from 0 (completely dissatisfied) to 100 (completely satisfied) by measuring (to the nearest millimeter) the distance of the mark from the leftmost endpoint. Heinberg and Thompson (1995), using similar VASs to measure

weight dissatisfaction and overall appearance dissatisfaction, reported significant correlations (0.66 and 0.76, respectively) between scores on these VAS measures and the Body Dissatisfaction Subscale of the Eating Disorders Inventory (Garner, Olmsted, & Polivy, 1983).

Participants completed the Somatomorphic Matrix (SM; Gruber et al., 2000). The SM is a computer-administered figure-rating measure that allows the respondent to manipulate levels of body fatness and muscularity in responding to body image inquiries. Body figures are arranged in a 10 by 10 matrix and vary along dimensions of body fatness and muscularity, with each of the 100 figures corresponding to a determined bodyfat percentage and fat-free mass index (FFMI; Kouri, Pope, Katz, & Oliva, 1995) values. In responding to each body image inquiry/prompt, the participant maneuvered his way through the matrix by clicking one of four buttons (increase/decrease bodyfat one increment or increase decrease muscularity one increment) on the screen, presented with one figure on the screen at a time, until he located the figure that most closely approximated his response to the prompt. The corresponding bodyfat percentage and FFMI were recorded and the program proceeded to present the next body image prompt.

Although the SM appears to be face valid, data regarding the psychometrics of the SM are very limited. The only study of reliability, which examined test-retest reliability over a span of seven to ten days, reported correlations for men between 0.34 and 0.79 for the various body image indices (e.g., self-ideal muscularity discrepancy, ideal body fat, etc.) (Cafri, Roehrig, & Thompson, 2004). Notably, the self-ideal

muscularity discrepancies were found to be the least reliable indices on the SM for males (and females). Work is currently being conducted in other laboratories to further test the reliability and validity of the SM.

Mood. Each participant's post-exposure mood was assessed using the Positive and Negative Affect Schedule – Expanded Form (PANAS-X; Watson & Clark, 1994). The PANAS-X has 60 items that measure 11 specific positive and negative affect domains. The PANAS-X items are words and phrases describing different emotions and respondents are instructed to rate, on a five-point Likert scale, to what degree they currently feel those ways (from "very slightly" to "extremely"). Watson and Clark note that researchers can select to use only those items that are pertinent to their research. Therefore, only 4 of the 11 domains were used for the present study: joviality, self-assurance, hostility, and guilt. Watson and Clark reported high correlations (between 0.85 and 0.91) between scales of the PANAS-X and the Profile of Mood States (POMS; McNair, Lorr, & Droppleman, 1971), and they reported greater discrimination between scales on the PANAS-X than on the POMS. Watson and Clark also reported that scores on all of the scales of the PANAS-X to be quite stable, with test-retest coefficients ranging from 0.51 to 0.71 over a two-month interval.

Male exposure images. Only the skinny, average, and lean/muscular conditions were retained from the pilot study for use in the main study. From the pilot study, the males with the highest fit ratings in each body type category were used in the main study. Specifically, 12 pictures (2[front/back] x 2 males x 3 conditions) in total were kept and used in the main study.

Social comparison. To assess how participants compared the appearance of their bodies to the appearance of the male bodies in the exposure images, participants were asked to complete a questionnaire on which they rank ordered themselves with the two comparison males on three appearance dimensions (muscularity, body fatness, and body attractiveness). Specifically, each participant had to decide which of the three males (of which he was one) had the most muscular body, the second most muscular body, and the least muscular body. In addition, participants were asked to rate on a seven-point Likert scale how they felt they compared to the males in the exposure images with respect to the same three appearance dimensions. For example, the muscularity comparison prompt was, "How do you feel the muscularity of your body compares to that of the males in the slides you just viewed?"

Salivary testosterone. Saliva samples were collected, with exogenous stimulation (Trident chewing gum), immediately before viewing the exposure images and then again approximately 20 minutes after viewing the male images. All samples were frozen and stored at -80 degrees Celsius until they were shipped on dry ice to Salimetrics (State College, PA). Once there, they were stored at -80 degrees Celsius until assayed. Upon testing, samples were centrifuged at 3000 rpm for 15 minutes to remove mucins. Enzyme immunoassay (EIA) kits, specifically designed for use with saliva, were used to assay the samples. The manufacturers of this particular assay kit reported sensitivity to be 1.5pg/mL, with an average intra-assay coefficient of variance (CV) less than 6.7%. All saliva samples were assayed in duplicate, and the averages of the duplicates were used in all analyses.

Study Design

Independent variable. Participants were randomly assigned to view one of three sets of pictures of male bodies that varied with respect to muscularity and body fatness. To control for facial attractiveness, the faces of the pictures were pixilated (blurred).

1. Skinny – 43 participants viewed two (front/back) pictures of two shirtless skinny males.
2. Average – 43 participants viewed two (front/back) pictures of two shirtless males with average muscularity and body fatness.
3. Lean/muscular – 43 participants viewed two (front/back) pictures of two shirtless lean and muscular males, which estimated the sociocultural ideal male body.

Dependent variables. Three dependent variables were examined: salivary testosterone, body satisfaction, and mood. Participants' post-exposure salivary testosterone levels were assayed via EIA. Body satisfaction was assessed using the SM (Gruber et al., 2000) and the three VASs described above. Post-exposure mood was measured by the PANAS-X (Watson & Clark, 1994).

Procedure

Participants were tested in small groups of four or five, and they were seated in a way that reasonably ensured that each participant was unable to see images presented to the other participants. Because testosterone levels have been found to follow a diurnal rhythm, highest and most variable in the morning, lower and more stable during the afternoon (Dabbs, 1990), all participants were tested between the hours of 2:00 pm and 6:00 pm CST.

Once the participants arrived for their experiment session, the experimenter explained the purpose and nature of the study. Participants were told that the purpose of the study was to examine the effects of hormones, appearance attitudes, and mood on date assignment and selection. The experimenter then explained to the participants that they would first complete some questionnaires that would assess their appearance attitudes and mood, as well as provide saliva for hormone testing. The participants were informed that their saliva would be collected twice over the course of the experiment. The rational for collecting their saliva twice was that this allowed for an average to be calculated, which would be more reliable than any single measurement.

After the purpose and nature of the study were explained, participants completed the measures of perceived body appearance control (PBAC), body appearance self-relevance (BASR), the SMAQ (Edwards & Launder, 1999), and the ABS (Brown & Gleaves, 2003). All three of these questionnaires were completed online, via a secure online data collection system (Surveymonkey.com). Participants then provided their first saliva sample. At each saliva collection time, participants were given a stick of Trident sugar-free chewing gum (regular flavor) to stimulate salivation, a straw, and a plastic vial into which they expectorated approximately two milliliters of saliva.

Once their saliva had been collected, they viewed one of the three slideshows of male photographs to which they had been randomly assigned to view. Before viewing the slides of the male images, participants were informed that, after viewing the upcoming images, they would rank themselves and the males in the images with respect to body appearance. Participants were also told that, at the end of the study, they would

assign the males in the images and themselves to female dates, based solely on appearance; however, they did not actually do this. The participants then viewed (via Microsoft PowerPoint on computer monitors) the slideshow of male pictures that corresponded to their race, i.e., either pictures of Caucasians or African-Americans.

