THE INFLUENCE OF SELF-ESTEEM AND BODY DISSATISFACTION ON MUSCLE DYSMORPHIA AND EXERCISE DEPENDENCE

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Using the psycho-behavioral model as a conceptual framework, the purpose of this study was to explore the relationships between self-esteem, body dissatisfaction, muscle dysmorphia, and exercise dependence among college men. Participants (*n* = 110) completed surveys including a demographic questionnaire, the Rosenberg Self-Esteem Scale, Body Part Satisfaction Scale, Drive for Muscularity Scale, and Exercise Dependence Scale-21. No significant relationship was found between self-esteem and muscle dysmorphia. A significant correlation was found between body dissatisfaction and muscle dysmorphia, as well as between muscle dysmorphia and exercise dependence. These results partially support the psycho-behavioral model of muscle dysmorphia.
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CHAPTER 1
INTRODUCTION

In Western society, there has been an increase in the number of people who are overweight and obese (Centers for Disease Control and Prevention, CDC, 2010). This increase can be attributed to a variety of factors including decreased daily physical activity and increased caloric consumption (National Heart Lung and Blood Institute, NHLBI, 2010). For example, modes of transportation have changed over time; today, it is common for people to drive rather than walk or ride a bike (NHLBI). The choice to drive rather than walk or ride is likely related to the environment (NHLBI) and the social norms of Western society (NHLBI, 2010). According to national data on physical activity and sedentary behaviors, 48.8% of adult Americans achieve the recommended levels of physical activity (moderate exercise 5x a week for at least 30 minutes or vigorous activities 3x a week for at least 20 minutes), 37.7% have insufficient levels of activity (more than 10 total minutes per week of moderate or vigorous activity), and 13.5% report being inactive (less than 10 minutes of moderate or vigorous activity) (CDC, 2007). More recent estimates indicate that 25% of adults engage in no leisure time activity (CDC, 2008). Moreover, although leisure time has increased, perceived lack of time is a common reason reported for not participating in physical activity (NHLBI). For the average American, the World Health Organization (WHO; 2010) suggests that to achieve the most benefits, people should participate in either 150 minutes of moderate activity or 75 minutes of intense activity per week.

The WHO defines obesity as having abnormal or excessive body fat levels that may impair one’s health (2006). Excess body fat and the strain it puts on a person’s
body can lead to a variety of health related problems, including increased risk for cardiovascular disease, respiratory problems, Type 2 diabetes, and even certain types of cancers. Despite the reported health risks, prevalence of obesity in the United States has continued to rise. According to recent data from the Center for Disease Control (CDC), 26.7% of people in the United States are classified as obese. The WHO reports an even more disturbing trend, predicting that by the year 2015, over 2.3 billion adults worldwide will be considered overweight and another 700 million will be obese.

However, despite the fact that more Americans are overweight and living sedentary lifestyles, society continues to view the ideal body type as lean, toned, and athletic. In fact, societal expectations regarding the “ideal” body and physique seem to stand in stark contrast to the social reality that many adults in the United States are overweight or obese. In an effort to achieve the socially idealized physique, some people participate in physical activity; taken to the extreme, excessive exercise, rather than offering health benefits, may actually be detrimental to physical and mental health (Baghurst & Kissinger, 2009). These detriments to physical and mental health include muscular and skeletal injuries, as well as increased risk for depression (Eichner, 1995). Furthermore, these efforts may lead to the onset of a disorder labeled muscle dysmorphia, which describes an obsession with obtaining a muscular physique (Olivardia, 2001).

Socially Idealized Bodies

To date, research examining social body ideals has focused primarily on women’s bodies. In Western society, the ideal female physique is thin, yet curvaceous, lean and toned, but not too muscular – a physique which rarely occurs naturally (e.g.,
Glauert, Rhodes, Byrne, Fink, & Grammar, 2009; Grogan, 2008; Koyuncu, Tok, Canpolat, & Catikkas, 2010). Mass media has shaped societal expectations about the ideal body, especially among women (Dittmar, Halliwell, & Stirling, 2009; Harper & Tiggeermann, 2008; Koyuncu et al., 2010). Pictures of thin supermodels and celebrities endorsing products are constantly displayed, whether it is in magazines, billboards, or televisions shows and commercials. These images of the thin supermodel promoted by the media are one of the factors that may contribute to eating disorders among women (Kim & Lennon, 2007; Shorter, Brown, Quinton, & Hunton, 2008).

Societal and media expectations about the ideal female body type are firmly entrenched into the psyche of many women in Western society (Koyuncu et al, 2010; Lowery et al., 2005). In the past two decades, there has been an increasing trend in TV shows, magazines, and children's toys which influence the social understandings of what body type is valued among females (Muller, Dennis, Schneider & Joyner, 2004; Seifert, 2005). TV shows and magazines portray the supermodel image as beautiful to women, while popular toys like Barbie suggest to young girls that a curvy and thin physique is what a woman should look like when they grow up. Although most research has focused on women and the social pressures to achieve the portrayed ideal body type, men also experience social pressures to achieve an ideal physique. Muller et al. (2004) explain that men are exposed to unrealistic ideals regarding their physique and may experience distress and disappointment if their body does not match up with social ideals portrayed by the media.

The idealized male physique is muscular, toned, and athletic. This ideal can be seen in television shows, magazines, comic books, and action figures. Popular
superheroes, such as Batman and Superman, have broad shoulders, chiseled abs, and bulging biceps which are constantly on display due to the skin tight uniforms these characters wear. The prominence of action figures’ muscles is a recent addition to their appearance (Pope, Olivardia, Gruber, & Borowiecki, 1999). Research conducted by Pope et al. (1999) showed that over the course of 30 years, the musculature of popular action figures has steadily increased. The researchers took measurements of various action figures’ chest, biceps, and waist and then scaled those measurements to reflect an average male’s height. They found that when scaled up to represent an actual person, the action figures physiques were far larger than even the most muscular bodybuilder. One example of this includes a scaled up version of the comic book character Wolverine having a 33 inch waist, 62 inch chest, and 32 inch biceps. The same can be said for the evolution of the G.I. Joe physique, with sharp increases in muscle size from 1964 figures to the 1998 versions. These figures emphasize society’s evolving view of the ideal male physique, despite the fact that the muscle definition and size represented is unlikely among the average male.

Expectations of the ideal male physique can also be seen in the media, not just on the pages of comic books and in the appearance of action figures. In the past 20 years, there have been an increasing number of magazines aimed at men, such as Muscle and Fitness and Men’s Health, and advertisements that feature men wearing revealing clothing (e.g., Grieve, 2007; Ricciardelli, Clow, & White, 2010). These magazines typically feature men with well-defined muscles on full display to the viewer, suggesting that this tall mesomorphic body type, one with high muscle mass, low body fat, and broad shoulders that taper to a small waist, is the standard appearance males
ought to achieve (Grieve, 2007; Ricciardelli et al., 2010). Men in Western society are socialized to idealize a strong, powerful male body – a body that is muscular and lean. Recent studies have shown that men are typically valued by both their musculature and ability to depict dominance, and that there is a link between musculature and the conventional ideas towards what is masculine, i.e.; strength, virility, and power (Baghurst & Kissinger, 2009; Ricciardelli et al., 2010).

