Dedicated to my parents, Tom and Leanne Chitester.
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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACKNOWLEDGMENTS</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
</tr>
<tr>
<td>ABSTRACT</td>
</tr>
<tr>
<td>CHAPTER</td>
</tr>
<tr>
<td>1 INTRODUCTION</td>
</tr>
<tr>
<td>2 MATERIALS AND METHODS</td>
</tr>
<tr>
<td>Subjects</td>
</tr>
<tr>
<td>Measures</td>
</tr>
<tr>
<td>Body Fat Percentage</td>
</tr>
<tr>
<td>FFMI</td>
</tr>
<tr>
<td>BMI</td>
</tr>
<tr>
<td>Demographic Information</td>
</tr>
<tr>
<td>Exercise Behavior</td>
</tr>
<tr>
<td>Eating Pathology</td>
</tr>
<tr>
<td>Supplement Use</td>
</tr>
<tr>
<td>Sociocultural Pressure</td>
</tr>
<tr>
<td>Drive for Muscularity</td>
</tr>
<tr>
<td>Exercise Dependence</td>
</tr>
<tr>
<td>Self-esteem</td>
</tr>
<tr>
<td>Procedure</td>
</tr>
<tr>
<td>Data Analysis</td>
</tr>
<tr>
<td>3 LITERATURE REVIEW</td>
</tr>
<tr>
<td>What Is It?</td>
</tr>
<tr>
<td>Initial Identification</td>
</tr>
<tr>
<td>Measurement</td>
</tr>
<tr>
<td>Heuristic Model of Male Body Change Strategies</td>
</tr>
<tr>
<td>Biological Factors</td>
</tr>
<tr>
<td>Body composition/BMI</td>
</tr>
<tr>
<td>Pubertal growth</td>
</tr>
<tr>
<td>Pubertal timing</td>
</tr>
<tr>
<td>Psychological Functioning</td>
</tr>
<tr>
<td>Negative affect</td>
</tr>
<tr>
<td>Self-esteem</td>
</tr>
<tr>
<td>Societal Factors</td>
</tr>
<tr>
<td>Table</td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>4–1</td>
</tr>
<tr>
<td>Descriptive statistics for outcome variables</td>
</tr>
<tr>
<td>4–2 Correlation matrix of outcome variables</td>
</tr>
<tr>
<td>4–3 Stepwise regression predicting drive for muscularity using subjective BMI</td>
</tr>
<tr>
<td>4–4 Stepwise regression predicting drive for muscularity using objective BMI</td>
</tr>
</tbody>
</table>
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>3–1</td>
<td>A heuristic model of male body change behavior; solid arrows indicate relationships with greater support than broken arrows</td>
<td>62</td>
</tr>
<tr>
<td>5–1</td>
<td>Proposed continua for male body-image disturbance</td>
<td>83</td>
</tr>
</tbody>
</table>
The ideal physique for men that is portrayed in the media is a lean and muscular physique, particularly upper body muscularity. The desire to obtain this ideal physique has resulted in increased body dissatisfaction within men. High levels of body dissatisfaction may result in a specific drive for muscularity wherein a man holds attitudes that muscularity is crucial to attain; this attitude is often accompanied by extreme body change behaviors aimed at increasing muscularity. Drive for muscularity is associated with low self-esteem, exercise dependence, eating pathology, and substance abuse (e.g., anabolic steroids, dietary supplements). Information on the psychological risk and maintenance factors of drive for muscularity is sparse. Furthermore, body composition is believed to be an important factor in the drive for muscularity; body mass index (BMI), a simple height-to-weight ratio is most often used, followed by fat-free mass index (FFMI; e.g., the amount of body weight attributable to muscle), and finally body fat percentage. BMI has been associated with general body-image disturbance in men, but this measure of body composition is limited because it does not account for weight attributable to muscle—a key factor in the drive for muscularity. Thus, it is unclear which measure of body composition (e.g., BMI, FFMI, body fat percentage) is most useful in understanding the
physique-related aspect of drive for muscularity. This is critical to understand because whether
drive for muscularity is related to actual or perceived degree of muscularity (similar to the
question of actual vs. perceived thinness as it relates to the drive for thinness in women) remains
equivocal.

This study’s objective was to identify the psychological and body composition predictors
of drive for muscularity. To achieve this, 113 men completed psychological (e.g., self-esteem,
exercise dependence, eating pathology, substance abuse) and body composition (e.g., BMI, body
fat percentage, FFMI) measures. Multiple regression analysis was conducted to determine the
psychological and body composition measures that were most predictive of drive for
muscularity. The results indicated that drive for muscularity is predicted by weightlifting,
supplement use, exercise dependence, and self-esteem; however, none of the body composition
measures predicted drive for muscularity. Future research efforts should focus on clarifying the
role of body composition in drive for muscularity and on developing interventions that target
behaviors (e.g., exercise, supplement use) that are associated with drive for muscularity.
Kostanski, Fisher, and Gullone (2004) argued that body-image disturbance is so common that it is a normal part of a young woman’s life. Is it really that common? Consider the three following findings (Spitzer, Henderson, & Zivian, 1999):

- The body mass index (BMI) of Playboy centerfolds decreased from 18.12 in 1977 to 18.03 in 1996 (18.50 is considered the low end of the “normal” range; Willett, Dietz, & Colditz, 1999);
- The BMI of Miss America beauty pageant winners decreased from 19.35 in 1953 to 18.06 in 1985;
- The BMI of American women has increased from 22.20 in the 1950s to 24.50 in 1990 (24.90 is considered the high end of the “normal” range; Willett et al., 1999).

Based on these findings it is clear that the slimmer female ideal promoted through the media is being viewed by American women who are becoming progressively larger. Consequently, several researchers believe that this disparity between media representation of the female “ideal” and the female reality is a main factor in body-image disturbance (e.g., Cattarin, Thompson, Thomas, & Williams, 2000; Spitzer et al., 1999). Recent research, however, indicates that women have less body dissatisfaction than their cohorts from the mid-1990s (Cash, Morrow, Hrabosky, & Perry, 2004). While encouraging, the following caveat exists: Cash et al. (2004) drew these cohorts from the same university, therefore limiting the generalizability of this finding.

In contrast to recent body-image research on women, body-image disturbance among men is on the rise, in part because of the now-prevalent portrayal of the male “ideal” in the mass media (Pope, Phillips, & Olivardia, 2000). For example, Spitzer et al. (1999) analyzed the body size of Playgirl centerfolds and they found a sharp increase in BMI from 1986 to 1996, while
simultaneously observing an increase in the average American man’s BMI. At first this may seem congruent, however the increase in body size of the Playgirl centerfolds is attributable to muscle mass, whereas the increase in BMI for American men is attributable to fat. Indeed, Leit, Pope, and Gray (2001) confirmed this in a similar study of Playgirl centerfolds. Furthermore, the action figures young boys play with are becoming more muscular. For example, assuming the 1998 Batman action figure stood 5’10”, Pope, Olivardia, Gruber, and Borowiecki (1999) calculated that, given his physical proportions, he would have a 30.3” waist, a 57.2” chest, and 26.8” biceps. These measurements do not represent the typical man, for if Batman were to enter the Mr. Olympia bodybuilding competition he would pose a serious threat to usurping the reigning champion (arguably the most muscular man on earth), who at a height of 5’11” has a 58” chest and 24” biceps. Unfortunately, by playing with extremely muscular action toys, boys are exposed to the muscular “ideal” at an increasingly younger age.

Therefore, despite some limited evidence to the contrary (e.g., Rozin, Trachtenberg, & Cohen, 2001), it appears that a disparity between the “ideal” physique and reality has also emerged for men. Identifying the time at which men began looking at their bodies with more dissatisfaction is difficult, but Chung (2001) argued that the rise to stardom in the 1980s of bodybuilders such as Arnold Schwarzenegger, who eventually became President George H.W. Bush’s Fitness Council head, was one factor. According to Chung (2001), Schwarzenegger’s prominent role as the pinnacle of fitness inadvertently set the bar higher for what acceptable muscularity is.

Indeed, this “drive for muscularity,” along with a simultaneous dissatisfaction with degree of body fat, is the main source of body-image disturbance in men (Pope, Phillips, et al., 2000). Moreover, some men who possess the “ideal” physique nevertheless view themselves as either
small or puny (Pope, Katz, & Hudson, 1993). For example, the individual may adopt a strict diet, forego social engagements and other activities in favor of spending more time in the gym, and in some instances use anabolic steroids to add more muscle mass. In addition, some highly dissatisfied men may engage in other compulsive muscle-related behaviors such as mirror-checking and weigh-ins several times a day (Pope, Gruber, Choi, Olivardia, & Phillips, 1997). This unique form of male body-image dissatisfaction, termed muscle dysmorphia, is also associated with mood disorders, anxiety, and disturbed eating practices (Pope, Phillips, et al., 2000).

As with women, body-image disturbance in men is a strong risk factor for eating disorders (Stice, 2002), and it is associated with low self-esteem in boys as young as 8 years old (Grilo & Masheb, 2005; McCabe & Ricciardelli, 2003; McCreary & Sasse, 2000). Also, male body-image disturbance is positively associated with depression (Kostanski & Gullone, 1998; McCreary & Sasse, 2000; Olivardia, Pope, & Hudson, 2000), which is a strong predictor of body dissatisfaction in high school boys (Presnell, Bearman, & Stice, 2004). Finally, some men may exercise excessively to achieve the “ideal” physique, which may lead to exercise dependence (Hausenblas & Symons Downs, 2002a, 2002b; Smith & Hale, 2004; Smith, Hale, & Collins, 1998); which is associated with physical and psychological difficulties (e.g., withdrawal symptoms, decreased time spent with family or friends, overuse injuries; Andersen, Cohn, & Holbrook, 2000; Pope, Phillips et al., 2000).

Because male body-image disturbance is centered on a preoccupation with muscularity, a key issue is that this preoccupation will lead to the adoption of unhealthy behaviors to gain muscle and decrease fat. For example, disturbed eating practices are often observed in men with body-image disturbance (Cafri, Thompson, Ricciardelli, McCabe, Smolak, & Yesalis, 2005), and
these eating practices have the following two goals: 1) to add muscle mass by eating high amounts of protein, and 2) to restrict foods high in fat content to decrease overall adiposity. However, one limitation to understanding these eating behaviors is that they are typically assessed by the use of instruments designed to assess eating disorder pathology (e.g., Eating Disorder Inventory—2). These measures do not capture the unique eating behaviors undertaken by individuals whose goal it is to increase muscle mass and shred body fat (e.g., paying close attention to the macronutrient breakdown of each meal consumed). Furthermore, these instruments have been validated in female eating disordered samples for whom eating pathology is qualitatively different (i.e., restricting food intake to decrease body size) when compared to a man who has a high drive for muscularity (i.e., eating large amounts of food to increase body size in the form of muscle). Therefore, a measure validated in men would add more understanding as to the specific nature of the eating pathology seen in men attempting to gain muscle.

The use of dietary supplements is common in men high in drive for muscularity (Kanayama, Pope, & Hudson, 2001). Although popular and expensive (Saper, Eisenberg, & Phillips, 2004), they generally show little impact on muscle mass (Kreider, 1999), and they may promote dependence (Kanayama et al., 2001), and have harmful side effects (Haller & Benowitz, 2000). The use of anabolic steroids is also a practice adopted by many men in their pursuit for muscularity (Chng & Moore, 1990; Cole, Smith, Halford, & Wagstaff, 2003; Wroblewska, 1997). This is alarming because of the health risks associated with anabolic steroid use (e.g., hypertension, disturbed lipid profiles, increased irritability, increased aggression, body-image disturbance, and mood disturbances; Hartgens & Kuipers, 2004).
Surprisingly, little research has examined body composition in relation to general body-image disturbance or drive for muscularity. Indeed, satisfaction with body composition is critical in determining whether body-image disturbance will develop in men. For example, BMI is related to body-image disturbance in men (Kostanski et al., 2004; Kostanski & Gullone, 1998; Presnell et al., 2004), and this relationship is either positive or negative depending on whether the body-image disturbance reflects (1) a self-perception that one is too thin, which results in a drive for muscularity; or (2) a self-perception that one is too heavy, which results in simultaneous drives to lose body fat and add muscle. Two studies (McCabe, Ricciardelli, & Banfield, 2001; McCreary, Karvinen, & Davis, 2006) have found that BMI was negatively correlated with body satisfaction in boys and men respectively. However, McCabe et al. (2001) also found that no correlation between BMI and a desire to increase muscle tone existed. This latter finding is consistent with the findings of McCreary and Sasse (2000) that BMI was uncorrelated with drive for muscularity. Taken together, these null findings indicate a need to clarify the relationship between BMI and drive for muscularity.

Because BMI does not yield precise estimates of body fat percentage and muscle mass, direct assessment of these latter two measures of body composition is preferable when conducting male body-image research. Upon reading the muscle dysmorphia literature one recognizes the importance of these assessments, yet only McCreary et al. (2006) used BMI, body fat percentage, and muscle mass (expressed as fat-free mass index [FFMI]) to predict drive for muscularity. They found that BMI was significantly correlated with both body fat percentage ($r = .68$) and FFMI ($r = .93$), and that a moderate yet significant correlation existed between body fat and FFMI ($r = .41$; McCreary et al., 2006). However, the only anthropometric measure that significantly predicted behaviors related to drive for muscularity was flexed bicep circumference.
(McCreary et al., 2006). Thus, there exists a need to clarify which measure of the three main body composition measures is most informative when conducting drive for muscularity research.

Cafri et al. (2005) attributed the lack of body composition assessment to factors such as time constraints on researchers, the need for personnel trained in body fat assessment, and cost associated with techniques such as hydrostatic weighing and Dual Energy X-ray Absorptiometry. The result is an absence of information pertaining to the body fat percentages and extent of muscle mass possessed by persons with a high drive for muscularity. Identifying and clarifying such relationships would be helpful in developing a precise model of the drive for muscularity.

The purpose of this study was to determine the psychological (e.g., self-esteem, exercise behavior, exercise dependence, eating pathology) and body composition (e.g, BMI, body fat, fat-free mass index [FFMI]) predictors of drive for muscularity in college-aged men. In accordance with this purpose, the following hypotheses were advanced:

**Self-esteem.** Similar to research in women (Stice, 2002), self-esteem is a predictor of negative body-image in men (Kostanski & Gullone, 1998). Self-esteem is also negatively correlated with body and muscle dissatisfaction in men (Cafri, Strauss, & Thompson, 2002; Kostanski & Gullone, 1998; McCreary & Sasse, 2000). However, in contrast to women, men who are thin do not report greater self-esteem than normal weight men (Mazzeo, Slof, Tozzi, Kendler, & Bulik, 2004); it is believed that this is because a thin woman is closer to the female “ideal” body whereas a thin man is farther from the “ideal” muscular male body. In addition, low self-esteem predicts problematic eating behavior, increased dieting, and use of binge-purge cycles (McGee & Williams, 2000; Neumark-Sztainer & Hannan, 2000; Stice, 2002). In light of these findings, I hypothesized that self-esteem would be a negative predictor of drive for muscularity.
Exercise. Although some studies indicate that exercise is associated with greater body satisfaction in men (e.g., Davis & Cowles, 1991; Hausenblas & Fallon, 2002; Williams & Cash, 2001), other studies with men have found exercise behavior to be associated with body dissatisfaction (Tiggemann & Williamson, 2000; Varnado-Sullivan, Horton, Savoy, 2006). Specifically, some studies have found that weightlifting is related to the drive for muscularity, greater physique dissatisfaction, and muscle dysmorphia (Lantz, Rhea, & Cornelius, 2002; McCreary & Sasse, 2000; Pope et al., 1997), but other research has found weightlifting to increase body satisfaction (Fisher & Thompson, 1994; Williams & Cash, 2001). Part of the discrepancy in study findings may be related to the measure of exercise. That is, some exercise measures were general and assessed aerobic and anerobic exercise in a nonspecific context (e.g., Hausenblas & Fallon, 2002), whereas other studies have focused on weightlifting (e.g., Williams & Cash, 2001). It is conceivable that exercise measures that focus on weightlifting may be more strongly related to drive for muscularity than general exercise measures because theoretically weightlifting should be related to drive for muscularity. Thus, I assessed both general exercise as well as weightlifting measures to determine if there was a difference. I hypothesized that weightlifting would be a stronger predictor of drive for muscularity than general exercise behavior.