To ensure adequate exposure, the pictures were presented as follows: the front view of the first male (for 10 seconds), then the back view of the first male (for 10 seconds), followed by a slide that contained side-by-side front and back views of the first male (for 10 seconds); then the front view of the second male (for 10 seconds), followed by the back view of the second male (for 10 seconds), and then the side-by-side slide of the second male (10 seconds). The participants then viewed a slide that contained the front views of both males, side-by-side; this slide remained on the screen while participants completed their self-target comparison rankings (i.e., relative rankings of muscularity, body fatness, and body attractiveness).

After completing the body appearance ranking form, participants completed three VAS measures of body satisfaction, the PANAS-X (Watson & Clark, 1994), and the SM (Gruber et al., 2000). The latter two were both administered via computer. Participants' heights, weights, and body fat percentages were then measured by the experimenter (the participant was not allowed to see his measurements). Upon completion of anthropometric measurements, saliva was collected for the second (and final) time, which was timed to be precisely between 15 and 20 minutes after completion of the body appearance ranking sheet. Participants were then questioned about what they suspected the nature of the study to be, fully debriefed, and allowed to leave.

Data Analysis

To determine whether or not the exposure manipulation was effective (e.g., participants exposed to lean/muscular pictures upward compared), analyses of variance (ANOVAs) were conducted to test for the predicted self-target comparison ratings (as noted above). The moderators that were examined were perceived body appearance control, body appearance self-relevance, attitudes towards muscularity, and pre-exposure body satisfaction. To test possible main effects of exposure on testosterone, analysis of variance (ANOVA) was conducted on testosterone gain scores (i.e., change from pre- to post-exposure). To examine possible main effects on the remaining two dependent variables (i.e., body satisfaction and mood) and the predicted two- and three-way interactions, analyses of covariance (ANCOVAs) with tests of the homogeneity of slopes were conducted. Exposure condition was the independent variable for all analyses. For each of the three dependent variables, three ANCOVAs were conducted to test the predicted moderator effects (two-way interactions); one entering perceived body appearance control (PBAC) as the covariate, another entering body appearance self-relevance (BASR) as the covariate, and a third entering pre-exposure body satisfaction (ABS) as the covariate. In testing the predicted three-way interactions, two of the proposed moderators (i.e., PBAC and the SMAQ-PAM) were entered as covariates. When significant interactions were found, the effects were plotted and the resultant graphs were inspected.

Results

Hypotheses were formulated for three separate sets of dependent variables: salivary testosterone, body satisfaction, and mood. The independent variable was type of body photographs to which participants were exposed; the three exposure conditions were lean/muscular, skinny, and average. Potential moderators were body appearance self-relevance (BASR), perceived body appearance control (PBAC), pre-exposure body satisfaction (ABS), and positive attributes attributed to muscularity (SMAQ-PAM). Results are presented separately by dependent variable.

Manipulation Check

To determine whether or not the body photographs were perceived by participants as they were intended, a series of one-way analyses of variance (ANOVAs) were performed. Exposure condition was the independent variable. In each condition, participants rated their muscularity, body fatness, and overall body appearance with respect to how they felt they compared to the males in the photographs they viewed; these relative ratings of muscularity, body fatness, and overall body attractiveness were the dependent variables in the three ANOVAs. Results indicate significant differences among the three exposure conditions for all three dependent variables: $F(2,126) = 61.06$, $p < 0.001$ (Muscularity); $F(2,126) = 11.31$, $p < 0.001$ (Body Fatness); $F(2,126) = 21.53$, $p < 0.001$ (Overall Body Attractiveness).

Significant ANOVAs were followed-up by Tukey HSD post hoc tests. Means and standard deviations can be seen in Table 1. The lean/muscular condition had lower relative muscularity ratings than the skinny and average conditions. Regarding body

fatness ratings, the skinny and lean/muscular conditions had lower relative leanness ratings than the average condition. Additionally, relative overall body attractiveness ratings for participants in the lean/muscular condition were lower than for participants in the average and skinny conditions. The preceding results are exactly as predicted, and suggest that participants in each condition perceived the body photographs the way the present researchers intended.

Table 1
Manipulation Check: Means and Standard Deviations for Relative Muscularity, Body Fatness, and Overall Body Attractiveness Ratings by Exposure Condition

BARS: Relative Ratings	Condition Lean/Muscular Mean (*SD*)	 Skinny Mean (*SD*)	 Average Mean (*SD*)
Muscularity	5.58 $_{a}$ (*0.93*)	3.40 $_{b}$ (*1.31*)	3.07 $_{b}$ (*1.16*)
Body Fatness	4.54 $_{a}$ (*1.45*)	4.40 $_{a}$ (*1.26*)	3.19 $_{b}$ (*1.61*)
Overall Body Attractiveness	4.79 $_{a}$ (*1.19*)	3.67 $_{b}$ (*1.06*)	3.16 $_{b}$ (*1.27*)

Note. Means that have different subscripts within each row are significantly different from one another ($p < 0.001$); these ratings represent data from the Body Appearance Ranking Sheet, *not* the VAS.

Testosterone

Results of analysis of variance on testosterone gain scores (pre-exposure testosterone minus post-exposure testosterone) indicate that testosterone did not differentially change in response to the three groups viewing different male body types (see Table 2). Additionally, none of the proposed moderators moderated the relationship between exposure and the effect on testosterone, as indicated by analyses of covariance

(ANCOVAs; see Table 2). There also was no significant three-way interaction between exposure condition, PBAC, and the degree to which participants espouse positive attributes of muscularity (see Table 2). However, when pre- and post-exposure testosterone levels were compared, collapsing across exposure condition, testosterone decreased significantly over the course of the experiment, $t(128) = 12.55$, $p < 0.001$ (see Table 3).

Table 2

Testosterone: Main and Moderating Effects

Effect	df	*F*	*p*	partial $?^2$
Condition	2,136	1.06	0.35	0.017
Condition x BASR	2,120	0.53	0.59	0.003
Condition x PBAC	2,122	0.21	0.81	0.004
Condition x ABS	2,122	1.27	0.28	0.020
Condition x PBAC x PAM	3,120	0.48	0.70	0.012

Note. PAM = SMAQ-PAM.

Table 3

Testosterone: Pre- and Post-Exposure Values

Condition	Pre-Exposure Testosterone Mean (*SD*)	Post-Exposure Testosterone Mean (*SD*)
Lean/Muscular	181.46 $_a$ (*66.32*)	143.11 $_b$ (*57.15*)
Skinny	161.16 $_a$ (*50.36*)	130.13 $_b$ (*43.70*)
Average	158.51 $_a$ (*56.64*)	128.88 $_b$ (*45.15*)

Note. Testosterone values are expressed in pg/ml units. Means that have different subscripts within each row are significantly different from one another ($p < 0.001$); these ratings represent data from the Body Appearance Ranking Sheet, *not* the VAS.