Due to these heightened expectations and the need to feel masculine, many men may experience a variety of psychological and behavioral issues (Bergeron & Tylka, 2007; Grammas & Schwartz, 2009), including lowered self-esteem and dissatisfaction with their body. These psycho-behavioral issues may, in turn, increase muscle dysmorphic attitudes and a dependence on exercise. Because of the serious adverse health risks associated with muscle dysmorphic attitudes and exercise dependence, it is important to understand these factors and how predisposing characteristics (e.g., self-esteem and body dissatisfaction) may contribute. In this study, men’s self-esteem and body dissatisfaction was examined in relationship to concerns about perceived muscularity (e.g., muscle dysmorphia) and excessive exercise attitudes and behaviors (e.g., exercise dependence).
CHAPTER 2
REVIEW OF LITERATURE

Although physical activity is an important part of maintaining overall health, it should be noted that too much physical activity can be harmful. Despite this fact, some individuals go beyond the recommended levels of physical activity, which may be associated with pressures felt to meet society’s definition of the ideal body type. The socially idealized body seems to contradict the social reality that many people in Western society are overweight or obese (CDC, 2010). Despite the prevalence of overweight and obesity, there is still a strong value placed on a certain body type in our society. For women, the ideal body type is one that is thin, curvaceous, lean and toned, but not too muscular (Koyuncu et al., 2010). Because of these expectations, much research has been conducted to understand the effects of trying to obtain this body type on women. However in recent years, the focus has begun to shift toward men, who also experience pressures to obtain a certain physique. For men, the ideal body type is the mesomorphic shape – high muscle mass, low body fat, and a torso with broad shoulders that tapers to a narrow waist (Grieve, 2007). As more men report feeling pressure to achieve the ideal body, dissatisfaction with their bodies and distorted body images, some turn to exercise in an attempt to fit that mold the media and societal expectations have created (Lantz, Rhea, & Mayhew, 2001).

Psychological and Behavioral Correlates of Socially Idealized Male Body

A number of psychological and behavioral correlates seem to be associated with the socially idealized body. Psychologically, low self-esteem and body dissatisfaction are fairly prevalent in Western society where unrealistic and unattainable body ideals
are pervasive (Lantz et al., 2001). Self-esteem refers to individuals’ positive or negative thoughts about themselves (Ferris, Lian, Brown, Pang, & Keeping, 2010), and body dissatisfaction is characterized by feelings of unhappiness when an internalized body ideal is not met (McFarland & Kaminski, 2009). In comparison to women, men generally report higher levels of self-esteem and body satisfaction (Josephs, Markus, & Tafarodi, 1992; Kling, Hyde, Showers, & Buswell, 1999). However, just as some women who are exposed to the highly unrealistic social ideals of the ultra-thin body experience dissatisfaction with their own bodies (Grammas & Schwartz, 2009), some men also experience feelings of dissatisfaction when they perceive that their own bodies do not measure up to social ideals (Adams, Turner, & Bucks, 2005; McFarland & Kaminski, 2009).

Research suggests that body dissatisfaction among males is increasing (Forrest & Stuhldreher, 2007; Frederick et al., 2007). Lantz and colleagues (2001) stated that increased body dissatisfaction may occur in males because of the perceived social rewards (i.e. desirability, greater competence) of having a muscular physique, as well as the notion that this ideal shape is unattainable by most men and therefore highly valued (Neighbors & Sobal, 2007). Forrest and Stuhldreher (2007) examined body image dissatisfaction in a university setting. Over a period of five years, reported prevalence of body dissatisfaction among males was 29% and 35% during the first and second survey phases, respectively. Moreover, higher prevalence rates of body dissatisfaction were found by Frederick and colleagues (2007), with 51-71% of the men surveyed across four separate questionnaires reporting discontent with their current body fat levels. Furthermore, Frederick and colleagues (2007) found that 90% of the
male undergraduates surveyed reported wanting greater musculature. Previous research has supported the relationship between men’s body image and self-esteem (Bergeron & Tylka, 2007; Grammas & Schwartz, 2009; Olivardia, Pope, Borowiecki, & Cohane, 2004); high levels of body dissatisfaction are generally related to lower levels of self-esteem and vice-versa.

Issues with self-esteem and body dissatisfaction may also lead to a more serious problem, such as muscle dysmorphia (MD; Pope, Gruber, Choi, Olivardia, & Phillips, 1997). Muscle dysmorphia is characterized by excessive concerns about one’s body shape and size, as well as an “obsession with muscle and bodybuilding” (Rhea et al., 2004, p. 428). Research has classified muscle dysmorphia as a subtype of Body Dysmorphic Disorder (BDD), which is defined as “an intense preoccupation with an imagined physical defect or an overemphasis regarding a slight defect involving specific body parts such as hair, nose, or irregular skin pigment” (Rhea, Lantz, & Cornelius, 2004, p. 428). BDD is characterized by an obsession with perceived bodily defects, typically focusing on certain body parts like the eyes, nose, ears, and skin color. Individuals with muscle dysmorphia are typically concerned with their perceived lack of musculature, despite typically having above average musculature (Grieve, 2007). Individuals with muscle dysmorphia have a strong drive for musculature and “dissatisfaction with current level of musculature and preoccupation with performing behaviors geared toward increasing musculature” (Bergeron & Tylka, 2007, p. 288).

Instead of seeing themselves as being in good physical condition, people with muscle dysmorphia see themselves as “90 pound weaklings” and go to great lengths to further improve what may be an already impressive physique. Individuals with muscle
dysmorphia commonly ignore responsibilities at work and social outings so they can keep up with their strict diet and exercise routine (Grieve, 2007). Even more disturbing, these individuals may turn to performance enhancing drugs despite having knowledge of the harm these drugs can cause their bodies (Grieve, 2007).

Determining the actual prevalence rates for muscle dysmorphia has been difficult for researchers (Olivardia, 2001; Pope et al., 1997). The difficulty in determining prevalence may be due to the fact that men suffering from muscle dysmorphia may be reluctant to come forward because of feeling embarrassed to disclose information about the severity of their issues (Olivardia, Pope, & Hudson, 2000; Pope et al., 1997). Pope et al. (1997) found that men did not participate because they felt that they were not muscular enough to be involved. Thus, actual data concerning the prevalence of muscle dysmorphia is typically estimated. Olivardia (2001) suggested that of the 5 million gym memberships held by men, perhaps as little as 5%, or 250,000, truly suffer from muscle dysmorphia. Though it seems like a relatively small number compared to other disorders, it is important to study what can be a very serious problem among male weight lifters.

Behaviorally, men may strive to obtain idealized physiques through vigorous exercise regimens because of the perceived value our culture places on the ideal body even though achieving the socially idealized physique is often unrealistic (Lantz et al., 2001). Because of social pressures, men may participate in exercise programs specifically designed to increase muscle mass and definition and decrease body fat. However, some men may find themselves engaging in intense bouts of exercise in a seemingly futile effort to gain a specific body type (Lantz et al., 2001). It is here that a
vicious cycle can occur, whereby men, in an effort to obtain a muscular physique, increase exercise when previous attempts have not produced expected results. These compulsive bouts of extreme exercise to achieve a muscular physique may be part of a dependence on exercise.