Dietary supplements. A method many men use to achieve greater muscularity while decreasing body fat is taking dietary supplements (Kanayama et al., 2001). Men who have body dissatisfaction often use dietary supplements to increase muscularity (Varnado-Sullivan et al., 2006). Of importance, adolescent boys who report supplement use have lower body esteem than nonsupplement using adolescent boys (Smolak, Murnen, & Thompson, 2005). The popularity of supplements for these purposes has led Kanayama et al. (2001) to refer to these supplements as
“body-image drugs.” Therefore, I hypothesized that the use of dietary supplements would be a significant predictor of drive for muscularity.

**Eating pathology.** McCreary and Sasse (2000) found that drive for muscularity is significantly higher in adolescent boys trying to gain weight (via unhealthy eating practices) than those who are not; and it is well established that body dissatisfaction and eating pathology are related (Olivardia et al., 2000; Olivardia, Pope, Mangweth, & Hudson, 1995). For example, in their study of 18–25-year-old men, Heywood and McCabe (2006) found a significant correlation between dietary restraint and body dissatisfaction related to body parts such as the shoulders, chest, and arms. Furthermore, in their study of 83 bodybuilders, weightlifters, and athletically active controls, Hallsworth, Wade, and Tiggemann (2005) found that, after controlling for BMI, drive for muscularity was significantly related to the Bulimia subscale of the Eating Disorders Inventory. Therefore, I hypothesized that eating pathology would be a significant predictor of drive for muscularity.

**Sociocultural pressure.** The etiology of drive for muscularity is multifactorial, and it is believed to include sociocultural sources such as peers, parents, and romantic partners. For example, during adolescence boys who mature early (and thus move closer towards the male “ideal” physique) enjoy high popularity, but also are more likely than boys who have not yet reached puberty to engage in body change strategies (e.g., weightlifting, dieting to gain weight, supplement use; McCabe & Ricciardelli, 2004a). Other research indicates that experiencing teasing from peers is associated with decreased body satisfaction (Paxton, Eisenberg, & Neumark-Sztainer, 2006); furthermore, encouragement from parents to lose weight has been associated with both decreased body satisfaction and use of muscle building strategies (e.g., steroid and supplement use; Smolak et al., 2005; Wertheim, Martin, Prior, Sanson, & Smart,
In addition, there is limited evidence that men told by a female dating partner to gain weight (presumably in the form of muscle) report low relationship satisfaction (Sheets & Ajmere, 2005), although other research indicates that men may be dissatisfied with their bodies despite a female dating partner’s satisfaction with it (Ogden & Taylor, 2000). Taken together, there is sufficient reason to believe that sociocultural pressure does impact drive for muscularity; therefore, I hypothesized that sociocultural pressure would be a significant predictor of drive for muscularity.

**Exercise dependence.** Exercise dependence is believed to be a key aspect of male body-image disturbance, especially muscle dysmorphism (Rhea et al., 2004). While moderate amounts of exercise are associated with greater body satisfaction (Williams & Cash, 2001), excessive amounts of exercise are associated with greater body-image disturbance (Pope et al., 1997; Rhea et al., 2004). Furthermore, exercise dependence is predicted by weight loss strategies (which is associated with male body-image disturbance) in adolescent boys (McCabe & Ricciardelli, 2004a). Therefore, I hypothesized that exercise dependence would be a significant predictor of drive for muscularity.

**BMI.** Although there exists a relationship between BMI and male body-image disturbance wherein both high and low BMI are associated with greater dissatisfaction (Frederick, Peplau, & Lever, 2006; Gila, Castro, Cesena, & Toro, 2005), McCreary et al. (2006) recently found that BMI was not a predictor of drive for muscularity. A possible explanation for this is in the nature of the BMI itself: because it is a height-to-weight ratio, it does not distinguish between weight attributable to body fat versus weight attributable to muscle. This distinction is critical because, by definition, the drive for muscularity is specifically associated with a desire to have larger muscles. Therefore, in light of both the finding of McCreary et al. (2006) and the nonspecificity
inherent in the BMI, I hypothesized that BMI would not be a significant predictor of drive for muscularity.

**FFMI.** While FFMI is significantly higher in men with muscle dysmorphia than normal comparison men (Olivardia et al., 2000), a recent study found that FFMI did not emerge as a predictor of drive for muscularity (McCreary et al., 2006). The authors speculated that perhaps self-assessment of muscularity is compromised because a layer of body fat "hides" the true extent of a man’s muscularity, and that the actual degree of muscularity one possesses is most easily appraised in men who either have low body fat or have very well-developed muscles. Therefore, because the men in this study were expected to have normal levels of body fat (thereby "concealing" the degree of muscularity the men actually possessed), I hypothesized that FFMI would not be a significant predictor of drive for muscularity.

**Body fat percentage.** Male body-image disturbance is centered around degree of muscularity; when given the opportunity to indicate ideal body fat percentage, men generally do not report desiring body fat percentage that is a large departure from what they currently have (Cafri et al., 2002). Pickett, Lewis, and Cash (2005) found that although noncompetitive weight trainers score significantly higher than athletically active controls on measures of body image such as appearance orientation, appearance evaluation, and satisfaction with muscle tone, they have similar body fat percentage. Furthermore, Olivardia et al. (2000) found similar levels of body fat percentage between men with muscle dysmorphia and normal comparison men. Although some research has found body-image satisfaction and body fat percentage to be inversely related (e.g., Huddy, Johnson, Stone, Proulx, & Pierce, 1997), the trend of most research on the topic is that body fat percentage is not the primary concern in male body-image, a point reinforced by McCreary et al. (2006) when they found that body fat percentage did not
emerge as a predictor of drive for muscul arity. Therefore, I hypothesized that body fat percentage would not be a significant predictor of drive for muscul arity.

**Self-report BMI vs. measured BMI.** Although many studies rely on self-reported (as opposed to measured) values of height and weight to derive participants’ BMI, there is question as to how accurate such self-reported values are. Specifically, several studies have found that “subjective” BMI is significantly lower than “objective” BMI (Brener, McManus, Galuska, Lowry, & Wechsler, 2003; Elgar, Roberts, Tudor-Smith, & Moore, 2005; Hill & Roberts, 1998). Therefore, I hypothesized that “subjective” BMI (resulting from self-reported height and weight at pre-screening) would be significantly lower than “objective” BMI (resulting from objective measurement of height and weight as assessed at the testing session), as evidenced by a paired-samples t-test.
CHAPTER 2
MATERIALS AND METHODS

Subjects

Because multiple regression was to be used to examine the study’s purposes, the power tables developed by Green (1991) for multiple regression analyses were used to determine sample size. Based on the maximum number of predictors for the multiple regression analysis (9), to detect a medium effect with $\alpha = .05$, a sample of 113 was required for a power of .80 (Green, 1991); therefore, the target sample size for this study was $N = 113$. To be eligible for inclusion, participants had to be men between the ages of 18–24; this age range was selected not only because other studies have used a similar age range (e.g., Heywood & McCabe, 2006), but also to remove age as a potential confounding variable in light of evidence that men of this age have different motivations for exercising than do older men (e.g., mid-30s and older; Davis & Cowles, 1991; Tiggemann & Williamson, 2000). The mean age of the 113 men in this study was 20.34 years ($SD = 1.52$, Range = 18–24 years); most described their ethnicity as White ($n = 77$), followed by Hispanic ($n = 14$), Asian ($n = 9$), Black ($n = 6$) or Middle Eastern ($n = 2$). In addition, each of the following descriptions of ethnicity was provided once: American, East Indian, Indian, Jewish, and Pacific Islander. Most of the men reported their sexual orientation as heterosexual ($n = 105$). With respect to academic standing, juniors were most frequent ($n = 40$), followed by seniors ($n = 33$), sophomores ($n = 21$), freshmen ($n = 18$), and completion of a masters degree ($n = 1$). Two participants reported current use of anabolic steroids, while one reported past but not current use of anabolic steroids.

Measures

The following variables were assessed in the study (see Appendix A).
Body Fat Percentage

Body fat percentage was assessed by the researcher using the 3-site (chest, abdomen, thigh) skinfold method for men (American College of Sports Medicine, 2000). This method correlates strongly with the hydrostatic weighing method, and it has an error of ± 3.5% (ACSM, 2000).

FFMI

Each participant’s FFMI was determined to quantify degree of fat-free mass. The equation for FFMI (Kouri, Pope, Katz, & Oliva, 1995; Pope, Gruber, et al., 2000) is:

\[
\text{FFMI} = \frac{Wt \times (100-\text{BF} \%) \times Ht^2 \times 100}{Wt^2 \times 100} + 6.1 (1.8-\text{Ht})
\]

where “Wt” is weight in kilograms, BF% is body fat percentage, and “Ht” is height in meters. The FFMI of nonweightlifting men typically ranges from 18–21; nonsteroid using bodybuilders typically have a FFMI between 21–25, and steroid using bodybuilders typically have a FFMI from 25 to the low 30s (Olivardia et al., 2000). The importance of ascertaining FFMI in studies of body image is well-noted (e.g., Eston, 2002).

BMI

BMI assesses weight (kg) relative to height (m²). While BMI correlates significantly with body fat percentage (EPIETOAA, 1998), it is used mainly to determine overweight or obese status (Wei et al., 1999). People with a BMI between 18.5 to 24.9 kg/m² are classified as normal; people with a BMI of 25.0 to 29.9 kg/m² are classified as overweight, and people with a BMI of 30.0 kg/m² or greater are classified as obese (Willett et al., 1999). BMI was calculated in two ways: a) subjectively via self-reported values of height and weight at pre-screening, and b) objectively via measurements of height and weight as assessed upon arrival at the Exercise Psychology laboratory. BMI was derived in these two ways because, while many epidemiological studies calculate BMI based on self-reported height and weight, there is
mounting evidence that BMI based on objectively measured height and weight is more accurate (e.g., Brener et al., 2003; England et al., 1998).

**Demographic Information**

The following demographic information was obtained from each participant: age, ethnicity, sexual orientation, academic standing (if applicable), past/current anabolic steroid use, and current duration/frequency of cardiovascular and weightlifting sessions (detailed in the next section). Author developed questions related to anabolic steroid use were the following: (1) “Are you currently using anabolic steroids in order to build muscle mass?”, which required either a “yes” or “no” response; (2) “If you are not currently using anabolic steroids to build muscle mass, have you in the past?”, which required either a “yes,” “no,” or “not applicable” response; similar methods have been employed to ascertain anabolic steroid usage (e.g., Neumark-Sztainer, Story, Falkner, Beuhring, & Resnick, 1999).

**Exercise Behavior**

Typical exercise behavior was assessed with the Leisure-Time Exercise Questionnaire (LTEQ; Godin & Shephard, 1985). The LTEQ asks participants to indicate how frequently during a typical week they engage in mild, moderate, and strenuous exercise for at least 15 minutes. An overall weekly exercise index is then derived from the following formula: 

\[3(\text{frequency of participation in mild activities during the past week}) + 5(\text{frequency of moderate activities}) + 9(\text{frequencies of strenuous activities})\]. The LTEQ has adequate reliability and validity (Godin, Jobin, & Bouillou, 1986), and correlates moderately with VO\(_{2\max}\), an index of cardiorespiratory fitness (Jacobs, Ainsworth, Hartman, & Leon, 1993).

Because the LTEQ does not specify the mode of exercise, participants were asked the following author-developed questions on the demographic survey: (1) “How many sessions of cardiovascular activity do you engage in per week, and how long does a typical session run?”
and (2) “How many sessions of weight training do you engage in per week, and how long does a typical session run?” For this latter question, because no standardized measures of weightlifting frequency or session duration exist, a weightlifting index (frequency x duration) was calculated. This was done because the LTEQ does not specify how much overall activity is due to weightlifting; this form of exercise is of critical interest in the present study because weightlifting is the primary exercise behavior that is responsible for muscular hypertrophy, which is what a man with high drive for masculinity strives to achieve.

**Eating Pathology**

Eating behavior specific to gaining muscle was assessed with the Diet subscale of the Muscle Dysmorphia Inventory (MDI; Lantz et al., 2002; Rhea et al., 2004). This subscale asks participants to rate the extent (1 = Never to 6 = Always) to which certain statements (e.g., “I regulate my caloric intake to maximize muscular development”) apply to them. This subscale has good reliability in powerlifters ($\alpha = .84$), bodybuilders ($\alpha = .87–.94$), and recreational weight trainers ($\alpha = .88$; Lantz et al., 2002; Rhea et al., 2004), and has good construct validity (Rhea et al., 2004). A high score indicates greater eating pathology. The internal consistency of the MDI-Diet subscale in the present study was good ($\alpha = .82$).

**Supplement Use**

Supplement use was assessed by the Supplement subscale of the MDI (Lantz et al., 2002; Rhea et al., 2004). This subscale asks participants to rate the extent (1 = Never to 6 = Always) to which certain statements (e.g., “Before a workout, I consume energy supplements.”) apply to them. This subscale has excellent reliability in powerlifters ($\alpha = .91$), good to excellent reliability in bodybuilders ($\alpha = .80–.94$), and adequate reliability in recreational weight lifters ($\alpha = .75$; Lantz et al., 2002; Rhea et al., 2004). Furthermore, it has good construct validity (Rhea et al.,
A high score indicates greater use of supplements. The internal consistency of the MDI-Supplement subscale in the present study was good ($\alpha = .86$).

**Sociocultural Pressure**

The Perceived Sociocultural Pressure Scale (Stice, Ziemba, Margolis, & Flick, 1996) was used to assess the extent (1 = Never to 5 = Always) to which participants perceived pressure from friends, family, dating partners, and the media to be lean and muscular. Because the scale was originally developed for use in eating disorder populations, the items were adapted to reflect the nature of body image of relevance to this study (the original scale is first in the appendix, followed by the adapted version used in this study). For example, the item, “I’ve felt pressure from my friends to lose weight” was changed to read as follows: “I’ve felt pressure from my friends to lose body fat.” An additional example would be the item, “I’ve noticed a strong message from my friends to have a thin body”, which was changed to read as follows: “I’ve noticed a strong message from my friends to have a muscular body.” The adaptation of the items was derived after consulting with graduate students and a professor, all of whom have extensive experience in body image research. A high score indicates greater perceived sociocultural pressure to conform to the male “ideal.” The internal consistency of the Perceived Sociocultural Pressure Scale in the present study was acceptable ($\alpha = .75$).