Body Satisfaction

This study examined five dependent variables separately in investigating the possible effect of body comparison on body satisfaction ratings. The three VAS measures (i.e., Muscularity, Body Fatness, and Overall Body Attractiveness) were examined, as well as the two indices of the Somatomorphic Matrix (i.e., Muscularity and Body Fatness). It was generally predicted that exposure to lean/muscular males would result in lower body satisfaction ratings, whereas exposure to skinny males would result in higher body satisfaction.

Visual analog scales. Analyses of variance revealed a significant main effect of exposure condition on VAS-Muscularity (marginal significance) and VAS-Overall Body Attractivness ratings; there was no statistically significant effect of exposure condition on VAS-Body Fatness (see Table 4). Tukey HSD post hoc tests indicated that participants who viewed lean/muscular male photographs were more dissatisfied with their muscularity and their overall body attractiveness than were participants who viewed the photographs of average male bodies; there were no other differences in body dissatisfaction ratings between the exposure conditions (see Table 5). Neither body appearance self-relevance nor perceived body appearance control moderated the relationship between exposure condition and the effect on VAS ratings (see Table 4). However, the ABS did moderate the relationship between exposure and VAS ratings, but only for VAS-Body Fatness (see Table 4).

To further investigate the significant moderator effect on VAS-Body Fatness ratings, participants were categorized into three groups (using sample mean and one

standard deviation above and below mean as group cutoffs) based on their scores on the pre-exposure body satisfaction measure (ABS). The mean VAS-Body Fatness ratings were then plotted for each condition by the three levels of ABS scores. Among the least body satisfied participants (pre-exposure), those who viewed skinny males were much *more* satisfied with their body fatness than those who viewed either lean/muscular or average males. However, for participants who endorsed medium to high levels of pre-exposure body satisfaction, those who viewed skinny males were slightly *less* satisfied with their body fatness than those who viewed either lean/muscular or average male bodies.

However, upon further examination, the significant Condition x ABS interaction for VAS-Body Fatness (noted above) appears to be attributable to two outlying visual analog body fatness ratings. Two of the highly dissatisfied participants who viewed skinny males endorsed minimal dissatisfaction with their body fatness after viewing their respective photographs. This is not a problem in and of itself, however when indicators of body size (i.e., weight, BMI, BF%) were examined, those two participants were the thinnest of all the highly body dissatisfied participants. Therefore, it appears the significant interaction is attributable to the two smallest/thinnest participants being in the same exposure condition. Indeed, when the two outlying data points were removed, the moderating effect became nonsignificant, $F(2,120) = 1.11$, $p = 0.333$.

The present study also predicted that the degree to which participants ascribed positive attributes to muscularity would qualify the two-way (Condition x PBAC) interaction. Analyses of covariance (IV: Condition; covariates: PBAC and SMAQ-PAM)

revealed a significant three-way interaction for VAS-Body Fatness, but not for VAS-Muscularity or VAS-Overall Body Attractiveness (see Table 4). To follow-up the significant three-way interaction, participants were divided into three groups (using sample mean and one standard deviation above and below mean as group cutoffs) based on their scores on the SMAQ-PAM. The PBAC x Condition interactions were then plotted and examined within each of the three SMAQ-PAM groups.

Table 4
Body Satisfaction – Visual Analog Scales: Main and Moderating Effects

Effect	df	*F*	*p*	partial $?^2$
VAS-Body Fatness				
Condition	2,136	1.06	0.35	0.017
Condition x BASR	2,120	0.53	0.59	0.003
Condition x PBAC	2,122	0.21	0.81	0.004
Condition x ABS	2,122	1.27	0.28	0.020
Condition x PBAC x PAM	3,120	0.48	0.70	0.012
VAS-Muscularity				
Condition	2,125	2.89	0.06	0.044
Condition x BASR	2,120	0.79	0.46	0.013
Condition x PBAC	2,121	0.11	0.90	0.002
Condition x ABS	2,122	0.45	0.64	0.007
Condition x PBAC x PAM	3,119	1.19	0.32	0.029
VAS-Overall Body Appearance				
Condition	2,125	3.50	0.03	0.053
Condition x BASR	2,120	1.20	0.14	0.032
Condition x PBAC	2,121	0.31	0.74	0.005
Condition x ABS	2,122	0.40	0.67	0.006
Condition x PBAC x PAM	3,119	1.96	0.12	0.047

Note. PAM = SMAQ-PAM.

Table 5
Body Satisfaction – Visual Analog Scales: Means and Standard Deviations for Body Fatness, Muscularity, and Overall Body Attractiveness

Dependent Variable	Condition		
	Lean/Muscular Mean (*SD*)	Skinny Mean (*SD*)	Average Mean (*SD*)
Body Fatness	44.54 $_{a}$ (*30.99*)	41.64 $_{a}$ (*24.45*)	38.35 $_{a}$ (*27.83*)
Muscularity	44.79 $_{a}$ (*22.28*)	39.12 $_{a\,b}$ (*20.67*)	34.00 $_{b}$ (*19.38*)
Overall Body Attractiveness	44.47 $_{a}$ (*23.57*)	38.71 $_{a\,b}$ (*16.86*)	32.65 $_{b}$ (*21.01*)

Note. Means that have different subscripts within each row are significantly different from one another ($p < 0.05$); higher scores indicate greater body dissatisfaction.

Somatomorphic Matrix. In addition to examining the effect of body comparison on body satisfaction, as indicated by VAS ratings, the present study also examined the two indices from the Somatomorphic Matrix (i.e., muscularity and body fatness) as dependent variables. Specifically, the differences between the muscularities and body fatnesses of the participant-selected *current* and *ideal* bodies (C-I discrepancies) were used as the indicators of body satisfaction. Results of ANOVAs indicated that the body type condition to which males were exposed did not differentially affect C-I discrepancies (see Table 6). Regarding moderating effects, results indicated that neither BASR nor PBAC moderated the relationship between exposure condition and either C-I discrepancy (see Table 6). Likewise, ANCOVAs for both C-I discrepancies showed that the degree to which participants ascribed positive attributes to muscularity did not moderate the proposed two-way (Condition x PBAC) interactions (see Table 6).

Table 6
Body Satisfaction – Somatomorphic Matrix: Main and Moderating Effects

Effect	df	*F*	*p*	partial $?^2$
SM – Muscularity				
Condition	2,99	0.28	0.76	0.006
Condition x BASR	2,94	0.19	0.83	0.004
Condition x PBAC	2,96	0.27	0.77	0.006
Condition x ABS	2,96	0.51	0.61	0.010
Condition x PBAC x PAM	3,94	0.21	0.89	0.007
SM – Body Fat				
Condition	2,99	0.02	0.98	< 0.001
Condition x BASR	2,94	0.18	0.84	0.004
Condition x PBAC	2,96	0.75	0.47	0.015
Condition x ABS	2,96	4.38	0.02	0.084
Condition x PBAC x PAM	3,94	0.83	0.48	0.026

Note. PAM = SMAQ-PAM.

Pre-exposure body satisfaction (ABS) did significantly moderate the relationship between exposure condition and the effect on the Body Fat C-I discrepancy, but not for the Muscularity C-I discrepancy. To further probe the significant moderator effect, participants were categorized into three groups (using sample mean and one standard deviation above and below mean as group cutoffs) based on their ABS scores. The mean Body Fat C-I discrepancy ratings were then plotted for each condition by the three levels of ABS scores.