There are seven specific characteristics of exercise dependence (Hausenblas & Downs, 2002): (a) tolerance - need for more exercise to achieve goals or progress slows when using the same amounts of exercise; (b) withdrawal - exercise is used to relieve withdrawal symptoms commonly associated with dependence (anxiety, fatigue, etc.); (c) intention effect - engaging in more exercise or exercising longer than intended; (d) lack of control - inability to reduce physical activity levels; (e) time - focus on spending or finding time to engage in exercise; (f) reductions in other activities - social life and job expectations are ignored due to exercise habits, and (g) continuance - continuing to work out despite having an injury (physical or mental) that was caused by the same exercise.

When experiencing a dependence on exercise, individuals feel that they need to spend hours per day devoted to physical activity at the expense of their physical and mental health (Allegre, Souville, Therme, & Griffiths, 2006; Hale, Roth, DeLong, & Briggs, 2010). The effects on physical health can include muscle strains and tears, tendon damage, joint pain, and fatigue (Olivardia, 2001). Although past research has lauded the effects vigorous exercise can have on improving mental health, specifically self-esteem (Kuennen & Waldron, 2007), there have been an increasing number of research articles that suggest that vigorous amounts of exercise may actually lead to lower levels of self-esteem among individuals when passion for exercise turns into an
obsession (Ebbeck, Watkins, Concepcion, Cardinal, & Hammermeister, 2009; Grieve & Helmick, 2008; Hall, Hill, Appleton, & Kozub, 2009). This fixation occurs because those suffering from low self-esteem may be troubled with some aspect of their appearance and seek ways to improve their looks (Kuennen & Waldron, 2007).

According to Hale et al. (2010), prevalence rates of exercise dependence reported vary greatly, with some studies suggesting prevalence rates as high as 46% to as low as 3% among undergraduates. Some of this variation results from researchers using different operational definitions of exercise dependence. Due to this variation, it is difficult to develop possible interventions designed to study exercise dependence among the population (Adams, 2009; Hale et al., 2010; Hausenblas & Downs, 2002).

Although some previous research has examined psychosocial factors associated with muscle dysmorphia and exercise dependence, much of the research has been descriptive and thus somewhat limited in terms of advancing knowledge regarding possible underlying mechanisms. The psycho-behavioral model of muscle dysmorphia, developed by Lantz and colleagues (2001) is a framework that provides some conceptual clarity with regard to the possible relationships between self-esteem, body dissatisfaction, muscle dysmorphia, and exercise dependence and will be used as the guiding framework for this study.

Psycho-Behavioral Model of Muscle Dysmorphia

The psycho-behavioral model of muscle dysmorphia was first developed in 2001 for the purpose of examining factors that influence muscle dysmorphia (Lantz, Rhea, & Mayhew, 2001). This model proposes various connections between precipitating factors (e.g., self-esteem, body dissatisfaction), muscle dysmorphia, psycho-behavioral
characteristics of muscle dysmorphia (e.g., dietary constraints, pharmacological abuse, exercise dependence), and possible negative psychological consequences (e.g., alienation; see Figure A.1).

The precipitating factors within the psycho-behavioral model of muscle dysmorphia include body dissatisfaction and low self-esteem. Body dissatisfaction generally refers to a perceived failure of one's body to meet some internalized ideal (McCabe & Ricciardelli, 2004; Silberstein, Striegel-Moore, Timko, & Rodin, 1988). Self-esteem refers to the positive or negative feelings individuals may have about themselves (Ferris et al., 2010). Body dissatisfaction and low levels of self-esteem, according to both the model and research (e.g., Grammas & Schwartz, 2009; Olivardia et al., 2004), are associated; that is, individuals’ dissatisfied with their bodies also are likely to have low levels of self-esteem, and vice versa (Grieve, 2007).

In turn, according to the psycho-behavioral model, high body dissatisfaction and low self-esteem are thought to contribute to muscle dysmorphia (Pope et al., 1997). Classified as a subtype of body dysmorphic disorder, individuals suffering from muscle dysmorphia commonly see themselves as not being muscular enough, despite evidence to the contrary (Rhea et al., 2004). Muscle dysmorphia is a very serious health problem because of the problematic behavioral characteristics associated with MD (Lantz et al., 2001; Pope et al., 1997). The pathogenic psycho-behavioral characteristics associated with MD are grouped into two categories: nutrition (i.e., pharmacological use, supplement use, and dietary behaviors) and physique concerns (i.e., body size/symmetry, physique protection, and exercise dependence). Finally, based upon the model, it is expected that MD will result in negative mental health consequences.
including alienation, narcissism, and positive deviance (Lantz et al., 2001). Indeed, Bergeron and Tylka (2007) found that muscle dysmorphia was associated with lower levels of psychological well-being.

For the purposes of this study, only selected aspects of the psycho-behavioral model will be examined; specifically, self-esteem, body dissatisfaction, muscle dysmorphic attitudes, and exercise dependence will be explored (see Figure A.2).

Self-Esteem, Body Dissatisfaction, Muscle Dysmorphia, and Exercise Dependence

As mentioned previously, low levels of self-esteem are associated with individuals’ negative feelings towards themselves and their appearance (Grammas & Schwartz, 2009; Olivardia et al., 2004). Research suggests that some males may suffer from low self-esteem and body dissatisfaction in relationship to perceived muscularity (Adams et al., 2005; Lantz et al., 2001; Neighbors & Sobal, 2007). Because muscularity is viewed by many to be a sign of masculinity, some men may suffer from low self-esteem because without sufficient musculature, they may not consider themselves “manly” (Olivardia, 2001). Ebbeck et al. (2009) found that those suffering from low self-esteem use weight lifting as a sort of coping mechanism, with improvements in muscularity viewed as a positive and therefore may encourage individuals to engage in more exercise. Ebbeck et al.’s (2009) findings support Lantz and colleagues’ (2001) hypothesis that while anaerobic activities may lead to improved levels of self-esteem, it is when time spent exercising becomes the sole determinant of one’s self-esteem level that pathogenic and unhealthy outcomes may occur. Moreover, it is suggested that a cyclical pattern may develop whereby individuals become obsessed with improving
body image though exercise, which may lead to the development of muscle dysmorphia. Because men suffering from muscle dysmorphia typically have a negative view of their current musculature and are fixated on gaining muscle size and definition, they may engage in vigorous amounts of exercise in an effort to increase their muscle mass. It is here that a pattern develops, where desired muscle size and definition is never attained, so individuals continue to increase their levels of physical activity to the point they become dependent on exercise. Exercise dependence may be seen as one of the behavioral characteristics of muscle dysmorphia because it is often associated with individuals' desire to obtain certain degree of musculature (Hale et al., 2010).

Purpose Statement

Using the psycho-behavioral model as a conceptual framework, the purpose of this study was to explore the relationships between self-esteem, body dissatisfaction, muscle dysmorphia, and exercise dependence among college men (see Figure A.2). It was hypothesized that (a) self-esteem would be negatively related to muscle dysmorphia and body dissatisfaction would be positively related to muscle dysmorphia, (b) muscle dysmorphia would be positively related to exercise dependence, and (c) muscle dysmorphia would mediate the relationships between self-esteem and body dissatisfaction and exercise dependence.
CHAPTER 3
METHODOLOGY

Procedure

Approval from the Institutional Review Board for the Protection of Human Subjects of the University of North Texas was obtained prior to the initiation of this study. Participants were recruited from Kinesiology and Physical Education classes at the University of North Texas. Instructors were contacted and asked if it was permissible to recruit study volunteers from students in the class. Participants were also recruited by listing the present study in the UNT SONA Systems, which is used by general psychology classes to allow enrolled students to participate in various experiments for class credit. Prior to volunteering to participate, an informed consent letter was provided to all potential participants. Participation involved completing a survey packet took approximately twenty minutes to complete. For their participation in the study, students received extra credit if they were recruited from Kinesiology courses or Psychology experiment credit if they were recruited from the UNT SONA Systems. All participants were entered into a random drawing for a $25 gift certificate to a local retailer.