**Drive for Muscularity**

Drive for muscularity was assessed by the Drive for Muscularity Scale (DMS; McCreary & Sasse, 2000), which is considered to be the best available scale for assessing muscularity-related concerns (Cafri & Thompson, 2004). Specifically, the DMS is a 15-item likert-type scale with two subscales that assesses the extent (1 = Always to 6 = Never) to which the respondent holds attitudes (Muscle-oriented body image; MBI) and engages in behaviors (Muscularity-related behavior; MB) indicative of the pursuit of a muscular physique. The DMS has good
reliability ($\alpha = .81–.91$), and has been shown to have good face, convergent, and discriminant validity in men (Chittester, 2003; McCreary et al., 2006; McCreary & Sasse, 2000; McCreary et al., 2004). In accordance with the recommendation by McCreary et al. (2004), one item (“I think about taking anabolic steroids”) was omitted from the survey because it does not load on either subscale of the DMS. All items are reverse coded so that high scores on the DMS indicate a high drive for muscularity. The internal consistency of the DMS-MBI ($\alpha = .88$) and DMS-MB ($\alpha = .83$) in the present study was good.

**Exercise Dependence**

Exercise dependence was assessed with the Exercise Dependence Scale (EDS; Hausenblas & Symons Downs, 2002b). The EDS is a 21-item likert-type scale that consists of seven subscales: withdrawal effects (“I exercise to avoid feeling stressed.”), tolerance (“I feel less of an effect/benefit with my current exercise.”), continuance (“I exercise despite recurring physical problems.”), lack of control (“I am unable to reduce how long I exercise.”), reduction in other activities (“My exercise interferes with work/school responsibilities.”), time (“I organize my life around exercise.”), and intention effects (“I often exercise longer than I intend.”). The EDS has acceptable reliability (Hausenblas & Fallon, 2002; Hausenblas & Symons Downs, 2002b), and preliminary data indicate the EDS is valid (Hausenblas & Symons Downs, 2002b; Symons Downs, Hausenblas, & Nigg, 2004). Higher EDS scores indicate greater exercise dependence. The internal consistency of the EDS in the present study was excellent ($\alpha = .91$).

**Self-esteem**

The Rosenberg Self-esteem Scale (Rosenberg, 1989) was used to assess global self-esteem. This 10-item scale asks participants to rate the extent (1 = Strongly agree to 4 = Strongly disagree) to which they agree with each question (e.g., “At times I think I am no good at all”). This scale is reliable and valid; recent research indicates it may be superior to other measures of
self-esteem (Griffiths et al., 1999). Some items are reverse coded; low scores on the Rosenberg Self-esteem Scale indicate poor self-esteem. The internal consistency of the Rosenberg Self-esteem Scale in the present study was good ($\alpha = .83$).

**Procedure**

Participants were recruited with advertisements to participate in a study on body image that would include body fat assessment (see Appendix B). These advertisements were disseminated by either being read aloud in college classes or by being posted in various locations. The advertisement was read aloud in select courses between August 2006 and January 2007 within the departments of Applied Physiology & Kinesiology and Psychology at the University of Florida, and the department of Social and Behavioral Sciences at Santa Fe Community College. In addition, the advertisement was posted from late-June to December 2006 in the following three ways:

- The announcement was placed on a website, [http://www.my.ufl.edu](http://www.my.ufl.edu), which is a secure website accessible only to university students;
- The announcement was placed in prominent areas within selected university parking structures;
- The announcement was placed in several private gyms and fitness centers within the Gainesville area.

The advertisement directed interested men to an email address to write to if they wanted to participate. The advertisement asked interested men to include the following demographic information in their email: age, height, weight, and contact information. The researcher then contacted each respondent (via email, or if unsuccessful, by phone call) to schedule an individual testing session (Note: a reminder email was sent to each participant the day before his appointment) with the primary researcher at the Exercise Psychology laboratory. Out of 159 men who either contacted the lab to indicate they were interested in participating or signed up when
the study announcement was made in their classes, 113 men actually enrolled in the study. Once at the testing center, after providing informed consent, the participant’s height and weight was measured by using a Healthometer scale (Chicago, IL). Height without shoes was measured to the nearest 0.25 inch, and weight was measured to the nearest 0.25 lb. Each participant was then asked to complete several surveys (detailed in the previous section). After the participant had completed the surveys, body fat percentage was assessed via skinfold measurement. After all data had been collected, the participant was debriefed and excused from the testing center. Testing sessions were between 20–30 minutes in length. The protocol for this study was reviewed and approved by the University of Florida Institutional Review Board prior to participant recruitment.

**Data Analysis**

First, descriptive statistics for all variables were calculated, and the internal consistency of all surveys was ascertained. In addition, once data were entered, a search for outliers (e.g., 3 or more standard deviations from the mean) and missing data was initiated. When data were missing, the mean of the particular variable was inserted when less than 5% of the values for the variable were missing (Cohen & Cohen, 1983). In addition, a correlation matrix was derived that showed the correlations between the following variables: objective BMI, self-report BMI, body fat percentage, FFMI, weightlifting index, exercise behavior (as measured by the LTEQ), eating habits (as measured by the MDI—Diet subscale), supplement use (as measured by the MDI—Supplement subscale), perceived sociocultural pressure, muscle-oriented body-image (as measured by the DMS—MBI subscale), muscle-related behaviors (as measured by the DMS—MB subscale), drive for muscularity, exercise dependence, and self-esteem. A paired-samples t-test was used to determine whether differences between subjective and objective BMI were significant.
Finally, to examine the main purposes, one stepwise multiple regression analysis was conducted. Stepwise regression was used because there exists no empirical data indicating which factor would be the best predictor of drive for muscularity; were such data available hierarchical regression, where the researcher specifies the ordering of predictors, would have been conducted. The stepwise regression analysis determined which measures of body composition (Independent variables = BMI, body fat percentage, FFMI) and psychological factors (Independent variables = exercise behavior, weightlifting index, eating pathology, supplement use, perceived sociocultural pressure, exercise dependence, and self-esteem) best predicted drive for muscularity (Dependent variable). Because multicollinearity (e.g., high correlations between independent variables) was a potential problem in this analysis, the tolerance values for the regression equation were determined.
Although body-image disturbance has historically been viewed as occurring mostly in women (Pasman & Thompson, 1988; Rand & Wright, 2000), recent research has determined that men also experience body-image disturbance (Salusso-Deonier & Schwarzkopf, 1991; Pope et al., 1993; Pope, Gruber, et al., 2000). While in women body-image disturbance arises when one compares her body to the thin and toned female “ideal” physique often portrayed in the media, body-image disturbance in men arises when one compares his body to the lean and muscular male “ideal” physique often portrayed in the media (e.g., Leit et al., 2001). Body-image disturbance is a risk factor for eating disorders (Phelps, Johnston, & Augustyniak, 1999; Stice, 2002), and the DSM–IV–TR lists preoccupation with body shape as a criterion for both anorexia and bulimia (APA, 2000). In addition, male body dissatisfaction is accompanied by a host of problematic behaviors (e.g., social avoidance, steroid use, disturbed eating; Brower, Blow, & Hill, 1994; Olivardia et al, 2000; Cafri et al., 2005), poor self-esteem (Cafri et al., 2005), and negative affect (Olivardia, 2001; Presnell et al., 2004). Because of the myriad problems associated with body-image disturbance, and the fact it is being observed more frequently in boys (McCabe & Ricciardelli, 2003; Cohane & Pope, 2001), it is imperative that predisposing factors be identified. This review focuses on the following male body-image issues: 1) What body-image disturbance is, 2) initial identification of body-image disturbance, 3) measurement of body-image disturbance, and 4) the Cafri et al. (2005) model of male body change strategies.

What Is It?

Body-image disturbance is a “subjective negative evaluation of one’s figure or body parts” (Presnell et al., 2004, p. 389). While body-image disturbance occurs in both men and women, the aspect of the body from which this disturbance stems varies between the sexes. In
women, body-image dissatisfaction arises from evaluation of one’s overall weight (i.e., the belief that one is too fat), and this is coupled with concern specific to the shape of the lower torso (e.g., hips, thighs, and buttocks; Cash et al., 2004). However, the source of men’s body-image disturbance arises from an evaluation of muscularity (Gokee-LaRose, Dunn, & Tantleff-Dunn, 2004). Knowledge of this concern was inadvertently gained during a study on the psychiatric effects of anabolic steroids in bodybuilders (Pope et al., 1993). The researchers observed that, of 108 bodybuilders, two (both of whom had a history of anorexia) reported such pronounced feelings of “puniness” and weakness that they would frequently decline social invitations and even wear heavy clothes on hot days to conceal their “small” size. Pope et al. (1993) coined the phrase “reverse anorexia” to explain this unique body-image disturbance, which is now referred to as muscle dysmorphia (Pope et al., 1997).

Although not explicitly stated in the diagnostic criteria advanced by Pope et al. (1997), a man with muscle dysmorphia would have to be muscular to the casual observer to warrant diagnosis. Because degree of muscularity can be subjective, Olivardia et al. (2000) proposed that one’s fat-free mass index (FFMI), a function of height, weight, and body fat percentage, be calculated to determine muscularity sufficient enough for diagnosis. The FFMI of nonweightlifting men typically ranges from 18–21; nonsteroid using bodybuilders typically have a FFMI between 21–25, and steroid using bodybuilders typically have a FFMI from 25 to the low 30s (Olivardia et al., 2000).

Given the muscularity requirement, one could argue that only very muscular men would even qualify for muscle dysmorphia. However, many non weightlifting men experience body-image disturbance, which usually focuses on a lack of muscularity. If these men do not have muscle dysmorphia (i.e., they do not possess the muscularity required for diagnosis), what do
they have? One way to describe this body-image disturbance is in relation to one’s “drive for muscularity” and its accompanying behaviors and attitudes (McCreary & Sasse, 2000). Because this is the most salient form of body-image disturbance in men, Cafri and Thompson (2004) advocated that its measurement be the cornerstone of future male body-image research.

**Initial Identification**

The first mention of body-image disturbance is Arkoff and Weaver’s (1966) article detailing the body-image of Japanese-Americans; ironic because body-image disturbance is more prevalent in Western society than in others (Yang, Gray, & Pope, 2005). Other early body-image research primarily dealt with dissatisfaction in relation to facial surgery (e.g., Peterson & Topazian, 1976; Macgregor, 1981) and obesity (Guggenheim, Poznanski, & Kaufmann, 1977). However, by the mid-1980s researchers began to focus on the link between body-image disturbance and eating disorders (e.g., Freeman, Beach, Davis, & Solyom, 1985); this is likely the reason why most body-image research up to the early 1990s focused on women.

**Measurement**

Several measures have been developed to assess body-image disturbance in men (see Stewart & Williamson, 2004, for a review), and the focus of each measure varies depending on what aspect of body-image disturbance (i.e., concerns surrounding degree of muscularity or adiposity) is of primary interest. The most widely used measures for assessing male body-image disturbance are the Drive for Muscularity Scale (DMS; McCreary & Sasse, 2000), the Multidimensional Body Self-Relations Questionnaire (MBSRQ; Brown, Cash, & Mikulka, 1990) and the body dissatisfaction subscale of the Eating Disorders Inventory (EDI—BD; Garner, Olmstead, & Polivy, 1983).

Over the past five years several new indices of male body-image disturbance have been advanced, including the Muscle Appearance Satisfaction Scale (Mayville, Williamson, White,
Netemeyer, & Drab, 2002), Muscle Dysmorphia Survey (Chittester, 2003), Muscle Dysmorphia Inventory (Rhea et al., 2004), and the Male Eating Behavior and Body Image Evaluation (Kaminski, Chapman, Haynes, & Own, 2005). These measures recognize that a major component of male body-image disturbance focuses on one’s simultaneous desire for more muscle mass and less body fat. Unfortunately, while these measures effectively assess preoccupations and behaviors characteristic of male body-image disturbance related to musculature, they do not assess specific nutritional strategies employed to gain muscle mass while simultaneously stripping away body fat. This information is critical in completely understanding a multidimensional construct (i.e., how dietary practices, substance use, body composition, body-image dissatisfaction, and other psychological factors interact) such as male body-image disturbance.

Heuristic Model of Male Body Change Strategies

In an effort to organize the constructs associated with male body-image disturbance, Cafri et al. (2005) advanced a heuristic model that maps these constructs and provides an illustration of the strength of the various relationships that exist between the constructs (Figure 3–1). The model consists of seven main constructs, with six constructs consisting of subcomponents. The seven main constructs (and their subcomponents) are:

- Biological Factors (body composition/BMI, pubertal growth, pubertal timing);
- Psychological Functioning (negative affect, self-esteem);
- Societal Factors (media influence, peer and parental influence, teasing, peer popularity);
- Social Body Comparison;
- Body Image Dissatisfaction (muscularity, body fat);
- Health Risk Behaviors (steroids, steroid precursors, ephedrine, dieting to lose weight, dieting to gain weight, dieting to increase muscularity);
• Sports (organized team sports, informal team sports, weightlifting).

The present study focuses on the following components: Biological Factors, Psychological Functioning, Societal Factors, Body Image Dissatisfaction, and Health Risk Behaviors. Accordingly, each of these constructs will be discussed in subsequent sections of this document. Because two constructs (Social Body Comparison and Sports) of the Cafri et al. (2005) model are not included in the present study, the reader is referred directly to the aforementioned article for a more in-depth review of those constructs.

**Biological Factors**

**Body composition/BMI**

BMI is a ratio of body weight (kg) to height (m²) widely employed to ascertain overweight or obese status. According to the Expert Panel on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults (EPIETOOA; 1998), BMI correlates significantly with body fat percentage; it is for this reason that it is advisable to assess BMI as a routine procedure of a patient’s visit to see a physician (Manson, Skerrett, Greenland, & VanItallie, 2004).

While BMI can be conveniently ascertained from self-reported height and weight, there is some evidence suggesting that BMI derived from self-report data is inaccurate. For example, in their study of 6000 16–64-year-old males and females in southwestern England, Hill and Roberts (1998) compared BMI based on self-reported height and weight to BMI based on measured height and weight. They found that, based on self-reported BMI, 49.7% of the males were classified as “normal,” whereas 37.3% were classified as “overweight.” However, based on objectively measured BMI, they found that the exact opposite was true: only 36.1% of the males had a “normal” BMI, while 46.7% were classified as “overweight.” Furthermore, similar patterns in the underestimation of BMI based on self-report data have been observed in 11th grade Welsh boys (Elgar et al., 2005) as well as high school-aged boys in the United States (Brener et al.,
This underestimation of BMI based on self-report data is attributed to an overestimation of height and an underestimation of weight, although some research suggests that only at-risk status (e.g., restrained eaters) significantly predicts weight underestimation (Shapiro & Anderson, 2003). Taken together, these findings suggest that BMI derived from self-reported height and weight is inaccurate, and this poses a noteworthy problem for researchers who have large sample sizes yet need this information from their participants.