Upon examination of the graph, participants with the highest pre-exposure body dissatisfaction who viewed average male bodies were more dissatisfied with their body fatness (as indicated by Body Fat C-I discrepancy) than other participants in the high

body dissatisfaction group who viewed either lean/muscular or skinny male bodies; the Body Fat C-I discrepancy was comparable across the three exposure conditions for participants with medium or low pre-exposure body dissatisfaction.However, upon examining participants' actual (i.e., measured) body fat percentages, it became apparent that the highly dissatisfied participants who viewed average males had a marginally significantly higher mean body fat percentage than their counterparts who viewed lean/muscular or skinny male photos, $F(2,15) = 2.96$, $p = 0.083$ (see Table 7). Notably, when participants' actual (i.e., measured) and estimated (i.e., current SM selection) body fatnesses were compared, there were no perceptual accuracy differences between the groups, $F(2,97) = 0.45$, $p = 0.638$. Thus, the significant moderating effect appears to have been due to confounding of actual participant body fatness.

Table 7
Highly Body Dissatisfied Participants (pre-exposure): Measured Body Fat Percentages by Exposure Condition

Condition	Mean (*SD*)
Lean/Muscular	18.80 $_{a\,b}$ (*7.19*)
Skinny	15.40 $_{b}$ (*7.09*)
Average	24.72 $_{a}$ (*4.91*)

Note. Means that have different superscripts are marginally significantly different from one another ($p < 0.10$).

Mood

Data from the PANAS-X were used to examine possible effects of body comparison on mood. Specifically, the present study examined two positive and two negative mood scales that, based on their item content, seemed most relevant to the research objectives: Joviality, Self-Assurance, Hostility, and Guilt (see Table 8 for item content of each scale).

Table 8
Composition of the Selected PANAS-X Mood Scales

Joviality	Self-Assurance	Hostility	Guilt
Happy	Proud	Angry	Guilt
Joyful	Strong	Hostile	Ashamed
Delighted	Confident	Irritable	Blameworthy
Cheerful	Bold	Scornful	Angry at self
Excited	Daring	Disgusted	Disgusted with self
Enthusiastic	Fearless	Loathing	Dissatisfied with self
Lively			
Energetic			

Analyses of variance revealed no significant main effects of exposure condition on any of the four mood scales (see Table 9). Analyses of covariance, likewise, indicated that none of the predicted moderator effects nor the predicted three-way interaction were significant in moderating the effect of exposure on any of the mood scales (see Table 9).

Table 9
Mood – PANAS-X: Main and Moderating Effects

Effect	df	*F*	*p*	partial $?^2$
Joviality				
Condition	2,125	1.32	0.27	0.021
Condition x BASR	2,120	0.31	0.73	0.005
Condition x PBAC	2,121	0.26	0.77	0.004
Condition x ABS	2,122	0.79	0.46	0.013
Condition x PBAC x PAM	3,119	1.87	0.14	0.045
Self-Assurance				
Condition	2,125	1.01	0.37	0.016
Condition x BASR	2,120	3.01	0.05	0.048
Condition x PBAC	2,121	0.54	0.58	0.009
Condition x ABS	2,122	2.23	0.11	0.035
Condition x PBAC x PAM	3,119	1.09	0.36	0.027
Hostility				
Condition	2,125	0.48	0.62	0.008
Condition x BASR	2,120	0.75	0.48	0.012
Condition x PBAC	2,121	1.19	0.31	0.019
Condition x ABS	2,122	0.09	0.91	0.001
Condition x PBAC x PAM	3,119	0.70	0.56	0.017
Guilt				
Condition	2,125	0.64	0.53	0.010
Condition x BASR	2,120	0.59	0.56	0.010
Condition x PBAC	2,121	0.33	0.72	0.005
Condition x ABS	2,122	0.27	0.76	0.004
Condition x PBAC x PAM	3,119	0.21	0.89	0.005

Note. PAM = SMAQ-PAM.

SUMMARY AND CONCLUSIONS

The three dependent variables were testosterone, body satisfaction, and mood, and the present study examined several corresponding hypotheses. However, only a handful of the hypotheses were supported. Each set of dependent variables are discussed separately below.

Testosterone

None of the hypothesized effects, main or moderating, of body comparison on testosterone were supported by the present data. One possible explanation for the nonsignificant results is that competition outcome simply does not influence testosterone levels in human males. Although there is considerable support for the notion that the outcome of a competition does affect testosterone levels, there are studies that have failed to find this purported effect. Therefore, it is possible that the outcome of competitive encounters does not influence testosterone in males. However, there are other possible explanations for the failure to find an effect of body comparison on testosterone, explanations that are more consistent with the existing testosterone and social comparison literatures.

Looking retrospectively, the lack of effect of body comparison on testosterone could be due to the comparison manipulation being relatively weak. The manipulation was effective in that participants perceived the bodies to be as they were intended. However, although the comparison manipulation was designed to invoke the strongest possible comparison, it was still fairly minimal, and may have not been strong enough to warrant qualification as an actual *competition*. All of the studies reporting an effect of

competition on testosterone involved more immediate, real-life, in-person, explicitly competitive interactions (e.g., judo or tennis matches). Thus, it could be that the comparatively weak competitive task in the present study is the reason that the body exposure had no appreciable effect on testosterone levels.

Studies also suggest that attribution of competition outcome is a relevant factor in the relationship between competition outcome and testosterone. Specifically, if a competitor attributes a competition outcome to personal behavior (as opposed to luck, for instance), then the effect of the outcome on testosterone occurs or is stronger (e.g., Gonzalez-Bono, Salvador, Ricarte, Serrano, & Arnedo, 2000; Gonzalez-Bono et al., 1999; Mazur & Lamb, 1980). The comparison task in the present study involved participants engaging in a *date assignment task* with shirtless male still images viewed on a computer monitor. *Actively* winning a more direct, explicit competition is likely a more personally relevant outcome with a much stronger effect than *passively* winning a comparison contest that is no immediate consequence of one's own behavior. Future studies might strengthen the body comparison manipulation by having participants engage in more immediate and direct (e.g., in-person) body comparisons with the targets of comparison.

Kivlinghan, Granger, and Booth (2005) reported that the experience of the competitor in the competitive event moderates the relationship between competition performance and effect on testosterone. Specifically, these researchers examined data from 46 (23 male) varsity and novice collegiate ergometer rowing (i.e., a stationary rowing machine) athletes. Although these researchers did not examine competition

outcome per se (i.e., win versus loss), they reported that increased testosterone over the course of the competition was associated with superior performance in the varsity rowers, but poorer performance among novice rowers. Notably, varsity and novice rowers only competed within their experience level (i.e., varsity versus varsity, novice versus novice).

As suggested by the results of Kivlinghan et al. (2005), the failure to find significant effects on testosterone could relate to the level of experience of the male participants. *Experience* in the context of the present study (i.e., body comparison) might be defined as experience with exercise/working out (or otherwise working on body appearance). Participants in the present study likely ranged in terms of how much experience they had with regular exercise. Unfortunately, the only *experience* data that were collected in the present study were number of hours *presently* spent exercising per week, which upon examination, did not moderate the relationship between exposure and pre-to-post change in testosterone. Future studies might benefit from assessing *experience* by collecting data on how long participants have consistently/regularly engaged in an exercise routine.