Participants

The proposed sample size was 110 men between the ages of 18 and 25 who engage in weight lifting at least 90 minutes per week. The sample size was chosen based on the guidelines recommended by Thomas, Nelson, and Silverman (2005).

The initial sample included 122 men; 16 were omitted because they did not meet the inclusion criteria for age or weight training, thus the final sample included 106 men between the ages of 18 and 25 ($M = 20.75$, $SD = 1.72$) from 122 total responses.
Sixteen of the survey responses were omitted due to not meeting the inclusion criteria for age or weight training. The majority of participants reported being in their 3rd year of college (33.3%), followed by 1st (23.8%), 2nd (20.0%), 4th (18.1%), and 5th or above (4.1%). Most participants were Kinesiology majors (57.1%), followed by other (39.0%), Sociology (2.9%), and Recreation (1.0%). The majority of participants reported their race as Caucasian (61.9%), followed by African American (20.0%), Hispanic/Latino (12.4%), Asian (2.9%) or other (2.9%).

Measures

Participants completed surveys including: (a) demographic and background questionnaire, (b) Rosenberg Self-Esteem Scale (Rosenberg, 1989), (c) Body Part Satisfaction Scale-Revised (Petrie, Tripp, & Harvey, 2002), (d) Drive For Muscularity Scale (McCreary & Sasse, 2000), and (e) Exercise Dependence Scale-21 (Hausenblas & Downs, 2002).

Demographic Questionnaire

Participants completed questionnaires regarding demographic characteristics, weight-lifting experience, attitudes about their body weight, and reasons for weight-lifting. Demographic questions included age, gender, ethnicity, height, weight, and ideal body weight. Attitudes about body weight included questions about level of satisfaction with their body and current weight, if they are currently trying to change their weight, and what methods they use to control their weight.

Physical Activity

A visual analog scale was developed to assess participants’ primary reason for weight lifting. The visual analog scale included one item with two anchors (e.g., Health and Function; Muscular Appearance) and an 11 centimeter line. Participants were to
place an X on a line closest to their reasons for weight lifting. If participants were involved in weight lifting for health and function reasons only, an X would be placed closest to Health and Function. If participants were involved in weight lifting only for muscular appearance, an X would be placed closest to Muscular Appearance. If participants were involved in weight lifting for both health and function and muscular appearance, an X would be placed closest to the middle of the line. Responses were scored by measuring in centimeters the location of the X on the line, with 0 = muscular appearance, 11 = health and function, and 5.5 = both.

Self-Esteem

The Rosenberg Self-Esteem Scale (Rosenberg, 1989) measures global self-esteem. It includes ten questions measured on a 4-point Likert scale ranging from 0 (strongly disagree) to 3 (strongly agree) that examine a person’s positive or negative thoughts about themselves (i.e. “I feel I am a person of worth” and “I certainly feel useless at times.”). The measure includes items representing positive thoughts (items 1, 3, 4, 7, 10) and negative thoughts (items 2, 5, 6, 8, 9). The negative thoughts items are reverse scored. Positive and negative items are assigned a value of 0-3 and are then summed. Scores range from 0 to 30 with higher scores representing greater self-esteem. The Rosenberg Self-Esteem Scale demonstrated acceptable reliability, with one week test-retest reliability (.82) and internal consistency (.77 to .88) (Blascovich & Tomaka, 1993). The internal consistency for the sample in this study was .86.

Body Dissatisfaction

The Body Part Satisfaction Scale-Revised (BPSS-R; Petrie, Tripp, & Harvey, 2002) measures dissatisfaction with the size and shape of one’s body. For males, Petrie
et al. (2002) modified the BPSS-R to represent dissatisfaction with leanness and muscularity of various body parts (i.e., legs, arms, torso). It is composed of 21 items on a 6-point Likert scale ranging from 1 (extremely dissatisfied) to 6 (extremely satisfied). All items are reverse scored so that higher scores reflect greater dissatisfaction. Responses are summed and the mean is calculated to represent the total score. Total scores range from 1 to 6 with higher scores representing greater body dissatisfaction.

The BPSS-R modified for males has demonstrated excellent internal consistency ($\alpha = .96$) (Greenleaf, Petrie, & Martin, 2010). The internal consistency of the total scale for the sample in this study was .93. The internal consistencies for the Leanness and Muscularity subscales were .90 and .84, respectively.

Muscle Dysmorphia

The Drive for Muscularity Scale (DMS; McCreary & Sasse, 2000) measures attitudes and behaviors associated with achieving muscularity (McCreary, Sasse, Saucier, & Dorsch, 2004). It is composed of fifteen items on a 6-point Likert scale ranging from 1 (always) to 6 (never) that examines a person’s attitudes towards muscularity (i.e., “I wish I were more muscular” and “I think I would feel more confident if I had more muscle mass”). Responses are reverse scored and then summed, with the mean of the fifteen responses representing the total score. Total scores range from 1 to 6 with higher scores representing a higher muscle dysmorphia. The DMS has demonstrated good reliability ($\alpha = .87$) (McCreary et al., 2004). The DMS has demonstrated convergent validity by determining higher scores were related to greater weight training frequency and dieting to gain weight. Discriminate validity was demonstrated by determining higher scores on the DMS were not related to a drive for
thinness (McCreary & Sasse, 2000). The internal consistency for the sample in this study was .87. Though other measures of muscle dysmorphia exist, such as the Muscle Dysmorphia Inventory (Rhea et al., 2004), the DMS was chosen because it specifically measures the variable of muscle dysmorphia, whereas the MDI measures the associated variables (i.e., dietary constraints, physique protection).

Exercise Dependence

The Exercise Dependence Scale-21 (EDS-21; Hausenblas & Downs, 2002) measures factors associated with a dependence on exercise. It is composed of 21 items on a 6-point Likert scale ranging from 1 (never) and 6 (always), with seven subscales including: withdrawal effects, continuance, tolerance, lack of control, reduction of other activities, time, and intention effects. Total and subscale scores are averaged, ranging from 1 to 6, with higher scores indicating dependence on exercise. Using the scoring procedures outlined in the EDS-21 test manual, participants were classified into one of three classifications: asymptomatic, non-dependent symptomatic, and at-risk for exercise dependence. Asymptomatic refers to participants having no dependence on exercise, non-dependent symptomatic referring to participants theoretically being exercise dependent, and at-risk referring to participants being dependent on exercise based on DMS criteria. The EDS-21 has demonstrated seven day test-retest reliability ($r = .92$) and internal consistency (.94; Hausenblas & Downs, 2002). The internal consistency for the total scale in this sample was .92. The internal consistencies for the subscales in this sample were: Withdrawal .85, Continuance .80, Tolerance .86, Control .84, Reduction .66, Time .77, and Intention .93.
Planned Data Analyses

SPSS was used to analyze the data. Preliminary data analyses included calculating appropriate descriptive statistics (e.g., mean, standard deviation, frequency) for demographic variables. Additionally, scale and subscale means and standard deviations were calculated. Normality of data was checked by examining skewness and kurtosis of scale and subscale scores. Reliability of scales was determined by examining internal consistency.