A common practice of studies on male body-image disturbance involves the calculation of BMI to serve as an objective measure of body size, which could then be correlated with degree of body dissatisfaction. Results of such studies have consistently shown a strong curvilinear relationship between BMI and body dissatisfaction in males (Frederick et al., 2006; Gila et al., 2005; Grilo & Masheb, 2005; Kostanski et al., 2004; Kostanski & Gullone, 1998; Presnell et al., 2004). However, a clear link between BMI and either the drive for muscularity or muscle dysmorphia, constructs that represent specific descriptions of male body-image disturbance, has yet to be established. In fact, only two studies are known to have even investigated the link between BMI and any variables related to either drive for muscularity or muscle dysmorphia (Cafri, van den Berg, & Thompson, 2006; McCreary et al., 2006). In their study of 13-18-year old boys, Cafri et al. (2006) observed small but significant positive correlations between BMI and dieting to gain weight (r = .16) and the use of performance enhancing drugs (e.g., anabolic steroids, ephedrine, prohormones; r = .13), but did not observe correlations between BMI and either body dissatisfaction or muscle dymorphia symptoms (Cafri et al., 2006). This latter finding is a surprising departure from the general male body-image disturbance literature. In addition, McCreary et al. (2006) found that BMI was not related to
attitudes or behaviors related to drive for muscularity among college-aged men. The findings of these studies indicate a need to clarify the role of BMI in drive for muscularity.

The most often cited reason why BMI is not used more often in drive for muscularity or muscle dysmorphia research is the recognition that BMI is a poor measure of body composition for persons who have a high degree of muscularity (McCabe & Ricciardelli, 2004b). For persons with a high amount of muscle mass, BMI could easily indicate a man was obese when he actually carried a significant amount of muscle. As a result, BMI is rarely (if ever) used as a primary outcome variable in research on either drive for muscularity or muscle dysmorphia. However, as has been established in this section, the decision whether to use objectively measured BMI vs. self-reported BMI should not be taken lightly because the available data suggest objectively measured BMI is superior to BMI based on self-report.

**Pubertal growth**

Puberty is a time in which a male’s body changes from that of a child to a mature young adult. For males this means an increase in body mass; specifically, a marked increase in muscularity. Thus, this is the stage at which boys begin to acquire the physique of a man and subsequently move closer towards the male “ideal,” which is often accompanied by increased body satisfaction (e.g., Rodriguez-Tomê, Bariaud, Cohen Zardi, Delmas, Jeanvoine, & Szylagyi, 1993). However, because puberty marks a period of body change it is possible that some adolescent males may seek even greater levels of muscularity through a variety of means; research on this topic is mixed. For example, O’Dea and Abraham (1999) found that trying to lose weight is significantly more likely in boys who have already reached puberty than in prepubescent boys, while McCabe et al. (2001) observed that pubertal growth was associated with behavior aimed at increasing muscle tone and with increased use of food supplements designed to add muscle mass. These findings illustrate a pattern of behavior consistent with the
simultaneous desire to decrease body fat and increase muscle mass. However, in their study of 269 adolescent boys, Cafri et al. (2006) found no relationship between pubertal development and substance use (steroids and food supplements), muscle dysmorphia symptoms, or dieting to gain weight. Taken together, the role of pubertal growth on body change strategies and body-image disturbance is unclear and would benefit from further study.

**Pubertal timing**

Although the precise role of puberty in male body-image disturbance is unclear, there is more certainty in how the timing of puberty impacts body-image disturbance and body change strategies. Specifically, the available research indicates that early maturation is associated with greater body-image satisfaction amongst adolescent boys, and that late maturation is associated with greater body-image disturbance (McCabe & Ricciardelli, 2004a; Siegel, Yancey, Aneshensel, & Schuler, 1999). While this may suggest an advantage to early maturation, a closer look at the longitudinal data of McCabe and Ricciardelli (2004a) reveals that early-maturing males are not devoid of problematic behaviors associated with their early jump into adulthood. Consistent with the findings of O’Dea and Abraham (1999), McCabe and Ricciardelli (2004a) found that early maturing males were more likely than on-time or late-maturing males to adopt weight loss strategies. Furthermore, weight loss strategies predicted exercise dependence and use of food supplements in these males eight months later. This troublesome pattern of behavior was not exclusive to early maturing males: common findings across early, on-time, and late-maturing males indicated that: 1) strategies to decrease weight predicted exercise dependence eight months later, and 2) use of food supplements predicted disordered eating (McCabe & Ricciardelli, 2004a).

Indeed, with respect to body change strategies, it seems that the early-maturing males are happy to have their increasingly masculine bodies, but they also engage in behaviors to make it
even more masculine. Needless to say, late-maturing males eventually “catch-up” to early and on-time maturers in regards to the onset of body change behaviors, but there is a final caveat: the only group for whom steroid use was not part of the final structural model at 8 months was the late-maturing males (McCabe & Ricciardelli, 2004a). Perhaps there is nothing wrong with maturing a little later after all.

**Psychological Functioning**

**Negative affect**

Negative affect or depression is positively correlated with body dissatisfaction in boys (Kostanski & Gullone, 1998; McCreary & Sasse, 2000), and has been identified as a strong predictor of body-image disturbance in the same population (Presnell et al., 2004). In addition, the model proposed by Cafri et al. (2005) hypothesizes that negative affect is related to unhealthy behaviors (e.g., use of anabolic steroids, ephedrine, special dieting techniques to minimize body fat and maximize musculature) often engaged in by men with body-image disturbance. Furthermore, Olivardia et al. (2000) found that men with muscle dysmorphia had significantly higher rates of past mood disorders (58%) than normal weightlifters (20%). With respect to body change behaviors, a recent study found negative affect in men to be significantly positively related to both efforts to increase muscle and dietary restraint (Heywood & McCabe, 2006). It is of note that some studies have assessed depression in anabolic steroid users, a subgroup of weightlifting enthusiasts and bodybuilders that may present with body-image disturbance (Blouin & Goldfield, 1995).

**Self-esteem**

The relationship between self-esteem and body-image disturbance has received a fair amount of research. In an overview of the risk factors for drive for muscularity, Cafri et al. (2005) proposed a model in which self-esteem and the adoption of unhealthy behaviors (e.g., use
of anabolic steroids, ephedrine, special dieting techniques to minimize body fat and maximize muscularity) are related. Simultaneously, Cafri et al. (2005) stated that body dissatisfaction leads one to adopt these unhealthy behaviors. What the model does not propose, however, is a direct link between self-esteem and body dissatisfaction, which is believed to be a stable relationship (Cohane & Pope, 2001). Indeed, poor self-esteem is often associated with body-image disturbance, and this has been found when measuring the drive for muscularity in adolescent boys (McCreary & Sasse, 2000). In addition, Irving, Wall, Neumark-Sztainer, and Story (2002) found that adolescent boys who used anabolic steroids had significantly lower self-esteem than non-users, and tentative support for a relationship between low self-esteem and use of anabolic steroids in weightlifters has been identified (Kanayama, Pope, Cohane, & Hudson, 2003). Findings such as these lend support to the sentiments of researchers who speculate that some men may enter bodybuilding, in part, to offset low self-esteem (Oliosi, Dalle Grave, & Burlini, 1999).

**Societal Factors**

**Media influence**

One reason for the increase in male body-image disturbance is the portrayal of an “ideal” male body in the mass media (e.g., men’s magazines; Labre, 2005), and there is evidence that viewing this ideal is negatively impacting high school boys (Presnell et al., 2004) and leading them to take measures to increase their muscularity (McCabe & Ricciardelli, 2005). Furthermore, not only are men from Playgirl centerfolds (Leit et al., 2001) to professional football players (Kraemer et al., 2005) becoming more muscular, the action figures preferred by many preadolescent boys are taking on superhuman physiques (Pope et al., 1999). To better understand the impact of viewing the ideal male body (as portrayed in the media) on body-image disturbance, Leit, Gray, and Pope (2002) showed slides depicting the ideal male physique to
undergraduate men in a laboratory setting and then asked them to indicate via the somatomorphic matrix: a) their perceived body type, b) the ideal body type, c) the average man’s body type, and d) the body type women preferred. Compared to men who had been shown neutral slides that did not depict the ideal male physique, men who saw slides of the ideal physique not only selected an ideal body type with a significantly higher FFMI (Leit et al., 2002), but also indicated they believed the average man had a significantly higher FFMI.

The drive for muscularity is not only pervasive in American culture—studies in other Westernized cultures such as Australia, France, The Netherlands, Great Britain, Austria, and South Africa have shown a similar pattern of preference for increasingly muscular physiques. For example, in a study comparing Austrian, French, and American men, Pope, Gruber et al. (2000) found no difference in how much more muscle each group desired: the preference was for an additional 27 lbs. of muscle. Contrasting these findings with research in Taiwanese men, which shows that they prefer to have a physique with only about 4.5 lbs. more muscle (Yang et al., 2005), illustrates the disparities between West and East in male body-image ideals.

Peer and parental influence

Studies have examined the impact of both peers and parents on body-image and body change strategies in males. For example, body dissatisfaction in boys is significantly related to the amount of weight-loss encouragement a parent provides (Wertheim et al., 2002). In light of this finding, some argue that there may be a difference in what mode of weight loss mothers (dieting) and fathers (exercise) consider acceptable (Ricciardelli & McCabe, 2004). Furthermore, Smolak et al. (2005) found that both peer and parental comments were predictive of muscle building techniques; specifically, boys who used either steroids or supplements reported significantly higher levels of parental comments regarding body size than did non-using boys.
Collectively, these studies suggest that peers and parents are quite influential in whether a boy decides to adopt body change behaviors aimed at increasing muscularity.

**Teasing**

One hallmark of muscle dysmorphia is that a very muscular male perceives that others will mock or ridicule his self-perceived small or wimpy physique. This belief can then lead to problems such as social avoidance and anxiety. In a similar vein, several studies have investigated the impact of teasing on the body-image of males. For example, Cafri et al. (2006) found teasing to be significantly negatively correlated with dieting to gain weight and body dissatisfaction in adolescent males; the latter finding was believed to have occurred because of an indirect relationship between the two variables that is mediated via negative affect. In addition, teasing was significantly positively correlated with muscle dysmorphia symptomatology, but did not emerge as a significant predictor of muscle dysmorphia symptoms. Again, Cafri et al. (2006) explained this latter finding as indicative of an indirect relationship between the two.

Paxton et al. (2006) recently conducted a longitudinal study on adolescent boys over a 5-year span in an effort to predict body dissatisfaction during middle adolescence. They found that Time 1 weight-related teasing was a significant predictor of Time 2 body dissatisfaction, but once the regression model was reduced and depression was included, weight-related teasing dropped out as a significant predictor. This suggests, as did Cafri et al. (2006), a relationship early in adolescence between teasing and body dissatisfaction that is mediated by depression. Although the relationship between teasing and body dissatisfaction must be teased apart by future research, what is already known of the relationship between the two has prompted the development of interventions aimed at decreasing teasing in the elementary school setting (e.g., Haines, Neumark-Sztainer, Perry, Hannan, & Levine, 2006).
Peer popularity

Little research has examined the relationship between popularity and male body change strategies, but it is known that a curvilinear relationship exists between popularity and physique in adolescent males. Specifically, in comparison to either thin or heavy adolescent males, adolescent males who have a muscular physique have greater body satisfaction and are more popular, but they are also more likely to be dieting (Graham, Eich, Kephart, & Peterson, 2000; McCabe & Ricciardelli, 2004a; Wang, Houshyar, & Prinstein, 2006). Furthermore, there is limited evidence of a weak association between popularity and efforts to increase muscularity amongst adolescent males (McCabe, Ricciardelli, & Finemore, 2002).

Social Body Comparison

Social comparison is the process by which an individual evaluates his or her attributes, characteristics, or outcomes based on how they compare to the attributes, characteristics, or outcomes of another person. For example, if an individual scored a 75% on an exam he may be discouraged; however, after learning the class mean was 65% he may view his score more positively in light of what “could have been.” Similar processes are believed to be at work when individuals evaluate their bodies; opportunities for a male to compare his body to another male’s body are numerous, especially considering how much television adolescent boys watch (e.g., music videos) and how many other media outlets (e.g., magazines) routinely produce content that emphasizes a lean and muscular physique (Labre, 2005; Tiggemann, 2005). Specifically, studies have found that males report greater body dissatisfaction after being exposed to images of the male “ideal” body (e.g., Leit et al., 2002; Strong, 2005).

Body-image Dissatisfaction

Unlike body-image disturbance in women, body-image disturbance in men arises because men perceive themselves as either too heavy or too thin (Kostanski et al., 2004; Kostanski &
Gullone, 1998; Presnell et al., 2004). This distinguishes the nature of body-image disturbance in men from that of women because it identifies a “double-edged sword” of risk in men not present in women. What has arisen from these findings is twofold: (1) when a male reports dissatisfaction with being too small, the desire is to gain weight in the form of muscle mass, and (2) when a male reports dissatisfaction with being too large, the desire is to lose weight in the form of body fat.

**Muscularity**

Recognizing the central role of muscularity in male body-image disturbance, several studies have derived FFMI as the objective measure of degree of muscularity in participants (Pope, Gruber, et al., 2000). For example, Olivardia et al. (2000) found that men with muscle dysmorphia had significantly higher FFMI than did normal comparison weightlifters; this lends support to the argument that a key element of muscle dysmorphia is that a quite muscular man perceives himself to be small or weak. Furthermore, body composition is a hypothesized (yet poorly understood) precursor to body-image disturbance in the Cafri et al. (2005) model, although some evidence indicates minimal musculature is a significant predictor of muscle dysmorphia symptoms (Chittester, 2003). There has been only one study to date that has directly correlated FFMI with drive for muscularity (McCrea, et al., 2006), and it found no correlation between the two. Further research is clearly required because gaining better insight into this relationship would greatly advance our knowledge of the complexity of male body-image disturbance and actual muscularity; to this point such research has been a notable oversight in the literature because of the critical role actual (or perceived) muscularity plays in male body-image disturbance.
Body fat

Because the BMI is unable to partial out weight attributable to body fat from weight attributable to muscle, estimations of body fat are preferred when assessing body composition. Not only is this practice more scientifically precise, it is also reflective of the recognition that body fat is one of two (degree of muscularity is the other) physique-related factors that males evaluate when asked their degree of body satisfaction. For example, Olivardia et al. (2000) noted that men with muscle dysmorphia had a similar amount of body fat than normal comparison weightlifters; this lends support to the argument that one aspect of muscle dysmorphia is a disturbance in how one appraises his body composition. Most research, though, indicates that between body fat and muscularity, body fat is the least consequential; perhaps this is why surprisingly little research has directly correlated body fat percentage with body-image disturbance in men.

One method of assessing satisfaction with body fat percentage is by asking the participant to ascertain his body fat percentage by using the somatomorphic matrix. This is a computer-based test in which the silhouette of a man is presented on the screen. The participant’s task is to simultaneously manipulate the degree of muscularity and body fat of the silhouette in order to arrive at (1) the participant’s perceived actual body shape, (2) the participant’s ideal body shape, and (3) the body shape he believes that most women find ideal. For example, using the somatomorphic matrix, Leit et al. (2002) found that undergraduate men perceived average men to have about 4% less body fat than the participants perceived themselves as having; this suggests a social comparison in which these participants believed themselves to be chubby relative to an average man.