Another possible unaccounted for moderator variable is the baseline testosterone levels of the participants. Newman, Sellers, and Josephs (2005) suggest that individuals with higher baseline testosterone levels have a stronger desire to maintain status than individuals with lower baseline testosterone. Consistent with this assertion, research indicates that individuals with higher baseline testosterone are more affected by status-relevant information than low-testosterone individuals (e.g., Christianson, 1998, as cited

in Newman et al., 2005; Mazur & Booth, 1998). Therefore, it could be that the effect of the exposure on testosterone may have differed depending on participants' baseline testosterone levels. Unfortunately, the saliva samples collected immediately prior to the exposure are not good representatives of baseline testosterone levels due to the reported tendency for testosterone to rise immediately prior to competitive interactions. Therefore, because of a possible anticipatory rise in testosterone, there is no way to examine whether or not baseline testosterone levels might moderate the effect of exposure on testosterone with data from the present study. Future studies would benefit from assessing baseline testosterone levels and examining it as a potential moderating variable.

The lack of effect of the exposure on testosterone could also be due to the participants possibly not deeming the males in the exposure images to be relevant targets of comparison. The social comparison and body image literatures both assert that individuals are less apt to make comparisons to targets to whom the comparer does not perceive himself to be similar enough to make them relevant targets of comparison. Therefore, simply noting in the exposure slideshows that the images were of males from the same university as the participants may not have been adequate detail to make them relevant targets of comparison.

Regarding the hypothesized moderator effects, none of the proposed moderators significantly affected the relationship between the exposure condition and change in testosterone from pre- to post-exposure. The most basic explanation for the nonsignificant moderator effects is that exposure to different types of male bodies had no

effect or such an infinitesimal effect on testosterone that even accounting for the moderator variables was insufficient to increase the strength of the exposure-testosterone relationship. A statistical explanation for the lack of statistically significant moderating effects (i.e., interaction terms) relates to the statistical power needed to detect moderating effects. Cronbach and Snow (1981) reported that more power is needed to obtain statistically significant moderator effects than significant main effects, even with comparable effect sizes. Because the effect sizes for the interaction terms in the present study were small (applying parameters proposed by Cohen, 1988), a larger sample would have been needed to obtain statistical significance. Notably, however, the lack of statistical significance is merely a statistical issue; having had an exceptionally large sample and statistically significant moderating effects would not have changed the true nature of the testosterone effects, which in the present study, were small in magnitude.

Although there were no significant main or moderating effects on testosterone, there was an unpredicted significant decrease in testosterone from pre-exposure to post-exposure, across all three exposure conditions. It is difficult to surmise the true nature of this decrease in testosterone given that testosterone data were only collected at two points in time: immediately before the exposure manipulation and then approximately 20 minutes after the exposure. One explanation for the decrease in testosterone, given that only two data points were collected, is that something during the time between the two testosterone collections caused the decrease in all participants. For instance, thinking about factors related to body image may have decreased participants' testosterone. This possibility, however, has never been examined in the literatures. It could also be that

simply viewing shirtless men affected participants' testosterone. The overwhelming majority of the (male) participants in the present study indicated that they were heterosexual, therefore the decrease in testosterone could have been due to feeling somewhat emasculated by viewing the shirtless bodies of the other (photographed) men. Again, there is no literature to speak to this possible explanation.

Another possible explanation for the decrease in testosterone between the two saliva collection times relates to an anticipatory rise in testosterone. Numerous researchers have noted a rise in testosterone shortly prior to the beginning of a competition, followed by an eventual return to baseline, with the rate of return dependant in part on the course and outcome of the competition (Daitzman & Zuckerman, 1980; Kemper, 1990; Klaiber et al., 1971; Schultheiss & Rohde, 2002; Suay et al., 1999). These researchers have suggested that this anticipatory rise in testosterone is the endocrine system's way of enhancing performance during the competition. Although the present study did not collect data more distally prior to the beginning of the competition (i.e., to get a non-competition baseline), the two data points that were collected appear consistent with the notion of a pre-competition anticipatory rise in testosterone.

Body Satisfaction

To examine the effect of the body exposure condition on body satisfaction, three VAS measures and the two indices of the Somatomorphic Matrix were used as dependent variables.

Visual Analog Scales

Regarding VAS ratings, results indicate that participants who viewed photographs of lean/muscular males were more dissatisfied with their own level of muscularity and overall body attractiveness than participants who viewed photographs of average males; there was no difference in dissatisfaction with muscularity between participants who viewed lean/muscular and skinny photographs. This was an unpredicted effect; it was predicted that there would be a significant difference in body satisfaction between participants viewing lean/muscular and skinny males. However, the significant result seems logical, and it is likely due to the fact that the lean/muscular males represent both coveted bodily appearance characteristics, i.e., low body fatness and high muscularity. The skinny males manifest one of those coveted characteristics, i.e., low body fatness, but very little muscle mass. The average bodies, by comparison, are neither lean nor muscular. Therefore, dissatisfaction was significantly greater consequent exposure to the more coveted bodies of the lean/muscular males than exposure to the average bodies.

Examination of potential moderators resulted in no significant moderating effects for VAS-Muscularity or VAS-Overall Body Attractiveness. It initially appeared that pre-exposure body satisfaction (ABS) moderated the effect of exposure condition on satisfaction with body fatness; however, the interaction was due to actual body size confounding the analysis. There was a significant three-way interaction for VAS-Body Fatness. Specifically, the PBAC and SMAQ-PAM interacted to moderate the effect that exposure to the different male photographs had on body fatness satisfaction ratings.

Examination of plotted body fatness data shows very different effects of perceived body appearance control on the relationship between exposure condition and body fatness satisfaction depending on how positively the participant perceived the attribute of muscularity. However, because of issues with sample size, the plotted data were only interpretable for participants who held medium regard for muscularity. Further examination revealed that there were very few participants who held muscularity in high or low regard who scored at the extremes of perceived body appearance control (i.e., either high or low PBAC). Specifically, there were five groups/cells that contained no participants. Therefore, because functions for participants endorsing high or low regard for muscularity (when there were data to plot) were based on very small sample sizes, the functions are likely unstable and uninterpretable. Examination of plotted data from participants endorsing medium regard for muscularity does reveal a main effect of perceived body appearance control, with body dissatisfaction increasing as perceived control decreases.

Somatomorphic Matrix

To be used as indicators of body dissatisfaction, two C-I discrepancy scores were calculated for the Somatomorphic Matrix; one for body fatness and another for muscularity. There were no main effects of exposure condition on either discrepancy score. These results are inconsistent with the findings of Leit, Gray, and Pope (2002), who reported greater muscularity dissatisfaction among males who viewed ideal bodies than those viewing control images. However, the exposure conditions used in the present study differed from those used by Leit et al. Leit et al. compared viewing ideal images to

viewing a combination of images of inanimate objects and non-body-focused images of males. It is likely that viewing the control images used by Leit et al. (i.e., inanimate and non-body-focused images) had less effect on body image than did viewing the control images in the present study (i.e., average and skinny shirtless males), thus resulting in a greater ideal versus control difference in body dissatisfaction in Leit et al. Regarding proposed moderating effects in the present study, results initially indicated a significant moderating effect of pre-exposure body satisfaction on the current-ideal body fat discrepancy. However, further analyses revealed the significant interaction was due to one group actually having a higher average body fat percentage (and thus larger current body) than the other groups, and not to an effect of viewing photographs of different male body types.