The data analysis for hypothesis testing included calculating the correlations to determine whether: (Hypothesis A) self-esteem is negatively related to muscle dysmorphia and body dissatisfaction is positively related to muscle dysmorphia, and (Hypothesis B) muscle dysmorphia is positively related to exercise dependence. Partial correlations were also calculated in order to examine the relationship between self-esteem and muscle dysmorphia while controlling for body dissatisfaction and to examine the relationship between body dissatisfaction and muscle dysmorphia while controlling for self-esteem.

Stepwise regression was planned to examine if (Hypothesis C) muscle dysmorphia mediates the relationships between self-esteem and exercise dependence and body dissatisfaction and exercise dependence. Two separate regressions were to be conducted; one with self-esteem as a predictor and one with body dissatisfaction as a predictor. In both regressions participant BMI was to be entered first to account for possible variation associated with body mass. Self-esteem and body dissatisfaction was to be entered on the second step and muscle dysmorphia was entered on the third step. To determine mediation, the Baron and Kenny method for determining mediation was to
be used. Mediation is determined by examining the change in influence of the independent (predictor) variable with the inclusion of the hypothesized mediator variable (muscle dysmorphia). The Sobel test was to be used to indicate the strength of the mediation effect. However, because the initial conditions required to test for mediation were not met, the regressions were not conducted. Instead, exploratory partial correlations were run to examine the relationships between self-esteem and exercise dependence and between body dissatisfaction and exercise dependence while controlling for muscle dysmorphia.
CHAPTER 4

RESULTS

Demographic and Background

Table A.1 includes means and standard deviations for demographic and background information. Participant age ranged from 18 to 25 ($M = 20.75$, $SD = 1.72$), height from 60 inches to 79 inches ($M = 70.11$, $SD = 3.18$), weight from 120 pounds to 320 pounds ($M = 181.46$, $SD = 34.85$), and ideal weight from 140 pounds to 290 pounds ($M = 184.11$, $SD = 25.22$). Participant BMI, calculated from measured height and weight, ranged from 16.50 to 44.52 ($M = 25.94$, $SD = 4.57$). Based upon BMI scores, participants were classified as underweight (BMI <18.5, 1.9%), normal weight (BMI ≥18.5 and ≤25, 47.2%), overweight (BMI >25 and ≤30, 34.9%), obese (BMI >30 and ≤35, 11.3%) and severely obese (BMI >35, 4.7%). However, because BMI may be inflated in a weight lifting sample, body fat estimations were included in the demographic data. Participant body fat percent was estimated from the equation obtained by Dr. A.S. Jackson, where $PFAT \text{ (percent fat)} = -13.05 + .14 \text{ Age (years)} + .76 \text{ (triceps skinfold)} + .63$, ranged from 8.94% to 41.01% ($M = 18.85$, $SD = 6.42$) (A.S. Jackson, personal communication, January 20, 2001).

Based upon a 10-point scale (1 = not satisfied to 10 = satisfied), participants were generally neutral to slightly positive in terms of satisfaction with body weight ($M = 6.81$, $SD = 2.07$) and body shape ($M = 6.84$, $SD = 1.96$). These two items were single item measures used to help describe the sample. These items were not used in the hypothesis testing. Most participants reported that they were trying to gain weight (48.1%), followed by trying to lose weight (33.0%), trying to stay the same weight (15.1%), or not doing anything to change weight (3.8%). The most frequently used
weight management behaviors were strength training ($M = 4.23, SD = .75$) and cardiovascular physical activity ($M = 3.74, SD = 1.08$). Less frequently used behaviors included eating more calories ($M = 2.96, SD = 1.33$), using weight gain supplements ($M = 2.80, SD = 1.63$), eating fewer calories ($M = 1.97, SD = 1.06$), taking diet pills ($M = 1.27, SD = .72$), using anabolic steroids or growth hormones ($M = 1.07, SD = .35$), using diuretics ($M = 1.05, SD = .27$), using laxatives ($M = 1.02, SD = .16$), and self-induced vomiting ($M = 1.01, SD = .13$). Based upon the visual analog scale, participants generally reported participating in weight lifting for both muscular appearance and health and function with a slight emphasis on muscular appearance ($M = 4.65, SD = 2.57$).

Descriptive Statistics

Table A.2 includes means and standard deviations for the measures of self-esteem, body dissatisfaction, muscle dysmorphia, and exercise dependence. On average, participants reported fairly high levels of self-esteem ($M = 24.14, SD = 4.57$). Participants’ total scale scores on the RSES ranged from 9 (low self-esteem) to 30 (highest possible score, indicating high self-esteem). Participants reported moderate levels of overall body dissatisfaction ($M = 2.84, SD = .79$), with total scale scores ranging from 1 (dissatisfied) to 4.43 (fairly satisfied). Participants reported similar levels of moderate body dissatisfaction on both the leanness subscale ($M = 2.82, SD = .92$) and the muscularity subscale ($M = 2.87, SD = .79$) of the BPSS, with scores ranging from 1 to 4.90 and 1 to 5, respectively. Participants reported moderate levels of muscle dysmorphic attitudes ($M = 3.36, SD = .90$). Total scores can range from 1 (never) to 6 (always), with participants' total scale scores ranging from 1.27 to 5.67.
Participants reported relatively low levels of exercise dependent symptoms \((M = 2.79, SD = .80)\), with total scale scores ranging from 1.24 to 5.24. Scores for each subscale ranged from 1 (never) to 6 (always); Withdrawal \((M = 2.98, SD = 1.30)\), Continuance \((M = 2.21, SD = 1.09)\), Tolerance \((M = 1.18, SD = 1.39)\), Control \((M = 1.20, SD = 1.45)\), Reduction \((M = 2.12, SD = .76)\), Time \((M = 3.21, SD = .106)\), and Intention \((M = 2.82, SD = 1.15)\). The majority of participants \((78.80\%)\) were classified as non-dependent symptomatic, with 15.40% classified as asymptomatic and 5.80% classified as at-risk for exercise dependence.

Relationships between Self-Esteem, Body Dissatisfaction, and Muscle Dysmorphia

To address the first hypothesis (“Self-esteem is negatively correlated to muscle dysmorphia” and “Body dissatisfaction is positively correlated to muscle dysmorphia”), correlations were used to determine the relationship between the variables. Partial correlations were performed to determine the relationship between self-esteem and muscle dysmorphia while controlling for body dissatisfaction, and to determine the relationship between body dissatisfaction and muscle dysmorphia while controlling for self-esteem. Self-esteem was not significantly correlated to muscle dysmorphia \((p > .05)\). Body dissatisfaction was positively correlated to muscle dysmorphia \((r = .27, p < .01)\). Partial correlations between self-esteem and muscle dysmorphia when controlling for body dissatisfaction and between body dissatisfaction and muscle dysmorphia when controlling for self-esteem \((p > .05)\) were not significant (see Table A.3 for correlations between all variables).

To address the second hypothesis (“Muscle dysmorphia is positively correlated to exercise dependence”), correlations were used to determine the relationship between
the variables. Muscle dysmorphia was significantly correlated to exercise dependence \(r = .59, p < .01\).