Unfortunately, recent reliability assessment by Cafri, Roehrig, and Thompson (2004) has raised legitimate concerns that the somatomorphic matrix is not reliable; clearly this assessment
tool should be re-examined and properly adjusted before being included in future body-image studies. This measurement problem underscores the need for direct assessment of body fat whenever it is an outcome of interest. Cafri et al. (2005) hypothesize that body composition is a key precursor to body dissatisfaction, yet there is little in the way of empirical data that can either confirm or falsify this proposed link. Therefore, there is a need to better understand the relationship between body fat percentage and body-image disturbance in men; such information could strengthen descriptive models such as those presented by Cafri et al. (2004) and Lantz et al. (2002).

**Health Risk Behaviors**

The pursuit of muscularity may potentially lead to the use of illegal substances or dietary supplements and products, most of which are marketed as “weight-gainer” or weight loss supplements. These substances are attractive to someone with high body-image disturbance because of the belief that they offer a “quick fix” to one’s body dissatisfaction that will require minimal lifestyle change on the part of the user. In addition, many men adopt rigid eating habits in an attempt to lose weight, gain weight, or add muscle mass. This section will detail these behaviors that increase the risk to health.

**Steroids**

Anabolic steroids, despite being illegal in the United States, are attractive to persons who desire greater muscularity because these substances significantly enhance muscle mass in a relatively short period of time (Hartgens & Kuipers, 2004). While steroids offer these desirable effects, they also pose numerous risks to both physical and psychological health. Adverse physical symptoms include destabilization of lipid levels (which may increase risk of cardiovascular events), disturbances in liver function, testicular atrophy, and acne (Hartgens & Kuipers, 2004; Pope & Katz, 1994; Tricker, O’Neill, & Cook, 1989). In addition, psychological
ramifications of steroid use include aggressive behavior, mood disorders, and psychotic symptoms (Lefavi, Reeve, & Newland, 1990; Pope & Katz, 1987; 1988; 1994; Tricker et al., 1989). Finally, beyond physical and psychological ramifications, steroid use is both a financial (a user could expect to pay between $100–$275 for a 100 count bottle; Kouri, Pope, & Katz, 1994) and legal risk (attempting to acquire steroids on the black market may be the pathway to jail for some users; e.g., Pope et al., 1993).

Perhaps the most troublesome aspect of body-image disturbance in men is its relationship to anabolic steroid use. Several studies have concluded that body dissatisfaction is a primary predictor of steroid use in men (Blouin & Goldfield, 1995; Brower et al., 1994; Chng & Moore, 1990; Kanayama et al., 2003; Cole et al., 2003). Furthermore, in a summation of interviews with 10 former steroid users, Olrich and Ewing (1999) alluded to body dissatisfaction as a precipitating factor. Specifically, these men reported steroid use, in part, because of (1) upward social comparisons (i.e., comparing oneself with more muscular men in the gym), and (2) perceived lack of gains in size and strength. In recognition of this unequivocal link, and the dire consequences of steroid use, it is prudent to develop interventions aimed at increasing body satisfaction in young men.

**Steroid precursors**

Adrenal hormones are substances designed to increase muscle mass because they are testosterone precursors. Some examples include growth hormones (e.g., levodopa or L-DOPA) and testosterone stimulants such as HCG. Perhaps the best-known adrenal hormone is androstenedione, the substance admittedly used by former major league baseball star Mark McGwire during his quest for the single season home run record in 1998. In a review of these types of hormones, Ziegenfuss, Berardi, Lowery, and Antonio (2002) concluded that while physiological effects such as decreases in high density lipoprotein (“good” cholesterol) and
increases in estrogen and testosterone levels are seen while taking these supplements, clear
evidence that they positively increase either muscle mass or performance (the primary claim
made when they are marketed) is lacking. In fact, Ziegenfuss et al. (2002) argued that the
theoretical risks of using these adrenal hormones outweigh any potential benefits they have to
offer, while others (Kreider, 1999) have gone further and said the use of these hormones should
not be encouraged.

Men with body-image disturbance often use a variety of performance-enhancing
substances (ranging from supplements found in health food stores to anabolic steroids obtained
on the black market) in an attempt to attain the “ideal” physique. In addition, adolescent boys
frequently consume these substances; this is alarming in light of McCabe and Ricciardelli’s
(2004a) finding that disordered eating in adolescent boys is predicted by the use of food
supplements. There are literally scores of different kinds of substances that are used by men who
want to simultaneously shred fat and gain muscle (Pope, Phillips, et al., 2000). Because of their
use primarily to alter body composition, which the user believes will facilitate greater body
satisfaction, some researchers have begun referring to these as “body image drugs” (Kanayama
et al., 2001). Two additional classes of supplements are described below.

Protein supplements are designed to add muscularity; they typically come in the form of
snack bars, shakes, or powder, and are often consumed pre-workout, post-workout, or between
meals. For example, protein supplements such as “Met-Rx” and “Power Bar” are high in protein
content, although there is little evidence that such supplements are more effective at promoting
muscle growth than foods such as lean meat or skim milk (Pope, Phillips, et al., 2000).

Creatine is a very popular supplement, and studies have shown it to increase muscle mass
(e.g., Chilibeck, Stride, Farthing, & Burke, 2004; Kreider, 1999), but it is believed that a large
portion of this gain may be attributable to water (Pope, Phillips, et. al, 2000). Creatine is regarded as relatively safe; a recent review of its side effects noted that the greatest harm it poses is likely restricted to issues regarding the purity of the supplement itself as it is manufactured (Bizzarini & De Angelis, 2004). Perhaps concerns over water retention explain the use of diuretics in some users (to eliminate water weight and increase the appearance of muscle mass). In addition, hydroxycitrate acid is a supplement frequently used as a compliment to muscle-promoting supplements because of its reported ability to inhibit lipogenesis and thus promote weight loss and a leaner physique. These claims, however, appear unfounded, as neither weight loss nor increased energy expenditure are facilitated by this supplement (Heymsfield, Allison, Vasselli, Pietrobelli, Greenfield, & Nunez, 1998; van Loon, van Rooijen, Niesen, Verhagen, Saris, & Wagenmakers, 2000).

**Ephedrine**

Ephedrine (ma huang) is a central nervous system stimulant often used in conjunction with caffeine to produce weight loss. The user will frequently combine the use of this supplement with exercise and strict dietary practices aimed at shredding fat and gaining muscle. In recent years there have been several reports of adverse effects associated with ephedrine, including mania-like episodes, acute myocardial infarction, stroke, and in especially vulnerable persons, death (Emmanuel, Jones, & Lydiard, 1998; Haller & Benowitz, 2000; Saper et al., 2004; Traub, Hoyek, & Hoffman, 2001). While Hutchins (2001) argued that “the implication of ephedrine-type alkaloids in deaths from a wide variety of conditions that occur in the general population is no more than idle speculation” (p. 1096), the Food and Drug Administration found sufficient reason to ban in April 2004 the sale of ephedrine in the United States.
**Dieting to lose weight**

Although females are more likely to try to lose weight than males (e.g., McCabe et al., 2002), males also adopt weight loss strategies. It is troublesome to note that this starts early in life: evidence indicates that boys as young as 8–years old already have thoughts of losing weight, or have already engaged in weight loss behavior (McCabe & Ricciardelli, 2003). When males desire to lose weight the efforts are primarily aimed at decreasing body fat (as opposed to overall body size reduction, as is the goal when females attempt to lose weight). In some men the drive to lose weight may be so severe that it leads to problems such as exercise dependence or eating disorders (O’Dea & Abraham, 2002; Sharp, Clark, Dunan, Blackwood, & Shapiro, 1994; Stice, 2002).

It is well established that bodybuilders, especially those who compete, closely monitor their dietary intake (Lantz et al., 2002) and display significantly greater eating disturbed attitudes than athletically active controls (Goldfield, Blouin, & Woodside, 2006; Pickett et al., 2005); however, it has been argued that careful attention to dietary intake is part of the competitive nature of the sport of bodybuilding, and, provided it harmed neither the health nor performance of the individual, could easily be viewed as “drive” or motivation (Chung, 2001). Of course, the problem arises when harm is being done to the individual when disturbed eating behaviors are taken in context of an overall pattern of behavior designed to achieve maximum muscularity.

**Dieting to gain weight/increase muscularity**

It is interesting to note that one of the first articles that observed a desire on the part of boys to increase weight attributed this desire to the tendency of boys to “value change in shape or tallness” (Andersen & Holman, 1997, p. 392); in retrospect, although they alluded to a desire to add muscle, it appears this did not occur to the researchers at the time, and rightly so because there was little knowledge of or research on this relatively new phenomenon. Whereas for
women the issue of dieting usually refers to weight loss efforts, a unique form of eating behavior is being observed more frequently in men. Specifically, males with body-image disturbance not only restrict foods high in fat, they also consume large amounts of food that are high in protein. Indeed, a study from Northern Ireland found that the amount of protein consumed by males significantly increased between the ages of 15 and 22 (Boreham, Robson, Gallagher, Cran, Savage, & Murray, 2004), although the extent to which this was an intentional dietary practice was not determined. This dieting behavior is aimed at maximizing gains in muscle mass while simultaneously limiting calories from fat. This may result in continuous cycles of weight gain and loss of over 11 lbs. in the case of competitive bodybuilders (Oliosi et al., 1999). If extreme eating practices produce such drastic weight fluctuations in competitive bodybuilders, it is disturbing to note that adolescent boys are increasingly turning to such strategies to achieve the lean, muscular look. This is especially concerning due to the knowledge that body-image disturbance is an identified risk factor for such unhealthy eating behavior (Cafri et al., 2005; Muris, Meesters, van de Blom, & Mayer, 2005).

A major limitation of understanding the role of dietary practices in the pursuit of muscularity has been the lack of a psychometrically sound instrument. Previous studies have used measures that have been validated for use with eating disordered populations (e.g., Tiggemann, 2005), but even these are not without limitation when being used in men. Recently a Muscle-Oriented behavior subscale has been identified on the Drive for Muscularity Scale (McCreary, Sasse, Saucier, & Dorsch, 2004); this contains some items that more precisely measure dietary practices aimed at building muscle (e.g., “I try to consume as many calories as I can in a day”). In addition, Kaminski et al. (2005) have developed the MEBBIE, a scale specifically designed to assess eating, exercise, and body-image related attitudes and behaviors; a
recent confirmatory factor analysis has determined the factor structure to be strong (Kaminski, personal communication, 2005), but it does not appear to contain questions specific to eating practices undertaken to add muscle. However, the Diet subscale of the Muscle Dysmorphia Inventory (MDI; Lantz et al., 2002; Rhea et al., 2004), with very specific items (e.g., “I control the intake of proteins, carbohydrates, and fats to maximize my muscular development”) and established psychometric properties, has emerged as a potential gold standard for assessing muscle-building dietary practices.

Sports

Millions of males worldwide participate in sports ranging from little league baseball and youth soccer to professional sports teams. In addition to the pure enjoyment of the specific sport, males become involved in sports for a variety of reasons, including moral development, self-esteem enhancement, development of leadership qualities, and social interactions (e.g., making friends, functioning within a group setting; Coakley, 2004; Tritschler, 2000). Considerable research over the past 30 years has been conducted to determine precisely how sport involvement impacts males on these variables and a host of others, and the consensus is that sport involvement is generally a positive experience. However, for some males, sport involvement can be accompanied by hazardous behaviors aimed at increasing performance, such as disturbed eating practices, supplement use, and steroid use (Hausenblas & Carron, 1999; Irving et al., 2002; McCabe & Ricciardelli, 2004a). Interestingly, qualitative research suggests that adolescent boys involved in sports report engaging in such behaviors to increase athletic performance, but nonetheless are fixated on their physiques for purely aesthetic reasons (Ricciardelli, McCabe, & Ridge, 2006). To further understand the role of sports in the adoption of body change strategies, Cafri et al. (2005) have drawn a distinction between organized and informal team sports; because no operational definitions were provided for what constitutes an “organized” or “informal” sport,
the following section is a general discussion about sport involvement regardless of organization status.

**Organized and informal team sports**

Sports teams could theoretically include YMCA/YWCA and other locally organized recreational leagues, in addition to professional, intercollegiate, or high school varsity teams. Within the context of drive for muscularity and its correlates the most studied population of competitive athletes is bodybuilders; indeed, success in this sport is completely reliant on unique diet and exercise behavior. Furthermore, many of these athletes use substances to help achieve maximal muscularity. Beyond bodybuilding (which will be discussed in further detail below), the sports that are most associated with unhealthy behavior related to diet, exercise, or substance use are those that are either (1) power or strength oriented (e.g., football, field events such as shot put), or (2) weight oriented (e.g., wrestling, martial arts, horse jockey; Jonnalagadda, Rosenbloom, & Skinner, 2001; Moore, Timperio, Crawford, Burns, & Cameron-Smith, 2002). However, competitive sport involvement (e.g., football, basketball, tennis, cricket) has been found to be a significant predictor of disordered eating and steroid use in early maturing adolescent boys, but not in on-time or late-maturing boys (McCabe & Ricciardelli, 2004a). This is consistent with the qualitative findings of Ricciardelli et al. (2006) in that part of the explanation for the increased likelihood of early maturing boys to engage in these behaviors lies in aesthetic concerns.

**Weightlifting**

The literature is equivocal when attempting to understand which groups of exercisers are most susceptible to experiencing body-image disturbance. For example, athletically active exercisers have lower levels of body-image disturbance than non-exercisers (Schwerin et al., 1996), Also, exercise behavior is a strong predictor of body satisfaction in physically active men...
(Hausenblas & Fallon, 2002), and Davis and Cowles (1991) found body dissatisfaction to be negatively correlated with physical activity. Furthermore, there is evidence that men who regularly lift weights are satisfied with their bodies (Pickett et al., 2005), and that weightlifting interventions designed to improve body satisfaction are efficacious (Williams & Cash, 2001). However, it is clear that for some men weightlifting is taken to unhealthy levels to achieve the ultimate high muscularity/low body fat look (Hildebrandt, Schlundt, Langenbucher, & Chung, 2006). Collectively, these findings suggest that exercise may have a protective effect against body-image disturbance for most men, but may be associated with problematic psychopathology and behavior in others.

Bodybuilders in particular report greater body-image disturbance than control men (Mangweth et al., 2001), martial artists (Blouin & Goldfield, 1995), and power lifters (Lantz et al., 2002). However, Boroughs and Thompson (2002) and Pickett et al. (2005) have recently found that bodybuilders are quite satisfied with their bodies. These conflicting findings suggest that some persons may initiate weightlifting as a result of pre-existing body dissatisfaction (Kanayama et al., 2003), while others become dissatisfied with their bodies only after initiating a weightlifting program; further research would help better understand this association.

**Other Factors Related to Male Body-Image Disturbance**

There are three additional factors that are notable when attempting to understand male body-image disturbance; what follows is a brief review of eating disorders, exercise dependence, and the impact of romantic partners.

**Eating Disorders**

Eating disorders are often viewed as one of the consequences of body-image disturbance, and the interplay between these constructs in women has received a great deal of interest; indeed, body-image disturbance is an extremely salient and stable risk factor for eating pathology.
(Cooley & Toray, 2001; Stice, 2002). Although there is no difference between men and women in eating disorder presentation (Braun, Sunday, Huang, & Halmi, 1999), the relationship between eating disorders and body-image disturbance in men has received little attention. College men with eating disorders have greater levels of body-image disturbance than non-eating disordered college men (Olivardia et al., 1995); this suggests that more research should examine the relationship between these variables in men. It is worthwhile to note, however, that body-image disturbance in men with eating disorders would likely center on dissatisfaction with overall weight, whereas body-image disturbance in non-eating disordered men would likely center around dissatisfaction with muscularity. That being said, Mangweth et al. (2001) demonstrated the complexity of male body-image disturbance when they found that men with eating disorders and male bodybuilders were virtually similar in their degree of dissatisfaction.