Although there were no significant moderating effects, this should not be construed to mean the proposed moderator constructs are irrelevant to body satisfaction. It is quite possible that the proposed moderator variables do affect body satisfaction, but that these effects are the same regardless of what types of bodies are viewed. In fact, data suggest that as body appearance control increases, so does body satisfaction, regardless of the body type viewed.

Mood

Exposure to different male body types did not differentially affect participant mood in the present study. Similarly, none of the proposed moderators significantly influenced the relationship between exposure and mood. There is research that suggests that exposure to images of ideal female bodies can increase negative affect in girls and

women, especially in those with vulnerabilities (e.g., pre-comparison body dissatisfaction, internalization of societal ideal, etc.) (Durkin & Paxton, 2002; Posavac et al., 1998; Stice et al., 2001). However, there is very little published experimental data on the effect of exposure to the ideal male body on mood in males, and results appear to be mixed. Agliata and Tantleff-Dunn (2004) reported higher depression ratings in participants who viewed a 30-minute television episode with commercials depicting the ideal male body than in participants who viewed non-appearance commercials. Conversely, Humphreys and Paxton (2004) examined body image in adolescent boys and reported no effect of exposure to idealized male images on level of depression.

There are several possible explanations for the present lack of effect of exposure and presumed comparison to male bodies on mood. As was noted when discussing the nonsignificant effects on testosterone levels, the experimental manipulation may have not been powerful enough to have influenced participants' mood. Agliata and Tantleff-Dunn (2004) used 16 videotaped commercials, thus their manipulation had 16 different ideal male bodies (versus 2 in the present study), resulting in longer exposure and to more bodies, and their exposure contained live action (versus still photographs). These differences in the exposure manipulations may explain the lack of significant effects on mood in the present study. Another possible explanation pertains to the length of the mood measure. The PANAS-X, with its required rating of 60 mood-related adjectives, may have led to participant mental exhaustion and diminished focus on considering and rating their moods. Future research would likely benefit from using a more concise and focused measure of relevant mood states.

Another possible explanation for the lack of group differences in mood following exposure to different male body types might be that change in testosterone mediates the effect on mood. Researchers, such as Dabbs et al. (2002) and Wang et al. (1996), have reported that experimentally lowering or raising testosterone decreased or increased positive affect, respectively. Thus, manipulation of testosterone levels appears to have a causal effect on mood. Testosterone has also been shown to have rewarding properties when administered to rats (Alexander et al., 1994; Packard et al., 1998). Regarding the competition-testosterone literature, Booth et al. (1989) reported that increased testosterone tended to only occur after a victory if that victory resulted in improved mood. The authors proposed that mood might moderate the relationship between competition outcome and testosterone. Mazur and Lamb (1980), based on findings from a three-part study; also proposed a moderating role of mood. However, instead of mood being a moderator, perhaps it is the effect on testosterone that precedes and actually mediates the effect of competition on mood. Therefore, given that there was no differential effect of the exposure manipulation on testosterone in the present study, post-exposure mood would not have been different for participants who saw photographs of lean/muscular, average, or skinny males.

Limitations

There are some limitations to note in the present study. One possible limitation relates to the nature of the experimental manipulation. The studies reporting a significant effect of competition on testosterone involved more immediate, real-life, in-person competitive interactions than what was utilized in the present study. Therefore, looking

retrospectively, the exposure manipulation may not have invoked a powerful enough self-target comparison in the participants to have affected testosterone levels. Future research might consider ways to strengthen the comparison task by utilizing a more immediate, interactive (i.e., person-to-person), and ecologically valid comparison task. For instance, envision a task where two males, one participant and one confederate, work out with weights separately but in close proximity to one another. This might serve as a more immediate and personally meaningful, and thus more powerful, comparison task. The body type of the confederate would be the manipulated variable, with salivary testosterone measured at baseline, and immediately before and after the weightlifting task.

Another limitation relates to the reported low reliability of responses on the SM, especially the C-I discrepancies (Cafri, Roehrig, & Thompson, 2004). However, based on Cafri and Thompson's (2004) proposed criteria for judging the effectiveness of male body image assessment measures, the SM appears to be one of the better designed measures for measuring male body image. Therefore, it is important that researchers continue to examine the reliability of responses from this measure; reliability studies are currently being conducted.

Summary

In the present study, comparing one's body to different male body types did not differentially affect testosterone levels or mood in college-age men. The body types of the males to which the participants were exposed did, however, differentially affect their body satisfaction. The two body characteristics that are the biggest contributors to body

appearance are muscularity and body fatness. Data show that American males of all ages tend to covet greater rather than lesser muscularity and lesser rather than greater adiposity. The present study indicates that the effect of body comparisons on body satisfaction depends on characteristics of the body to which the observer is comparing himself. The more coveted body characteristics manifested in the target of comparison, the greater the blow on body satisfaction experienced by the individual doing the comparing. Regarding the proposed moderator variables, it does not appear that the main effect of exposure body type was qualified by perceived body appearance control, body appearance self-relevance, or preexisting body satisfaction. Ultimately, the present study contributes to the extant literature by indicating that young men are affected by viewing the bodies of their peers. This finding is generally consistent with the small handful of existing studies that have examined the effect on males of exposure and presumed comparison to images of the ideal male physique.

It is becoming increasingly evident that body image is a relevant construct for men, just as it is for women. Unfortunately, male body image research lags considerably behind that with females. Therefore, it is important that research presses on to elucidate the processes involved in how males think and feel about their bodies. The present study took a unique and interesting look at male body image, although, looking retrospectively, the experimental manipulation might not have been powerful enough to afford firm conclusions about some of the research questions. This is an exciting time for male body image researchers, given the abundance of new and interesting paths to be forged through the horizon.

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APPENDIX A

PBAC

<u>Instructions</u>: Please rate the degree to which you agree or disagree with the statements below. Indicate your agreement/disagreement by circling the corresponding number below each item.

1. I have the ability to control the amount of fat on my body.

1	2	3	4	5	6	7
Completely Disagree			Neither Disagree nor Agree			Completely Agree

2. I have the ability to control the amount of muscle mass on my body.

1	2	3	4	5	6	7
Completely Disagree			Neither Disagree nor Agree			Completely Agree

3. I could change the appearance of my body if I chose to do so.

1	2	3	4	5	6	7
Completely Disagree			Neither Disagree nor Agree			Completely Agree

4. I can maintain a body fat percentage with which I would be satisfied.

1	2	3	4	5	6	7
Completely Disagree			Neither Disagree nor Agree			Completely Agree

5. I can maintain a level of muscularity with which I would be satisfied.

1	2	3	4	5	6	7
Completely Disagree			Neither Disagree nor Agree			Completely Agree

6. Regardless of how hard I try, I can’t seem to lose body fat.

1	2	3	4	5	6	7
Completely Disagree			Neither Disagree nor Agree			Completely Agree

7. Regardless of how hard I try, I can’t seem to gain muscle mass.

1	2	3	4	5	6	7
Completely Disagree			Neither Disagree nor Agree			Completely Agree

8. When I have tried, I have not been able to change the appearance of my body.

1	2	3	4	5	6	7
Completely Disagree			Neither Disagree nor Agree			Completely Agree

9. I can control the appearance of my body.

1	2	3	4	5	6	7
Completely Disagree			Neither Disagree nor Agree			Completely Agree

APPENDIX B

BASR

<u>Instructions</u>: Please rate the degree to which you agree or disagree with the statements below. Indicate your agreement/disagreement by circling the corresponding number below each item.