Muscle Dysmorphia as a Mediator between Self-Esteem, Body Dissatisfaction and

Exercise Dependence

Following the procedures outlined by Baron and Kenny (1986) and Holmbeck (1997) several steps were taken to determine the extent to which muscle dysmorphia mediated the relationship between self-esteem, body dissatisfaction, and exercise dependence. Muscle dysmorphia was chosen as a mediator based on the psycho-behavioral model of muscle dysmorphia (Lantz, Rhea, & Mayhew, 2001). The initial step was to determine that relationships existed between (a) the independent variables (self-esteem and body dissatisfaction) and the dependent variable (exercise dependence), (b) the independent variables (self-esteem and body dissatisfaction) and the potential mediator (muscle dysmorphia), and (c) the potential mediator variable (muscle dysmorphia) and the dependent variable (exercise dependence). Thus, because the initial conditions were not met, the planned hierarchical regressions were not conducted to test for mediation.

Exploratory Analyses

To further explore possible associations between the psychological variables of self-esteem and body dissatisfaction and exercise dependence, two sets of partial correlations were conducted. In the first analysis, the relationship between self-esteem and exercise dependence was examined while controlling for muscle dysmorphia (see Figure A.4). The partial correlation between self-esteem and exercise dependence was not significant \(p > .05\). In the second analysis, the relationship between body
dissatisfaction and exercise dependence was examined while controlling for muscle
dysmorphia (see Figure A.5). The partial correlation between body dissatisfaction and
exercise dependence was significant ($r = -.30$, $p < .05$).
CHAPTER 5
DISCUSSION

Due to perceived social expectations and the desire to appear and feel masculine, some men may experience a variety of psychological and behavioral issues associated with their bodies and appearance (Bergeron & Tylka, 2007; Grammas & Schwartz, 2009). These psycho-behavioral issues, such as low self-esteem and body dissatisfaction may, in turn, be associated with muscle dysmorphic attitudes and a dependence on exercise. Because of the serious adverse health risks associated with muscle dysmorphic attitudes and exercise dependence, it is important to understand these factors and how predisposing characteristics (e.g., self-esteem and body dissatisfaction) may contribute to the disorder. In this study, men’s self-esteem and body dissatisfaction were examined in relationship to concerns about perceived muscularity (e.g., muscle dysmorphia) and excessive exercise attitudes and behaviors (e.g., exercise dependence).

Participants in the current study reported fairly high levels of self-esteem, moderate levels of overall body dissatisfaction and muscle dysmorphic attitudes, and relatively low levels of exercise dependent symptoms. In line with research conducted by Hale and colleagues (2010), participants reported moderate levels of muscle dysmorphic attitudes, as measured by the DSM, and exercise dependence. Drive for Muscularity mean scores were similar in both samples, with Hale and colleagues (2010) reporting a DMS mean of 3.50, while the current study reported a DMS mean of 3.36. Hale and colleagues (2010) found 77.4% of participants were at risk for exercise dependence, while the current sample found 78.8% were considered at-risk.
Research Question A: Self-Esteem, Body Dissatisfaction, and Muscle Dysmorphia

It was hypothesized that there would be a significant negative correlation between self-esteem and muscle dysmorphia. Although past research has found that self-esteem was significantly negatively correlated to body dissatisfaction (Olivardia et al., 2004), the present study did not support this hypothesis. Previous research has suggested that low self-esteem is related to increased muscle dysmorphic attitudes (Grieve, 2007; Lantz et al., 2001). In both studies, researchers proposed negative correlations would be found between self-esteem and muscle dysmorphia. However, because the majority of research on muscle dysmorphia has been descriptive in nature, the precipitating factor of self-esteem as seen in the psycho-behavioral model proposed by Lantz et al. (2001) is not fully understood. Moreover, the current study used participants’ global self-esteem as a predictor for muscle dysmorphic attitudes. Research conducted by Ebbeck et al. (2009) examined, in part, self-esteem in relationship to muscle dysmorphic attitudes using the self-worth subscale of the Adult Self-Perception Profile (Messer & Harter, 1986), as well as the physical self-worth and perceived body attractiveness subscales from the Physical Self-Perception Profile (Fox, 1990). These findings suggest that that while self-esteem may be a precipitating factor in the onset of muscle dysmorphia, it is perhaps important to focus on more specific forms of self-esteem, such as physical self-worth, instead of one’s global self-esteem. Moreover, research conducted by Grossbard, Lee, Neighbors, and Larimer (2009) examined contingent self-esteem and its association to body image concerns among college students. Contingent self-esteem is described as the degree in which one’s positive view of the self is dependent on certain criteria, like appearance (Grossbard et
aI., 2009). In part, researchers found that there was a significant positive relation between contingent self-esteem and drive for muscularity among males, meaning the more males felt their appearance influenced their self-esteem, the more driven they were to achieve a muscular physique. By focusing on a more specific aspect of one’s self-esteem, it may be possible for researchers to gain a better understanding of how muscle dysmorphic attitudes are developed.

Body dissatisfaction was hypothesized to be positively associated with muscle dysmorphia. Logically, it has been suggested that males’ dissatisfaction with their levels of leanness or muscularity may lead to an obsession with achieving the perceived social ideal. In the present study, this hypothesis was supported; there was a significant relationship between participants’ dissatisfaction with their bodies and their attitudes towards achieving a muscular physique. Because of this dissatisfaction with their current physique, some males may engage in various strategies designed to enhance their physique (Grossbard et al., 2009). In the current sample, some men did report using pathogenic, and potentially health damaging, weight control strategies, such as supplement and steroid use. Furthermore, Grossbard et al. (2009) suggests that pathogenic strategies have been shown to have both negative physical and mental effects on health, such as increased cholesterol, heart disease, and depression. Previous research has supported the relationship between body dissatisfaction and muscle dysmorphia (Hale et al., 2010; Lantz et al., 2001). Moreover, the psycho-behavioral model of muscle dysmorphia proposed by Lantz et al. (2001) suggests that body dissatisfaction is one of the precipitating factors that may lead to muscle dysmorphic attitudes. However, research on males’ body dissatisfaction and its
relationship to muscle dysmorphia has been limited; therefore more research is necessary to further understand how body dissatisfaction may influence the onset of muscle dysmorphic attitudes among males.

Research Question B: Muscle Dysmorphia and Exercise Dependence

It was hypothesized that muscle dysmorphia would be significantly correlated to exercise dependence. In the current study, this hypothesis was supported; muscle dysmorphia was positively related to exercise dependence, indicating that men who reported obsessive attitudes towards achieving a certain degree of musculature also reported a reliance on exercise. These results lend further support to the psycho-behavioral model proposed by Lantz et al. (2001), which suggests that exercise dependence is one of the behavioral characteristics associated with muscle dysmorphic attitudes. Moreover, research conducted by Hale et al. (2010) found that men’s scores on a measure of muscle dysmorphia predicted their scores on an exercise dependence measure. Because muscle hypertrophy typically occurs through some form of physical activity, one should expect that an obsession with obtaining musculature would be related to excessive amounts of exercise. However, it is important to note that excessive exercise may be contraindicative to gaining musculature because of the need for proper recuperation from strenuous exercise like weight lifting. Muscles need adequate rest in order to repair and hypertrophy, and when too much stress is placed on them in the form of excessive exercise, growth is hampered (Eichner, 1995). However, research examining the relationship between muscle dysmorphia and exercise dependence has been scarce. Hale and colleagues stated that prior to their publication, no studies had been conducted that examined the relationships between

30
drive for muscularity and exercise dependence in a weight lifting sample. Thus, the current study advances research by focusing solely on a weight lifting sample, which may be considered having a greater risk for developing muscle dysmorphic attitudes due to the nature of the activity.