Because most current male body-image research addresses dissatisfaction specific to muscularity, and because past body-image research has typically been done in women, there is little information available on the relationship between male body-image disturbance and eating disorders. In fact, preliminary evidence suggests that a history of eating disorders is associated with muscle dysmorphia. For example, Olivardia et al. (2000) found a significantly higher incidence of past eating disorders in men with muscle dysmorphia (29%) than in normal comparison weightlifters (0%). Furthermore, Hitzeroth, Wessels, Zungu-Dirwayi, Oosthuizen, and Stein (2001) found that 6% (1 of 15) of amateur South African competitive bodybuilders with muscle dysmorphia had a past eating disorder. What follows is a brief overview of the research examining the relationship between male body-image disturbance and each eating disorder.
Anorexia nervosa

Although anorexia is seen less frequently in men than in women, evidence indicates that the disease presents with similar pathology for women and men (Woodside et al., 2001). Because body-image disturbance is a key component of anorexia, it is essential to understand body-image disturbance in men. For example, Gila et al. (2005) found that adolescent boys with anorexia had significantly higher body dissatisfaction than non-anorexic adolescent boys; this clearly indicates the presence of a relationship between the two, and suggests that if body-image disturbance is alleviated it would be accompanied by an alleviation of other symptoms of anorexia.

In some men anorexia may be a precursor to the development of muscle dysmorphia. For example, Pope et al. (1993) found that two out of three bodybuilders with muscle dysmorphia reported a history of anorexia. While the sample of muscle dysmorphic bodybuilders was small, this unique pairing of opposite diagnoses at different times within the same individual suggests a complex clinical picture of male body-image disturbance.

Bulimia nervosa

The clinical presentation of bulimia in men closely resembles that of bulimic women (Pope, Hudson, & Jonas, 1986). Furthermore, adolescent boys with eating patterns similar to bulimia and binge-eating disorder have expressed greater body dissatisfaction than age-matched, non-eating disturbed controls (Keel, Klump, Leon, & Fulkerson, 1998). In addition, Blouin and Goldfield (1995) identified a subgroup of bodybuilders whose psychological make-up consisted of a disturbing mixture of body dissatisfaction, bulimic-like eating patterns, and steroid use. Unfortunately, bulimic tendencies appear frequently in bodybuilders, a population that, despite recent findings of Pickett et al. (2005), seems predisposed to body dissatisfaction (Lantz et al., 2002).
**Binge-eating disorder**

People with binge-eating disorder are typically obese, and previous sections of this manuscript have established the link between bodyweight and body-image disturbance in men. Specifically, several studies have found that body-image disturbance is significantly higher in women with binge-eating disorder than in men (Barry, Grilo, & Masheb, 2002; Grilo & Masheb, 2005; Grilo, Masheb, Brody, Burke-Martindale, & Rothschild, 2005), and that body-image disturbance is correlated with body mass index (Grilo & Masheb, 2005) in men with binge-eating disorder. This is congruent with the finding that men often report body dissatisfaction when they perceive themselves as either not muscular enough or too fat.

**Exercise Dependence**

Regular exercise has positive physical and psychological benefits (Berger & Motl, 2000; Landers & Arent, 2001), a point underscored by a growing body of research that indicates exercise is an effective intervention for treating body-image disturbance (e.g., Fisher & Thompson, 1994; Williams & Cash, 2001). However, if taken to an unhealthy level exercise may be detrimental to health. The “craving for leisure-time physical activity, resulting in uncontrollable excessive exercise behavior, that manifests in physiological (e.g., tolerance/withdrawal) and/or psychological (e.g., anxiety, depression) symptoms” (Hausenblas & Symons Downs, 2002a, p. 90) is called exercise dependence. Based on one’s motives for excessive exercise behavior, exercise dependence can be described as either primary or secondary. Primary exercise dependence is when the exercise behavior is the end in itself, whereas secondary exercise dependence is when the exercise behavior is undertaken specifically to alter or control the desired body composition (Carron, Hausenblas, & Estabrooks, 2003).

There is a subset of males who take exercise to unhealthy levels to attain the “ideal” physique. Indeed, a person with exercise dependence may experience withdrawal effects, and
this may be reflected in the finding of O’Dea and Abraham (2002) that 34% of surveyed college men indicated they are distressed if unable to exercise as much as they desired, and that 20% displayed characteristics of disordered eating. This unhealthy overemphasis on exercise, and the simultaneous focus on disordered eating practices, is concerning in light of McCabe and Ricciardelli’s (2004a) recent finding that exercise dependence in adolescent boys is predicted by weight loss strategies over an 8–month period. Taken together, these findings suggest that, as disruptive and harmful as exercise dependence may be, disordered eating habits may be a precursor to unhealthy exercise behavior.

Research on drive for muscularity does not usually assess exercise dependence per se, but instead assesses “body change strategies” in which exercise (e.g., McCabe & Ricciardelli, 2004a; Ricciardelli & McCabe, 2002) or, specifically, weightlifting (e.g., Smolak et al., 2005) is a component. Contrast this approach with that undertaken in the muscle dysmorphia literature. According to the diagnostic criteria proposed by Pope et al. (1997), exercise continuation that results in significant social, occupational, or interpersonal impairment is a component of muscle dysmorphia. Therefore, because the exercise behavior itself is implicit in the diagnosis, and because it is implied that weightlifting is the mode of exercise, most assessment of exercise behavior is gained as part of a diagnostic interview (e.g., Hitzeroth et al., 2001; Olivardia et al., 2000). Attempts to circumvent an interview have led to the creation of measures such as the Bodybuilding Dependence Scale (Smith, et al., 1998) and the Muscle Appearance Satisfaction Scale (Mayville et al., 2002). However, these scales do not assess the actual mode, duration, and frequency of exercise; instead, their focus is on the respondent’s degree of persistence in exercising despite barriers (e.g., illness, injury, demands of daily activities). Therefore, the above
findings indicate a need to quantify the mode, duration, and frequency of exercise behavior when conducting future research on male body-image disturbance.

**Romantic Partners**

If there is only one certainty about how romantic partners (male-female dyads) view both their own and their partner’s body it is that the female’s body is more scrutinized than the male’s (Ogden & Taylor, 2000). In females, the scrutiny is related to the belief that the female should either lose (because she is seen as too heavy) or gain (because she is seen as too thin) weight. For example, Sheets and Ajmere (2005) found that an equal number (7%) of college women in their study had been told within the previous 3 months by a dating partner to either lose or gain weight; however, women who were told to gain weight had significantly higher relationship satisfaction than women told to lose weight. This finding implies that thinner women perceive themselves as closer to the “ideal” female physique. In addition, Weller and Dziegielewski’s (2004) study of 117 college-aged women found that romantic partner support was significantly and inversely related to body-image disturbance, which is consistent with the finding of Befort, Robinson Kurpius, Hull-Blanks, Foley Nicpon, Huser, and Sollenberger (2001) that college-aged women who receive weight-related criticism from romantic partners report greater body shame. Although Ogden and Taylor (2000) have argued that female body dissatisfaction stems from sources other than their romantic partner’s reactions to their bodies, the aforementioned findings make it difficult to dismiss the impact males can have on the body-image of their female romantic partners.

Can females have a similar impact on the body-image of their male romantic partners? There has been little research done on this topic, but there is limited evidence, both qualitative (e.g., Adams, Turner, & Bucks, 2005) and empirical, that the female partner’s evaluation of the male’s body does impact the male’s body satisfaction. For example, in their study of college
men, Sheets and Ajmere (2005) found that 24.4% of them had been told by a dating partner within the previous 3 months to either lose or gain weight. However, a disproportionate number of these men (19.7%) were told to gain weight; because the mean BMI of the sample men ($M = 24.70$) was higher than the BMI of 88% of these men, their female partners presumably were expressing their desire for a male partner with more bulk on his frame. The message was not lost on these males, as relationship satisfaction in men told to gain weight was significantly lower than in other men (Sheets & Ajmere, 2005). Consistent with this, Tantleff-Dunn and Thompson (1995) found that the only factors that significantly predicted appearance evaluation in men was what the men perceived their female partners thought of their bodies and what their female partners rated as their actual male body size preference. At the same time, other research indicates that although females view their male partners’ bodies, as well as specific body parts (e.g., shoulders, chest, arms), as closer to the “ideal” than the males believe they are, males still display a significant discrepancy between what they consider the actual and the “ideal” sizes (Ogden & Taylor, 2000). While the above findings indicate female romantic partners can influence male body-image, further research is required to clarify this relationship.

**Summary**

This chapter has described the main factors relevant to the study of male body-image disturbance. Males do experience body-image disturbance, although the rates of disturbance are lower than in women. Another distinguishing feature that separates male body-image disturbance from that experienced by women is the aspect of appearance that is dissatisfying: women primarily are dissatisfied with self-perceived heaviness, whereas men may be equally dissatisfied with either self-perceived heaviness or thinness. The Cafri et al. (2005) heuristic model of male body change strategies serves as a useful tool in attempting to understand the complexity of male body-image disturbance, especially because body-image disturbance is a known risk factor for
eating disorders, a health concern no longer restricted entirely to females, and is associated with low self-esteem and negative affect. Finally, it is believed that the drive for muscularity is also associated with (1) use of anabolic steroids to gain muscle mass, (2) misuse of dietary supplements designed to add muscle and strip away fat, and (3) the adoption of strict eating behaviors that could lead to rapid weight fluctuation.

In conclusion, the model offered by Cafri et al. (2005) serves as the inspiration for the current study. While there are seven main constructs in the model, for brevity the present study focuses primarily on the testing of hypothesized relationships that either have limited empirical support (e.g., biological factors and body-image dissatisfaction) or no proposed relationship (e.g., self-esteem and body-image dissatisfaction) where one should be. Notable exclusions from this study are social body comparison and the impact of sport. Social body comparison was omitted from the study because of the strength of support already existing for its inclusion; although weightlifting was included in the present study, the impact of organized and informal sports was omitted because the primary investigator elected to focus on general exercise behavior instead of sport involvement per se. Additional research on model constructs not included in this study is warranted to further our knowledge of drive for muscularity and associated body change behaviors.
Figure 3–1 A heuristic model of male body change behavior; solid arrows indicate relationships with greater support than broken arrows. Reprinted from Clinical Psychology Review, Vol. 25, Cafri et al., Pursuit of the muscular ideal: Physical and psychological consequences and putative risk factors, pp. 215-239, Copyright (2005), with permission from Elsevier.
CHAPTER 4
RESULTS

Descriptive Statistics

Body fat percentage was within the normal range for men of this age, and the FFMI indicated musculature of nonsteroid using recreational weightlifters (Table 1–1 contains descriptive statistics). In addition, the mean objective BMI indicated “overweight” status; it was also found that BMI based on objective measures of height and weight was significantly higher than BMI based on self-reported height and weight (\( t_{(112)} = 13.83, p < .001 \)). The correlation matrix for study variables is located in Table 1–2. Among the more noteworthy correlations are the following: (1) Objective BMI and FFMI \( (r = .77, p < .01) \), (2) self-report BMI and FFMI \( (r = .75, p < .01) \), and (3) perceived sociocultural pressure and the measures of body composition (objective BMI: \( r = .32, p < .01 \); self-report BMI: \( r = .29, p < .01 \); body fat: \( r = .24, p < .01 \); FFMI: \( r = .21, p < .05 \)).

Multiple Regression Analyses

Because the correlation between objective BMI and self-reported BMI was so high \( (r = .97) \), two separate regression analyses were run: one with objective BMI as an independent variable and the other with self-report BMI as an independent variable. Because the results across the analyses were consistent, only the regression analysis for the objective BMI is reported here (Table 1–3 contains the regression analysis using subjective BMI); the decision to report the data for the objective BMI was due to the fact that this method of BMI calculation is more accurate than subjective BMI (Elgar et al., 2005). Examination of the tolerance values revealed that I did not have multicolinearity among the independent variables (Tolerance values range = .02 to .92; Mertler & Vannatta, 2002). The regression equation explained 51\% of the variance in drive for muscularity, \( F(10,102) = 12.68, p < .001 \), with weightlifting index (\( \beta = .17 \),
$p = .05$), supplement use ($\beta = .37, p < .001$), exercise dependence ($\beta = .24, p < .01$), and self-esteem ($\beta = -.23, p < .01$) emerging as significant predictors (Table 1–4).
Table 4–1 Descriptive statistics for outcome variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>$M$</th>
<th>$SD$</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI – Obj</td>
<td>25.05</td>
<td>3.63</td>
<td>17.79–42.08</td>
</tr>
<tr>
<td>BMI – SR</td>
<td>23.82</td>
<td>3.31</td>
<td>17.01–39.14</td>
</tr>
<tr>
<td>Body fat percentage</td>
<td>15.96</td>
<td>7.01</td>
<td>4.70–32.70</td>
</tr>
<tr>
<td>FFMI</td>
<td>21.20</td>
<td>2.26</td>
<td>16.59–29.32</td>
</tr>
<tr>
<td>Cardio frequency</td>
<td>2.63</td>
<td>1.79</td>
<td>0.00–10.00</td>
</tr>
<tr>
<td>Cardio duration (mins.)</td>
<td>41.04</td>
<td>34.66</td>
<td>.00–180.00</td>
</tr>
<tr>
<td>Weightlifting frequency</td>
<td>2.24</td>
<td>1.80</td>
<td>.00–6.00</td>
</tr>
<tr>
<td>Weightlifting duration (mins.)</td>
<td>38.41</td>
<td>31.36</td>
<td>.00–150.00</td>
</tr>
<tr>
<td>Weightlifting index</td>
<td>127.57</td>
<td>134.90</td>
<td>.00–750.00</td>
</tr>
<tr>
<td>LTEQ</td>
<td>55.83</td>
<td>41.91</td>
<td>.00–333.00</td>
</tr>
<tr>
<td>MDI – Diet</td>
<td>13.10</td>
<td>5.48</td>
<td>5.00–25.00</td>
</tr>
<tr>
<td>MDI – Supplement</td>
<td>8.31</td>
<td>4.65</td>
<td>4.00–22.00</td>
</tr>
<tr>
<td>PSPS</td>
<td>16.63</td>
<td>5.07</td>
<td>8.00–33.00</td>
</tr>
<tr>
<td>DMS – MBI</td>
<td>3.79</td>
<td>1.22</td>
<td>1.43–6.00</td>
</tr>
<tr>
<td>DMS – MB</td>
<td>2.53</td>
<td>1.01</td>
<td>1.00–5.00</td>
</tr>
<tr>
<td>DMS Total</td>
<td>3.16</td>
<td>.94</td>
<td>1.36–5.07</td>
</tr>
<tr>
<td>EDS</td>
<td>45.51</td>
<td>14.33</td>
<td>21.00–86.00</td>
</tr>
<tr>
<td>RSES</td>
<td>33.73</td>
<td>4.37</td>
<td>23.00–40.00</td>
</tr>
</tbody>
</table>