1. The appearance of my body influences the way I think and feel about myself.

1	2	3	4	5	6	7
Completely Disagree			Neither Disagree nor Agree			Completely Agree

2. When I feel my body is attractive, I feel better about myself in general.

1	2	3	4	5	6	7
Completely Disagree			Neither Disagree nor Agree			Completely Agree

3. When I feel my body is attractive, I am in a better mood.

1	2	3	4	5	6	7
Completely Disagree			Neither Disagree nor Agree			Completely Agree

4. I feel bad about myself when I feel like my body isn't as attractive as I want it to be.

1	2	3	4	5	6	7
Completely Disagree			Neither Disagree nor Agree			Completely Agree

5. I am more optimistic about life in general when I feel my body looks good.

1	2	3	4	5	6	7
Completely Disagree			Neither Disagree nor Agree			Completely Agree

6. The way my body looks affects the way I think and feel about myself in other areas of my life.

1	2	3	4	5	6	7
Completely Disagree			Neither Disagree nor Agree			Completely Agree

7. The appearance of my body affects my self-confidence.

1	2	3	4	5	6	7
Completely Disagree			Neither Disagree nor Agree			Completely Agree

8. The appearance of my body affects my social interactions.

1	2	3	4	5	6	7
Completely Disagree			Neither Disagree nor Agree			Completely Agree

9. The appearance of my body is an important part of who I am.

1	2	3	4	5	6	7
Completely Disagree			Neither Disagree nor Agree			Completely Agree

10. The appearance of my body is responsible for much of what has happened in my life.

1	2	3	4	5	6	7
Completely Disagree			Neither Disagree nor Agree			Completely Agree

APPENDIX C

SMAQ

(Edwards & Launder, 1999)

Please place a cross (X) under the column that applies best to each of the following numbered statements. All of the results will be *strictly* confidential. The options are coded as follows:

1 = definitely
2 = strongly agree
3 = agree
4 = neutral
5 = disagree
6 = strongly disagree
7 = definitely not

1	2	3	4	5	6	7	
( )	( )	( )	( )	( )	( )	( )	1. I feel that I am less attractive to prospective partners when I have small muscles than when I have larger muscles
( )	( )	( )	( )	( )	( )	( )	2. I would like to be bigger in the future
( )	( )	( )	( )	( )	( )	( )	3. Men with small muscles are less masculine than men with larger muscles
( )	( )	( )	( )	( )	( )	( )	4. I aim to develop further my physique
( )	( )	( )	( )	( )	( )	( )	5. I would like to be more muscular in the future
( )	( )	( )	( )	( )	( )	( )	6. I feel bad about my body when I do not feel very big or muscular
( )	( )	( )	( )	( )	( )	( )	7. I would like to spend more time building up my muscles
( )	( )	( )	( )	( )	( )	( )	8. I think that large muscles are a sign of masculinity
( )	( )	( )	( )	( )	( )	( )	9. I often engage in bodybuilding
( )	( )	( )	( )	( )	( )	( )	10. I feel more masculine when I am more muscular
( )	( )	( )	( )	( )	( )	( )	11. I intend to become more muscular in the future
( )	( )	( )	( )	( )	( )	( )	12. Being larger, stronger-looking, and more muscular makes men more attractive to prospective partners
( )	( )	( )	( )	( )	( )	( )	13. I want to be more muscular than I am now
( )	( )	( )	( )	( )	( )	( )	14. I often engage in activities that build up my muscles
( )	( )	( )	( )	( )	( )	( )	15. I feel less of a man when I have small muscles than when I have large muscles
( )	( )	( )	( )	( )	( )	( )	16. It is important to me that I should be more rather than less muscular
( )	( )	( )	( )	( )	( )	( )	17. Being muscular gives me confidence
( )	( )	( )	( )	( )	( )	( )	18. I feel that when I have small muscles I do not look as good as when I have large muscles
( )	( )	( )	( )	( )	( )	( )	19. I would prefer to be more rather than less muscular
( )	( )	( )	( )	( )	( )	( )	20. I feel more of a mature man when I have large muscles

APPENDIX D

Affective Body Satisfaction

***Instructions*: On this page are listed a number of body areas or aspects. Please indicate how satisfied you are with each of the following areas or aspects of your body**

1 = Very Dissatisfied
2 = Mostly Dissatisfied
3 = Somewhat Dissatisfied
4 = Neutral/Indifferent
5 = Somewhat Satisfied
6 = Mostly Satisfied
7 = Very Satisfied

_____ Shoulders

_____ Biceps (front of upper arm)

_____ Overall Body Build

_____ Chest/Breasts

_____ Back

_____ Triceps (back of upper arm)

_____ Lower Legs (calves)

_____ Muscle Tone

_____ Stomach/Abdominals

_____ Upper Legs (quadriceps and hamstrings)

_____ Overall Body Fatness (amount of fat on body)

_____ Weight

_____ Overall Muscle Mass (amount of muscle on body)

APPENDIX E

Male Exposure Photographs

Ideal

Average

Skinny

APPENDIX F

Body Appearance Ranking Sheet

<u>Instructions</u>: Please rate yourself with respect to the images you have just seen on the dimensions listed below. Indicate your rankings by placing the number that corresponds to each image next to where you think they rank (you are #3).

Muscularity

- Most muscular body _____
- Second most muscular body _____
- Third most muscular body _____
- How do you feel the muscularity of your body compares to that of the males in the slides you just viewed?

1 2 3 4 5 6 7
"Much more muscular" "About the same" "Much less muscular"

Body Fatness

- Leanest body _____
- Second leanest body _____
- Third leanest body _____
- How do you feel the fatness of your body compares to that of the males in the slides you just viewed?

1 2 3 4 5 6 7
"Much less bodyfat" "About the same" "Much more bodyfat"

Overall Body Attractiveness

- Most attractive body _____
- Second most attractive body _____
- Third most attractive body _____
- How do you feel the attractiveness of your body compares to that of the males in the slides you just viewed?

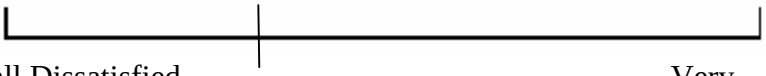
1 2 3 4 5 6 7
"Much more attractive" "About the same" "Much less attractive"

APPENDIX G

VAS

Instructions: Please place a vertical line on the horizontal lines below to indicate how dissatisfied you are with each of the body appearance aspects listed below (see sample below).