Research Question C: Muscle Dysmorphia as a Mediator

The final purpose of this study was to examine muscle dysmorphia as a potential mediator of the relationships between self-esteem and exercise dependence and between body dissatisfaction and exercise dependence. Because the initial conditions for determining mediation were not met, the planned hierarchical regressions to test for mediation were not conducted.

Exploratory analyses were run to further examine relationships between the variables of interest. Specifically, results indicated that when controlling for muscle dysmorphia, body dissatisfaction was significantly and negatively related with exercise dependence. Although it was hypothesized that dissatisfaction with one’s leanness or muscularity would be related to an increased participation in physical activity such as weight lifting in an effort to improve body composition, these results suggest the opposite is occurring in the present sample. That is, the results suggest that without the influence of muscle dysmorphic attitudes, males may actually be less likely to develop a dependence on exercise. Moreover, the results suggest that muscle dysmorphia acts as a suppressor variable in regards to exercise dependence.

Previous research has suggested that one’s appearance anxiety, which may be related to body dissatisfaction, may explain an avoidance of exercise (Davis, Brewer, & Weinstein, 1993). Researchers found that increased appearance anxiety in males was
negatively related to physical activity, although the relationship was weak. This negative relation should be expected due to the fact that individuals with greater anxiety related to their appearance would be less likely to put themselves in situations where their bodies are on display for fear of rejection or ridicule. Because of this, individuals with greater appearance anxiety are less likely to go to the gym, a place where one’s body is constantly on display. However, all the participants in the current study were participating in at least 90 minutes per week of weight lifting. Although participants did not report the environment in which they lift weights, it is possible that some may avoid public settings where their bodies might be on display. Further examination could include environmental factors, which were not assessed in these individuals.

The results of this exploratory analysis are important to understand because as health professionals, we encourage achieving a healthy body composition through sensible diet and exercise programs. It is also important to understand that whether a person is obsessed with achieving a certain degree of muscularity or not, there are still potentially negative consequences such as excessive exercise or avoidance of physical activity.

Implications

The findings that body dissatisfaction was related to muscle dysmorphia and muscle dysmorphia was related to exercise dependence has important implications for both fitness enthusiasts and professionals. Because of the negative effects both muscle dysmorphia and exercise dependence can have on one’s physical and mental well-being, it is important to find ways to educate people about healthy ways to improve their bodies through physical activity. The current study found that nearly 79% of participants
were non-dependent symptomatic, suggesting that while they do not currently meet the clinical criteria for exercise dependence, their present attitudes could develop into a dependence on exercise. The negative effects of extreme amounts of exercise have been well documented (Hausenblas & Downs, 2002), so it is important to educate individuals on proper exercise habits, as well as setting realistic expectations for body composition changes.

It is here that health and fitness professionals face an enormous challenge of finding the balance between encouraging exercise without promoting a ‘more is better’ philosophy. As mentioned previously, promoting healthy levels of physical activity and getting inactive individuals to engage in a consistent exercise program is important due to the increasing prevalence of obesity in the United States. However, it is just as important for health and fitness professionals to pay attention to those individuals that may be engaging in excessive amounts of exercise and helping them move away from such excessive and potentially damaging behaviors. Therefore, it is important to train health and fitness professionals to recognize the symptoms of body dissatisfaction, muscle dysmorphia, and exercise dependence.

Limitations

There were several limitations in the current study. One was the relatively small sample size used in the study. Another limitation was the use of a convenience sample, with the majority of participants selected from various kinesiology and physical education classes. Participants recruited from these classes were likely to have prior knowledge of healthy exercise habits compared to the general population, which could have influenced their responses. The current study also relied on self-reported data.
Participants may have chosen the more socially desirable responses instead of responding honestly, even though the surveys were anonymous. Finally, the current study only examined four parts of the psycho-behavioral model of muscle dysmorphia (Lantz et al., 2001). Other measures such as dietary restraints, physique protection, and supplement use were not examined.

**Future Research**

The results of this study offer many opportunities for future research. In contrast with previous research, self-esteem had no significant relationship with muscle dysmorphic attitudes. Therefore, more research is needed to examine if other measures of self-esteem such as physical self-worth may be related to muscle dysmorphia. As mentioned previously, research by Grossbard et al. (2009) found contingent self-esteem was positively associated to the drive for muscularity. Furthermore, research by Ebbeck et al. (2009) suggested physical self-worth may be a more appropriate indicator for muscle dysmorphic attitudes. Thus, replication of these studies is important so health professionals can better understand the underlying development of muscle dysmorphic attitudes. Additionally, because exploratory analyses revealed a negative correlation between body dissatisfaction and exercise dependence when controlling for muscle dysmorphia, future research could focus on why that relationship is negative. Research could also examine if similar measures or samples of weight lifters could be used to replicate these findings.

Future research could also focus on the effect weight lifting experience may have in relation to the psycho-behavioral model. The current study did not examine group differences (beginners vs. intermediates vs. advanced weight lifters), so future research
could examine whether precipitating factors and muscle dysmorphic attitudes were different between males with greater experience in weight lifting. Oftentimes, males may start lifting weights in hopes of improving their self-esteem and their body satisfaction (Lantz et al., 2001). Initial gains in self-esteem and improved body composition seen by beginners may lead to more muscle dysmorphic attitudes (Lantz et al., 2001), whereas more advanced trainees may have more appropriate expectations for changes in their bodies.

Finally, further examination of the psycho-behavioral model (Lantz et al., 2001) of muscle dysmorphia itself is important. As mentioned before, research on muscle dysmorphia is scarce, so replication of findings is important to see if previous research is reliable and if not, how future research can advance theoretical models like the psycho-behavioral model used in the current study. Existing research focusing on muscle dysmorphia has primarily been descriptive in nature, so a more in depth analysis may prove vital for understanding how this disorder develops. For example, future models of muscle dysmorphia could examine whether participant BMI or percent body fat, which are measures of body composition, could act as a precipitating factor to the onset of muscle dysmorphic attitudes.

Conclusion

Though the current study supported some aspects of previous research, there is still a lack of understanding in regards to muscle dysmorphia and what underlying mechanisms can lead to this potentially debilitating disorder. Theoretical frameworks have hypothesized that males' body image and exercise habits may be influenced by self-esteem and body satisfaction (Lantz et al., 2001). However, it is important to
replicate and extend the current study in order to confirm and refine Lantz et al.’s framework.

While most research in body image disturbances has focused on women, there has been an increased focus on male body image and the associated negative consequences. The results of the current study extend previous research on muscle dysmorphia by examining the precipitating factors of self-esteem and body satisfaction and the behavioral characteristic of exercise dependence as seen in the psycho-behavioral model proposed by Lantz et al. (2001). Also, because of the focus on female body image, it is important to recognize that men are not immune to the pressures to achieve a certain body type as was once believed, and more research is necessary to understand the possible underlying causes.