Note: Obj = Measured; SR = Self-report; FFMI = Fat-free mass index; LTEQ = Leisure Time Exercise Questionnaire; MDI—Diet = Muscle Dysmorphia Inventory—Diet subscale; MDI—Supplement = Muscle Dysmorphia Inventory—Supplement subscale; PSPS = Perceived Sociocultural Pressure Scale; DMS—MB = Drive for Muscularity—Muscle-oriented body image subscale; DMS—MB = Drive for Muscularity—Muscularity-related behaviors subscale; EDS = Exercise Dependence Scale; RSES = Rosenberg Self-esteem Scale.
Table 4–2  Correlation matrix of outcome variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. BMI – OBJ</td>
<td>-</td>
<td>.97**</td>
<td>.65**</td>
<td>.77**</td>
<td>.06</td>
<td>-.02</td>
<td>.19*</td>
<td>.01</td>
<td>.32**</td>
<td>-.21*</td>
<td>-.02</td>
<td>-.14</td>
<td>.02</td>
<td>-.08</td>
</tr>
<tr>
<td>2. BMI – SR</td>
<td>-</td>
<td>.61**</td>
<td>.75**</td>
<td>.09</td>
<td>.00</td>
<td>.23*</td>
<td>.01</td>
<td>.29**</td>
<td>-.19*</td>
<td>.00</td>
<td>-.12</td>
<td>.01</td>
<td>-.07</td>
<td></td>
</tr>
<tr>
<td>3. Body fat</td>
<td>-</td>
<td>.03</td>
<td>-.23*</td>
<td>-.05</td>
<td>.08</td>
<td>-.03</td>
<td>.24**</td>
<td>-.17</td>
<td>-.17</td>
<td>-.20*</td>
<td>-.16</td>
<td>-.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. FFMI</td>
<td>-</td>
<td>.27**</td>
<td>.04</td>
<td>.18</td>
<td>.02</td>
<td>.21*</td>
<td>-.13</td>
<td>.11</td>
<td>-.03</td>
<td>.18</td>
<td>-.04</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Weightlifting index</td>
<td>-</td>
<td>.24*</td>
<td>.35**</td>
<td>.45**</td>
<td>-.03</td>
<td>.11</td>
<td>.62**</td>
<td>.40**</td>
<td>.36**</td>
<td>.11</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. LTEQ</td>
<td>-</td>
<td>.10</td>
<td>.07</td>
<td>.02</td>
<td>-.01</td>
<td>.14</td>
<td>.14</td>
<td>.06</td>
<td>.14</td>
<td>.06</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. MDI – Diet</td>
<td>-</td>
<td>.53**</td>
<td>.08</td>
<td>.06</td>
<td>.55**</td>
<td>.33**</td>
<td>.33**</td>
<td>.05</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>8. MDI -- Supplement</td>
<td>-</td>
<td>.12</td>
<td>.28**</td>
<td>.77**</td>
<td>.59**</td>
<td>.40**</td>
<td>.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. PSPS</td>
<td>-</td>
<td>.22*</td>
<td>.14</td>
<td>.21*</td>
<td>.20*</td>
<td>-.34**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. DMS – MBI</td>
<td>-</td>
<td>.44**</td>
<td>.88**</td>
<td>.35**</td>
<td>-.37**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. DMS -- MB</td>
<td>-</td>
<td>.81**</td>
<td>.57**</td>
<td>-.09</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. DMS Total</td>
<td>-</td>
<td>-.53**</td>
<td>-.29**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. EDS</td>
<td>-</td>
<td>-.20*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>14. RSES</td>
<td>-</td>
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<td></td>
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</tr>
</tbody>
</table>

Note: Obj = Measured; SR = Self-report; FFMI = Fat-free mass index; LTEQ = Leisure Time Exercise Questionnaire; MDI—Diet = Muscle Dysmorphia Inventory—Diet subscale; MDI—Supplement = Muscle Dysmorphia Inventory—Supplement subscale; PSPS = Perceived Sociocultural Pressure Scale; DMS—MBI = Drive for Muscularity—Muscle-oriented body image subscale; DMS—MB = Drive for Muscularity—Muscularity-related behaviors subscale; EDS = Exercise Dependence Scale; RSES = Rosenberg Self-esteem Scale.

*p < .05. **p < .01.
Table 4–3 Stepwise regression predicting drive for muscularity using subjective BMI

<table>
<thead>
<tr>
<th>Predictor</th>
<th>β</th>
<th>SE</th>
<th>95% Confidence interval</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subjective BMI</td>
<td>.20</td>
<td>.07</td>
<td>-.07–.19</td>
<td>.08</td>
</tr>
<tr>
<td>Body fat</td>
<td>-.28</td>
<td>.02</td>
<td>-.08–.00</td>
<td>.19</td>
</tr>
<tr>
<td>FFMI</td>
<td>-.30</td>
<td>.08</td>
<td>-.28–.02</td>
<td>.13</td>
</tr>
<tr>
<td>Weightlifting index</td>
<td>.17*</td>
<td>.00</td>
<td>.00</td>
<td>.61</td>
</tr>
<tr>
<td>LTEQ</td>
<td>-.03</td>
<td>.00</td>
<td>.00</td>
<td>.93</td>
</tr>
<tr>
<td>MDI – Diet</td>
<td>.02</td>
<td>.01</td>
<td>-.03–.03</td>
<td>.62</td>
</tr>
<tr>
<td>MDI – Supplement</td>
<td>.38***</td>
<td>.02</td>
<td>.04–.11</td>
<td>.57</td>
</tr>
<tr>
<td>PSPS</td>
<td>.12</td>
<td>.01</td>
<td>-.01–.05</td>
<td>.77</td>
</tr>
<tr>
<td>EDS</td>
<td>.25**</td>
<td>.05</td>
<td>.01–.03</td>
<td>.68</td>
</tr>
<tr>
<td>RSES</td>
<td>-.24**</td>
<td>.02</td>
<td>-.08–(-.02)</td>
<td>.83</td>
</tr>
</tbody>
</table>

Note: FFMI = Fat-free mass index; LTEQ = Leisure Time Exercise Questionnaire; MDI—Diet = Muscle Dysmorphia Inventory—Diet subscale; MDI—Supplement = Muscle Dysmorphia Inventory—Supplement subscale; PSPS = Perceived Sociocultural Pressure Scale; EDS = Exercise Dependence Scale; RSES = Rosenberg Self-esteem Scale.

\[ F(10,102) = 12.85, p < .001, \text{ Adj } R^2 = .51; *p = .05. **p < .01. ***p < .001. \]
Table 4–4 Stepwise regression predicting drive for muscularity using objective BMI

<table>
<thead>
<tr>
<th>Predictor</th>
<th>β</th>
<th>SE</th>
<th>95% Confidence interval</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective BMI</td>
<td>.06</td>
<td>.12</td>
<td>-.22–.25</td>
<td>.02</td>
</tr>
<tr>
<td>Body fat</td>
<td>-.20</td>
<td>.04</td>
<td>-.11-.05</td>
<td>.05</td>
</tr>
<tr>
<td>FFMI</td>
<td>-.20</td>
<td>.15</td>
<td>-.38–.21</td>
<td>.04</td>
</tr>
<tr>
<td>Weightlifting index</td>
<td>.17*</td>
<td>.00</td>
<td>.00</td>
<td>.61</td>
</tr>
<tr>
<td>LTEQ</td>
<td>-.03</td>
<td>.00</td>
<td>.00</td>
<td>.92</td>
</tr>
<tr>
<td>MDI – Diet</td>
<td>.04</td>
<td>.01</td>
<td>-.02–.04</td>
<td>.65</td>
</tr>
<tr>
<td>MDI – Supplement</td>
<td>.37***</td>
<td>.02</td>
<td>.04–.11</td>
<td>.56</td>
</tr>
<tr>
<td>PSPS</td>
<td>.12</td>
<td>.01</td>
<td>-.01–.05</td>
<td>.76</td>
</tr>
<tr>
<td>EDS</td>
<td>.24**</td>
<td>.01</td>
<td>.01–.03</td>
<td>.69</td>
</tr>
<tr>
<td>RSES</td>
<td>-.24**</td>
<td>.02</td>
<td>-.08–(-.02)</td>
<td>.81</td>
</tr>
</tbody>
</table>

Note: Obj = Measured; FFMI = Fat-free mass index; LTEQ = Leisure Time Exercise Questionnaire; MDI—Diet = Muscle Dysmorphia Inventory—Diet subscale; MDI—Supplement = Muscle Dysmorphia Inventory—Supplement subscale; PSPS = Perceived Sociocultural Pressure Scale; EDS = Exercise Dependence Scale; RSES = Rosenberg Self-esteem Scale.  
*p = .05.  **p < .01.  ***p < .001.
CHAPTER 5
DISCUSSION

Drive for muscularity represents a form of male body dissatisfaction that is associated with substance use, eating pathology, and exercise dependence (McCreary et al., 2004). However, knowledge of the predictors of drive for muscularity, including the role of body composition, is limited. Therefore, the purpose of my study was to identify the body composition and psychological predictors of drive for muscularity. Implications of my results, study limitations, and future research directions are discussed below.

First, consistent with my hypotheses and the research of McCreary et al. (2006), the body composition measures of BMI, body fat percentage, and FFMI did not predict drive for muscularity. It is possible that no effect emerged because the men in my sample had average levels of body fat and FFMI, and were only slightly overweight; if more men in the sample deviated from average values (e.g., had either higher body fat or FFMI) different results may have been attained. However, the fact that FFMI did not emerge as a predictor of drive for muscularity is noteworthy because theoretically one would expect to see higher drive for muscularity in less muscular men. In explaining their findings, McCreary et al. (2006) speculated that perhaps body fat “hides” the musculature that lies beneath, which would result in a man’s inability to gauge his true level of muscularity – a similar effect may be at work here. Nevertheless, my findings suggest that drive for muscularity occurs independently of body composition.

Further similarities with McCreary et al. (2006) emerged, as evidenced by the following significant correlations: (1) objective BMI and subjective BMI, (2) objective BMI and body fat percentage, (3) subjective BMI and body fat percentage, (4) objective BMI and FFMI, and (5) subjective BMI and FFMI. However, in a departure from McCreary et al. (2006), the correlation
between body fat percentage and FFMI in my study was nonexistent. That these two measures of body composition are uncorrelated is to be expected because of the distinct difference between fat and muscle. Furthermore, all measures of body composition were weakly yet significantly related to perceived sociocultural pressure; although the direction of causation is unclear, it is possible that either (1) men misinterpret the messages coming from others and infer that their body does not fit the “ideal” male physique, or (2) the body composition of the men truly doesn’t reflect the “ideal” male physique, which increases the likelihood that a man would hear messages confirming this.

Among the measures of body composition, only objective and subjective BMI were significantly related to dietary habits consistent with drive for muscularity. It is possible that this is due to the belief men have that eating more food, especially foods high in protein, will add muscle; while this may help, the extra calories gained from these foods will lead to more fat deposition as well, thus increasing BMI. However, while BMI was unrelated to muscularity-related behaviors, it was inversely related to muscle-oriented body image; this is an unexpected finding because it indicates that men with higher BMI’s have less concern about their muscularity, although this may be clarified by the fact that BMI correlated significantly with FFMI.

Second, in support of my hypotheses I found that supplement use, exercise dependence, and self-esteem significantly predicted drive for muscularity. The findings regarding supplement use indicate that it is predictive of drive for muscularity, as evidenced not only by the regression analysis but also by significant correlations with weightlifting, dietary practices, muscle-oriented body-image, and muscularity-related behaviors. Furthermore, supplement use was positively related to exercise dependence. Thus, the negative health behaviors of pathological exercise and
supplement use are related. Future research is needed to determine the temporal course of these
two behaviors because this information will aid in determining men who are at-risk for unhealthy
exercise and eating. The collective picture these findings paint is one of an interconnected set of
strategies simultaneously undertaken to increase muscularity.

The results of my study also revealed that exercise dependence predicts drive for
muscularity. It is possible that, because men view exercise as a critical means by which to
increase muscularity, some men experience severe frustration, negative mood, or anxiety when
they are prevented from exercising or are unable to exercise. Further evidence of the
ramifications of exercise dependence is found in its significant inverse relationship with self-
esteeem; this indicates that for some men, feelings of self-worth are closely tied to their ability to
engage in exercise. Exercise dependence was significantly related to perceived sociocultural
pressure to be lean and muscular; thus it is possible that some men derive self-worth based on
whether they possess a physique that is deemed “ideal” by society, and exercise represents the
best way to achieve that ideal. Exercise dependence was also significantly related to
weightlifting, dietary practices, muscle-oriented body-image, and muscularity-related behaviors.
This indicates that some men, because of their high drive for muscularity, become dependent on
weightlifting as a specific form of exercise, and that this dependence is accompanied by
unhealthy eating aimed at increasing muscle. These conclusions are consistent with a host of
research in weightlifters and bodybuilders showing that exercise dependence and dietary
practices are related (Lantz et al., 2002; Rhea et al., 2004); indeed the Bodybuilding Dependence
Scale (Smith & Hale, 2004) was developed specifically to assess this unhealthy exercise
behavior.
Self-esteem was a significant negative predictor of drive for muscularity, further supporting the notion that for some men, self-esteem is closely connected to possessing the “ideal” physique. This is consistent with research that has found an inverse relationship between self-esteem and both satisfaction with muscularity and problematic eating behaviors in preadolescent boys (McCabe & Ricciardelli, 2003; McGee & Williams, 2000). The results also indicate that self-esteem is inversely related to both muscle-oriented body-image and perceived sociocultural pressure to be lean and muscular. These findings not only underscore the impact of the media on self-esteem when it comes to how men evaluate their bodies, but also how physique-related comments from friends, parents, and dating partners impact self-esteem in general. Therefore, these persons could provide a protective effect against body dissatisfaction by building self-esteem in males via interpersonal support and refusal to themselves internalize a body-image “ideal.”

Third, consistent with my hypothesis, objectively measured BMI was significantly higher than BMI derived from self-reported height and weight. Upon inspection of the data, this discrepancy in BMI was due to the tendency of men to overestimate their height. Thus, men appear to be accurate in self-reporting their weight. However, they may overestimate their height because of the self-presentational and social benefits of being tall. That is, researchers have found that taller men typically attain high social status, are able to exert greater social dominance, and enjoy the psychological upper hand in threatening situations (Cassidy, 1991; Bailey, Caffrey, & Hartnett, 1976). My data support the recommendations of Eston (2002) and suggest that when BMI is calculated in men, researchers should proceed cautiously when interpreting their results, especially if the BMI is for diagnostic purposes (e.g., obesity, anorexia nervosa). Furthermore, my findings are consistent with those of others (e.g., Brener et al., 2003;
Hill & Roberts, 1998) who have found that self-reported height is overestimated relative to measured height.

Fourth, consistent with my hypothesis, weightlifting behavior was a significant predictor of drive for muscularity. For the man who desires greater muscularity weightlifting is a necessity because it results in strength and muscle gains. This is not to say that weightlifting is inherently pathological, maladaptive, or unhealthy; rather, my findings suggest that weightlifting may be a tool misused by those men highly fixated on attaining a more muscular physique. It is a paradox, then, that while weightlifting was significantly related to dietary practices, supplement use, and muscularity-related behaviors, it was not significantly related to muscle-oriented body-image. Collectively, these results suggest that men with high drive for muscularity rely heavily upon weightlifting and other behaviors (e.g., supplement use) in pursuit of the “ideal” physique, whereas men with moderate or low levels of drive for muscularity adopt these same behaviors independent of body-image concerns (e.g., for perceived health benefits that supplements and high protein diets offer).