SAMPLE:



Not at all Dissatisfied Very Dissatisfied

Muscularity

Not at all Dissatisfied Very Dissatisfied

Body Fatness

Not at all Dissatisfied Very Dissatisfied

Overall Body Appearance

Not at all Dissatisfied Very Dissatisfied

APPENDIX H

PANAS-X

(Watson & Clark, 1994)

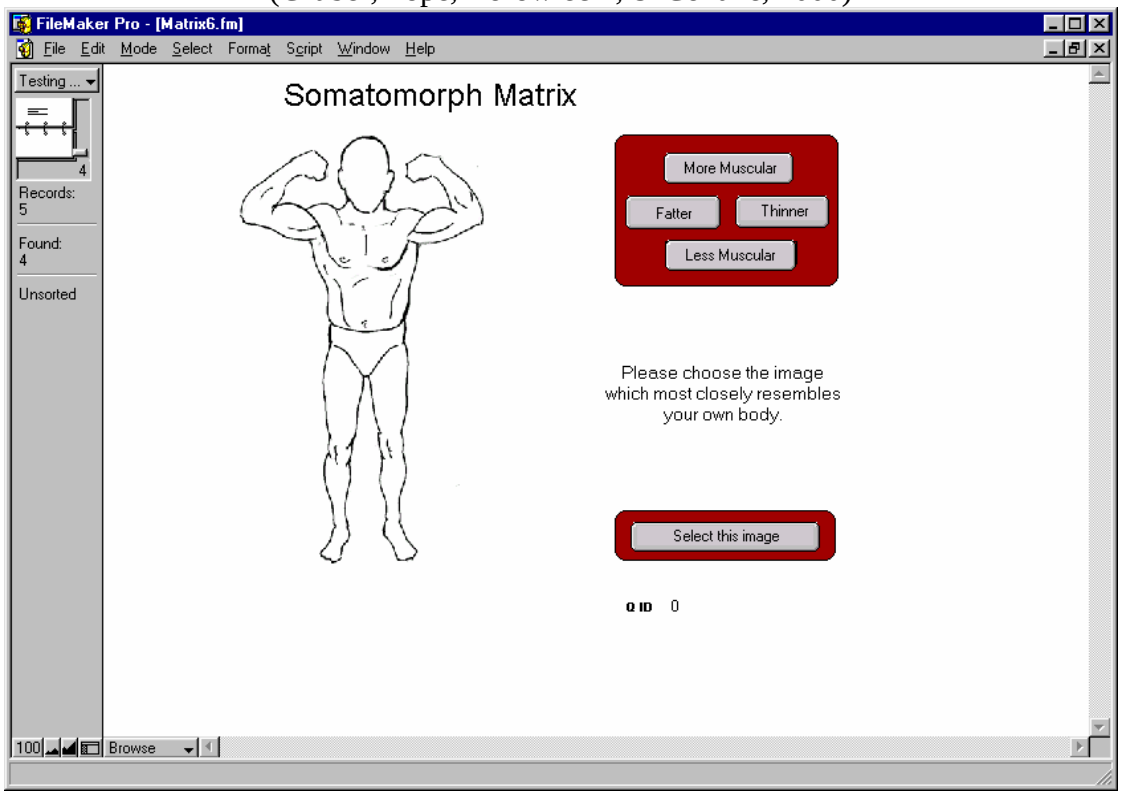
Instructions: This scale consists of a number of words and phrases that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you <u>currently</u> feel each of the following feelings. Use the following scale to record your answers:

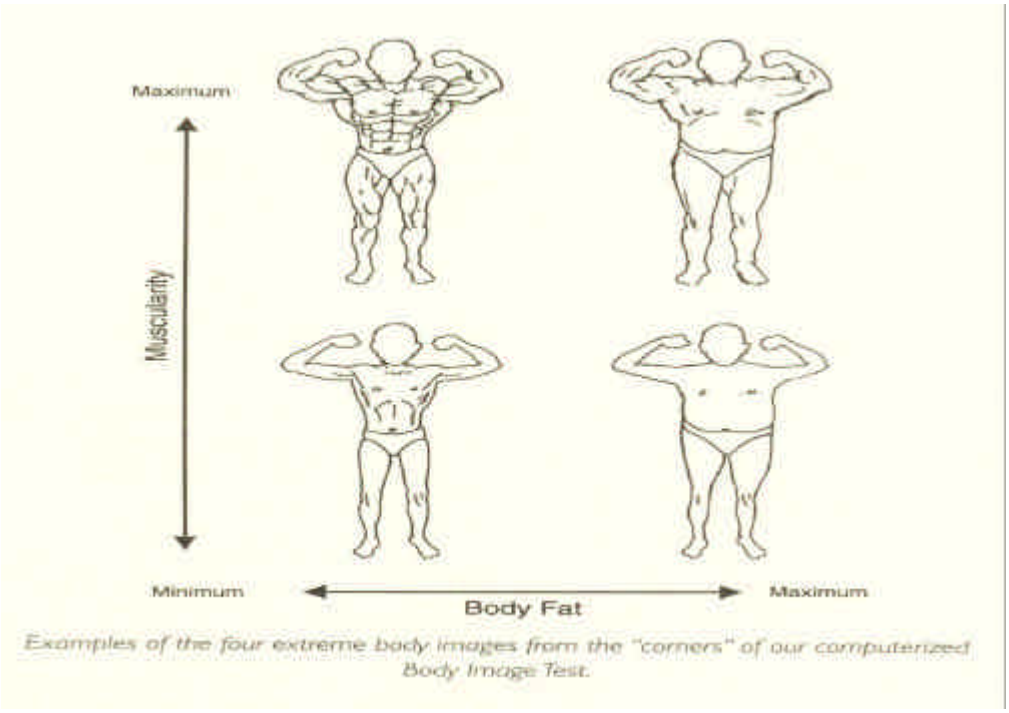
1	2	3	4	5
Very slightly or not at all	A little	Moderately	Quite a bit	Extremely

_____ cheerful	_____ shaky	_____ ashamed
_____ disgusted	_____ happy	_____ at ease
_____ attentive	_____ timid	_____ scared
_____ bashful	_____ alone	_____ drowsy
_____ sluggish	_____ alert	_____ angry at self
_____ daring	_____ upset	_____ enthusiastic
_____ surprised	_____ angry	_____ downhearted
_____ strong	_____ bold	_____ sheepish
_____ scornful	_____ blue	_____ distressed
_____ relaxed	_____ shy	_____ blameworthy
_____ irritable	_____ active	_____ determined
_____ delighted	_____ guilty	_____ frightened
_____ inspired	_____ joyful	_____ astonished
_____ fearless	_____ nervous	_____ interested
_____ disgusted with self	_____ lonely	_____ loathing
	_____ sleepy	_____ confident
_____ sad	_____ excited	_____ energetic
_____ calm	_____ hostile	_____ concentrating
_____ afraid	_____ proud	_____ dissatisfied with self
_____ tired	_____ jittery	
_____ amazed	_____ lively	

APPENDIX I

Somatomorphic Matrix
(Gruber, Pope, Borowiecki, & Cohane, 2000)





Examples of the four extreme body images from the "corners" of our computerized Body Image Test.

VITA

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