Furthermore, because exercise has been shown to affect both physical and mental health, it is important to examine how physical activity can have either positively or negatively influence individuals’ attitudes and behaviors. Thus, more research is necessary to examine the relationships between psychological well-being, body image, attitudes towards achieving muscularity, and exercise habits in order to educate males on proper expectations to have when participating in weight lifting.
APPENDIX
CONSENT FORMS, SUPPLEMENTAL TABLES AND FIGURES
Before agreeing to participate in this research study, it is important that you read and understand the following explanation of the purpose, benefits and risks of the study and how it will be conducted.

**Title of Study:** Influence of Self-esteem and Body Dissatisfaction on Muscle Dysmorphia and Exercise Dependence.

**Principal Investigator:** Christy Greenleaf, Ph.D., University of North Texas (UNT) Department of Kinesiology, Health Promotion, and Recreation.

**Purpose of the Study:** This study will examine associations between self-esteem, body dissatisfaction, muscle dysmorphic attitudes, and exercise habits. Specifically, the following research questions will be addressed: To what extent do self-esteem and body satisfaction predict muscle dysmorphic tendencies? and To what extent does muscle dysmorphia influence exercise dependence?

**Study Procedures:** You will be asked to fill out a series of questions in a survey packet that will take about 20 to 25 minutes of your time.

**Foreseeable Risks:** No foreseeable risks are involved in this study. Anonymity will be protected and individuals will not be linked to surveys.

**Benefits to the Subjects or Others:** We expect the project to benefit you by allowing you to reflect on your view of self esteem, body image and involvement in physical activity.

**Compensation for Participants:** You will receive extra course credit as compensation for your participation. If you choose not to volunteer for this study, there is an alternative option that is equivalent to the time and effort of participating in this study.

**Procedures for Maintaining Confidentiality of Research Records:** Your responses to the survey will be completely anonymous, and only the investigators will have access to the research data. The confidentiality of your individual information will be maintained in any publications or presentations regarding this study.

**Questions about the Study:** If you have any questions about the study, you may contact Christy Greenleaf, Ph.D. at telephone number 940-565-3415.

**Review for the Protection of Participants:** This research study has been reviewed and approved by the UNT Institutional Review Board (IRB). The UNT IRB can be contacted at (940) 565-3949 with any questions regarding the rights of research subjects.
Research Participants’ Rights:
Your signature below indicates that you have read or have had read to you all of the above and that you confirm all of the following:

- **Christy Greenleaf or Reid Parnell** has explained the study to you and answered all of your questions. You have been told the possible benefits and the potential risks and/or discomforts of the study.
- You understand that you do not have to take part in this study, and your refusal to participate or your decision to withdraw will involve no penalty or loss of rights or benefits. The study personnel may choose to stop your participation at any time.
- You understand that your decision to participate or to withdraw from the study will have no effect on your standing in this course or your course grade.
- You understand why the study is being conducted and how it will be performed.
- You understand your rights as a research participant and you voluntarily consent to participate in this study.
- You have been told you will receive keep this form.
- **You understand that by returning the survey packet to the researcher, your consent is implied.**
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<td>Race (n = 105)</td>
<td></td>
</tr>
<tr>
<td>Caucasian</td>
<td>61.9</td>
</tr>
<tr>
<td>African American</td>
<td>20.0</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>12.4</td>
</tr>
<tr>
<td>Asian</td>
<td>2.9</td>
</tr>
<tr>
<td>Other</td>
<td>2.9</td>
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</table>
Table A.2  
*Mean and Standard Deviations of Psycho-behavioral Model of Muscle Dysmorphia Variables*  
Table: Mean and Standard Deviations of Psycho-behavioral Model of Muscle Dysmorphia Variables  
<table>
<thead>
<tr>
<th>Scales</th>
<th>M (SD)</th>
<th>Range</th>
<th>( \alpha )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total sample (( n = 106 ))</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RSES (( n = 105 ))</td>
<td>24.14 (4.57)</td>
<td>9.00-30.00</td>
<td>.86</td>
</tr>
<tr>
<td>BPSS (( n = 101 ))</td>
<td>2.84 (0.79)</td>
<td>1.00-4.43</td>
<td>.93</td>
</tr>
<tr>
<td>Leanness</td>
<td>2.82 (0.92)</td>
<td>1.00-4.90</td>
<td>.90</td>
</tr>
<tr>
<td>Muscularity</td>
<td>2.87 (0.79)</td>
<td>1.00-5.00</td>
<td>.84</td>
</tr>
<tr>
<td>DMS (( n = 105 ))</td>
<td>3.36 (0.90)</td>
<td>1.27-5.67</td>
<td>.87</td>
</tr>
<tr>
<td>EDS-21 (( n = 104 ))</td>
<td>2.79 (0.80)</td>
<td>1.24-5.24</td>
<td>.92</td>
</tr>
<tr>
<td>Withdrawal</td>
<td>2.98 (1.30)</td>
<td>1.00-6.00</td>
<td>.85</td>
</tr>
<tr>
<td>Continuance</td>
<td>2.21 (1.09)</td>
<td>1.00-6.00</td>
<td>.80</td>
</tr>
<tr>
<td>Tolerance</td>
<td>1.18 (1.39)</td>
<td>1.00-6.00</td>
<td>.86</td>
</tr>
<tr>
<td>Control</td>
<td>1.20 (1.45)</td>
<td>1.00-6.00</td>
<td>.84</td>
</tr>
<tr>
<td>Reduction</td>
<td>2.12 (0.76)</td>
<td>1.00-5.00</td>
<td>.66</td>
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<tr>
<td>Time</td>
<td>3.21 (1.06)</td>
<td>1.33-6.00</td>
<td>.77</td>
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<tr>
<td>Intention</td>
<td>2.82 (1.15)</td>
<td>1.00-6.00</td>
<td>.93</td>
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</table>
Table A.3  
Correlations of Self-esteem, Body Dissatisfaction, Muscle Dysmorphia, and Exercise Dependence

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
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<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. RSES</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2. BPSS</td>
<td>-.35**</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3. DMS</td>
<td>-.16</td>
<td>.27**</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4. EDS-21</td>
<td>-.07</td>
<td>-.07</td>
<td>.59**</td>
<td>-</td>
</tr>
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</table>

Partial correlations controlling for body dissatisfaction

<table>
<thead>
<tr>
<th>Variables</th>
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<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. DMS</td>
<td>-.07</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Partial correlations controlling for self-esteem

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. DMS</td>
<td>-</td>
<td>.23</td>
<td>-</td>
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</tbody>
</table>

** p < .001, * p < .05
Figure A.1. Psycho-behavioral model of muscle dysmorphia (Lantz et al., 2001).
Figure A.2. Influence of self-esteem and body dissatisfaction on MD and ED.
Figure A.3. Correlations and partial correlations of psycho-behavioral model of muscle dysmorphia. Dashed lines represent partial correlations.
Figure A.4. Correlations and partial correlations of self-esteem and exercise dependence when controlling for muscle dysmorphia. Dashed lines represent partial correlations.
Figure A.5. Correlations and partial correlations of body dissatisfaction and exercise dependence when controlling for muscle dysmorphia. Dashed lines represent partial correlations.
REFERENCE LIST


and weight related self-discrepancy activation in experimental exposure effects.