Fifth, consistent with my hypothesis, general exercise behavior (as measured by the LTEQ) did not predict drive for muscularity. It is possible that this is a reflection of the lack of specificity regarding exercise mode inherent in the LTEQ; this study has established weightlifting specifically as a predictor of drive for muscularity. Although there was a weak yet significant relationship between the LTEQ and weightlifting, my results indicate that because the LTEQ does not specifically assess weightlifting it may not be the best measure of exercise behavior for use in men. Instead, the LTEQ assesses general leisure-time activity, and therefore is more appropriate for body-image research in women, where the primary emphasis on body-image is on weight reduction as opposed to muscular hypertrophy (McCabe et al., 2002).
Contrary to my hypotheses, eating pathology and perceived sociocultural pressure did not predict drive for muscularity. First, dietary behaviors were not predictive of drive for muscularity. This is interesting in light of the finding that supplement use was predictive of drive for muscularity; this suggests that normal college-aged men do not adopt eating behaviors aimed at maximizing muscular growth (perhaps because it is too laborious), but they instead will readily turn to supplements to achieve greater muscularity. This is consistent with the larger societal trend towards “quick fixes” such as pills, powders, snack bars, exercise equipment, etc., that promise fast results with minimal effort. It is likely that dietary behaviors would have been predictive of drive for muscularity had the sample been comprised of advanced weightlifters or bodybuilders as such athletes are known to adopt strict dietary practices to achieve their goals of muscular hypertrophy (Lantz et al., 2002).

Second, perceived sociocultural pressure did not predict drive for muscularity. The Perceived Sociocultural Pressure Scale consists of eight items that ask the respondent how messages about body fat and muscularity from friends, family, dating partners, and the media impact them. It is possible that if these different influences were isolated then a more specific prediction would be available. For example, friends and family may serve as protective factors against developing drive for muscularity, whereas dating partners and the media may contribute to drive for muscularity. It is noteworthy that fellow gym-goers or weightlifting partners were not included in the Perceived Sociocultural Pressure Scale; it is possible that pressure to attain greater muscularity may stem from others in the gym environment. Further research would aid in clarifying this issue.

My findings have several implications for the Cafri et al. (2005) model. Specifically, my results support their model of male body change strategies because weightlifting predicted drive
for muscularity (body-image dissatisfaction in the model). My findings also suggest that the link between health risk behaviors and body-image dissatisfaction should be bi-directional because use of supplements predicted drive for muscularity. However, my findings do not support the hypothesized link between body composition (BMI, body fat percentage, FFMI) and body dissatisfaction; replication of this finding would suggest that this hypothesized link be removed. Furthermore, my findings also indicate the need for two additions to the model: 1) self-esteem predicted drive for muscularity (body-image dissatisfaction in the model), therefore providing support for a directional arrow between psychological functioning and body-image dissatisfaction, and 2) exercise dependence predicted drive for muscularity, therefore providing support for its inclusion as a health risk behavior. Implementing these changes in the model would help refine the relationships between these constructs and male body-image dissatisfaction.

**Limitations**

Although this study advances our knowledge of how body composition and selected psychological factors relate to drive for muscularity, there are several limitations. First, the participants were a convenient sample of college-aged men, which limits the generalizability of the results. Future researchers are encouraged to examine predictors of drive for muscularity in other populations, including adolescent boys, older men, men who are not attending college, and athletically active women (e.g., bodybuilders). For example, establishing predictors of drive for muscularity in adolescent boys would aid in the identification of boys who are at highest risk of drive for muscularity and its associated features. This is especially important because increasing numbers of boys as young as 8-years old report body-image dissatisfaction and disordered eating (Cohane & Pope, 2001; McCabe & Ricciardelli, 2003). The generalizability of the results is also limited to college-aged men in Florida; because Florida is a peninsula its citizens are able to visit
beaches (where a greater proportion of one’s body will be exposed to others) frequently. It is therefore possible that men in Florida are more invested in their appearance than men who live in northern states where such bodily exposure occurs less frequently. Thus, further research examining drive for muscularity in other regions is needed.

Second, while demographic variables such as sexual orientation and ethnicity were assessed, their low frequency precluded moderator analysis. It is possible that these variables, as well as other demographic variables that were not assessed (e.g., socioeconomic status), moderate drive for muscularity. With respect to sexual orientation, one participant reported homosexual orientation, but seven men reported “Male” as their sexual orientation. Because the question of sexual orientation was open-ended on the demographic questionnaire, it is unclear whether these participants meant to communicate their gender or if they were indeed homosexual. Most research indicates that homosexual men have greater body dissatisfaction and drive for muscularity than heterosexual men (Kaminski et al., 2005; Yelland & Tiggemann, 2003), however other research has not supported this (e.g., Boroughs & Thompson, 2002). Therefore, it would be informative if future research on drive for muscularity included sexual orientation as a moderator.

Ethnicity has been shown to moderate body dissatisfaction in women, whereby Whites report more body dissatisfaction than non Whites (e.g., Wildes, Emery, & Simon, 2001). For example, when compared to Mexican women, American women have greater levels of concern about significant weight gain and fear of becoming fat (Crandall & Martinez, 1996). Although the topic has received little research attention in men, preliminary evidence suggests that culture and ethnicity may also moderate male body dissatisfaction as well as the likelihood of adopting body change strategies (Ricciardelli, McCabe, Williams, & Thompson, 2007). For example,
there is evidence that Taiwanese men are more satisfied with their bodies than American and European men (Yang et al., 2005), and other research indicates that nonwhite men are less likely than white men to desire the V-shaped taper that is associated with a muscular physique (Fallon, DeBraganza, Chittester, & Hausenblas, 2005). However, some research indicates that nonwhite adolescent boys have greater rates of disordered eating than white adolescent boys (Neumark-Sztainer & Hannan, 2000). Because this is counter to the available research in men with eating disorders more research is needed.

Third, although current and past steroid use was ascertained, there were insufficient numbers of participants who answered “yes” to these questions to conduct any meaningful analyses (two participants indicated current steroid use, and one participant indicated past but not current steroid use). However, four men who were not current steroid users indicated that the question, “If you are not currently using anabolic steroids to build muscle mass, have you in the past?” did not apply to them. This response technically would indicate current usage; whether this was the case, or the response options provided were confusing to the participant, cannot be determined.

This also illustrates the final limitation of the study, which is the use of self-report measures. Although all self-report measures contained herein have adequate psychometric properties, it is possible that some information collected from some participants on these types of measures contain inaccuracies because of (1) Normal memory deficits, (2) inaccurate recall, or (3) intentionally providing inaccurate information. For example, the measurement of exercise behavior by the LTEQ was limited because the respondent was asked to indicate the number of strenuous, moderate, and mild exercise sessions engaged in per week. In an attempt to help the respondent answer the items, the LTEQ provides examples of activities that would qualify as
strenuous, moderate, or mild in intensity, but the only reference to weightlifting is under the strenuous exercise heading. This begs the question: Can a person have a “light” weightlifting session? Most people would say yes, but because such a session must be subjectively described as moderate or mild there is reason to suspect that the ability to accurately delineate between these intensities is diminished: one man’s moderate intensity weightlifting session may be another man’s mild intensity weightlifting session. In addition, while reliable and valid, the skinfold method of body fat estimation has a ± 3.5% margin of error (ACSM, 2000); another method of body fat estimation (e.g., DEXA) may yield a more precise estimate and thus strengthen the findings of subsequent research.

Finally, out of 159 men who indicated they were interested in participating in the study by signing up when the study announcement was made in their classes, 113 men actually enrolled in the study. It is possible that the lack of follow through on the part of the 46 men who did not participate was attributable to factors such as lack of time, insufficient incentive (e.g., knowing their body fat percentage or earning extra credit toward their classes was not enticing enough to participate), reluctance to have their body fat estimated (perhaps due to body-image concerns), or simply lack of interest. However, all men who reported to the lab at their scheduled appointment time to participate in the study completed all aspects of the study.

**Future Research**

Because body dissatisfaction in men has severe psychological and physical ramifications further research is needed to examine its causes and consequences.

First, there is a need for a psychometrically sound measure that assesses eating behaviors specific to adding muscle mass and decreasing body fat. Certain items of the DMS (McCreary & Sasse, 2000) and MEBBIE (Kaminski et al., 2005) assess such eating patterns in a general sense, but more precise items are required to fully understand the specific eating patterns of persons
attempting to add muscle mass while simultaneously limiting body fat accumulation. The MDI (Lantz et al., 2002; Rhea et al., 2004) shows promise.

Second, while Cafri et al. (2005) have proposed a model of the risk factors for male body-image disturbance, they do not indicate a direct link between self-esteem and body image dissatisfaction—why not? This is puzzling because there is sufficient evidence that there is a direct inverse relationship between body-image disturbance and self-esteem, and this study has found that self-esteem is a negative predictor of drive for muscularity in particular.

Third, most male body dissatisfaction research has been conducted in adolescent boys; the only line of research that is a consistent exception to this is muscle dysmorphia. Indeed, it is logical to focus research on a population that may be a target for intervention, but there is ample evidence indicating there is a need for better understanding of body-image disturbance in men. Specifically, information on drive for muscularity across the life span would contribute to understanding how it is similar to, or different than, other men’s health issues (e.g., male pattern baldness, weight gain, impotence). For example, it is possible that drive for muscularity is especially salient in adolescence and young adulthood because this is a time when boys and young men gain a sense of what it means to be masculine, and they therefore derive self-identity from having a lean and muscular physique. In fact, some researchers have argued that, as traditional gender roles become increasingly blurred and there exists greater parity between the sexes, men may focus on developing their physiques in an effort to assert their masculinity (Pope, Phillips et al., 2000). In light of this it would be informative to conduct prospective research to determine the course of drive for muscularity as men age; at what point in a man’s life does possessing a muscular physique lose its appeal or perceived benefits? For example, how do significant life events such as marriage and fatherhood impact a man’s lifestyle, as well as his
concept of what makes him masculine? Future research that addresses these questions would be most enlightening.

Fourth, the conceptualization of male body-image disturbance as two parallel continua may be beneficial (Figure 5–1). Together, these continua are able to encapsulate the finding that males are dissatisfied with being too small (with respect to muscularity), not large enough (with respect to muscularity), or too large (with respect to body fat). At opposite ends of the body fat dimension is the dissatisfaction due to perceiving oneself to be either too skinny or too fat; this reflects body-image disturbance relative to degree of body fat (e.g., the higher the body fat the higher the body-image dissatisfaction). However, because body fat is only half of the body-image equation for men, there is need for a muscle mass continuum that addresses dissatisfaction with degree of muscle; this reflects the fact that body-image disturbance can also be a function of dissatisfaction with minimal muscularity (which would increase the chances of a drive for muscularity) or dissatisfaction that one’s actual high muscularity is not muscular enough (which would indicate muscle dysmorphia). Therefore, these two criteria may be used together to ascertain the likelihood of male body-image dissatisfaction if both body fat and muscularity (expressed as FFMI) are known. For example, a man with little body fat and minimal musculature would have a higher chance of experiencing body-image disturbance than a man with little body fat but optimal musculature. Conversely, a man with high musculature and low body fat would likely have minimal body-image dissatisfaction; the exception would be if, despite his considerable muscle mass, the man perceived himself as having a “puny” or “scrawny” body with minimal musculature – this would be indicative of muscle dysmorphia.

Fifth, more research is needed to determine the efficaciousness and safety of the myriad nutritional supplements that men with body-image disturbance frequently use, especially given
the findings of this study that supplement use is predictive of drive for muscularity. Current knowledge indicates that some supplements (e.g., creatine) are relatively inert, whereas others (e.g., ephedrine) pose potentially life-threatening side effects if abused or used by at-risk persons.

Sixth, weightlifting as a specific mode of exercise was found to predict drive for muscularity in this study, but the role of exercise in male body-image disturbance is still relatively unclear. Many studies report a positive correlation between exercise behavior and body satisfaction in men, yet some studies, especially in the muscle dysmorphia literature, indicate bodybuilders, whose preferred mode of exercise is weightlifting, are more likely to experience body-image disturbance than other groups of physically active men. This suggests that some men involved in bodybuilding are more invested than others in their appearance and are therefore more likely to be dissatisfied with perceived physique flaws; more research using samples of male weightlifters would clarify this relationship.

Seventh, although the findings of this study and McCreary et al. (2006) indicate that there is no relationship between body composition and drive for muscularity, there remains a lack of research describing the correlation between body composition (as assessed by BMI, body fat, and FFMI) and body-image disturbance in men. Most relevant would be further information correlating these measures with drive for muscularity and muscle dysmorphia – does a person need to have a certain combination of objective muscle mass and fat mass before becoming driven to attain muscularity? The findings presented herein indicate no, however establishing a dose-response-type relationship may improve understanding of how actual body composition is related to body-image disturbance; in turn, this information could be integrated into interventions (e.g., Cash & Hrabosky, 2004) aimed at decreasing body-image disturbance in males, or may aid
researchers in determining which persons are most susceptible to experiencing body-image disturbance (this could facilitate the identification of “at-risk” persons based on body composition).

In conclusion, this study has established additional support for the Cafri et al. (2005) model in that weightlifting was found to predict drive for muscularity (e.g., body-image dissatisfaction in the model). Furthermore, whereas the model indicates that body-image dissatisfaction leads to health risk behaviors (e.g., supplement use), this study found that supplement use predicts drive for muscularity. In addition, this study also suggests two important components be considered for inclusion in the model: (1) Self-esteem as a negative predictor of drive for muscularity, and (2) exercise dependence, possibly under the “Health Risk Behavior” or “Sports” constructs, as a predictor of body-image dissatisfaction. Finally, the finding that measures of body composition do not predict drive for muscularity call into question the proposed link between biological factors and body-image dissatisfaction in the model. Future research is required to determine if body-image dissatisfaction in men truly is independent from actual body composition. Collectively, this study’s findings add to the understanding of drive for muscularity in men, and may potentially contribute to interventions designed to decrease drive for muscularity and its associated features.
Body fat dimension

Low Fat  Optimal  Excessive Fat

Muscle mass dimension

Minimal Muscularity (Actual)  Optimal  Excessive Muscularity (Actual)

Figure 5–1. Proposed continua for male body-image disturbance.
APPENDIX A
LIST OF MEASURES

General Information

Age: _____
Ethnicity: ______________
Sexual orientation: ____________ (e.g., hetero-, homo-, bi-sexual)
Academic standing: _____ Fr. _____ So. _____ Jr. _____ Sr.
Are you currently using anabolic steroids in order to build muscle mass?
   _____ Yes _____ No
   
   If you are not currently using anabolic steroids to build muscle mass, have you in the past?
   _____ Yes _____ No _____ Not applicable

How many sessions of cardiovascular activity do you participate in per week?

   _____
   
   How long (in minutes) does a typical session run? _______

How many weightlifting sessions do you participate in per week?

   _____
   
   How long (in minutes) does a typical session run? _______
Leisure-Time Exercise Questionnaire

Instructions. This is a scale which measures your leisure-time exercise (i.e., exercise that was done during your free time such as intramural sports–NOT your physical education class). Considering a typical week, please indicate how often (on average) you have engaged in strenuous, moderate, and mild exercise more than 15 minutes during your free time?

1. Strenuous exercise: heart beats rapidly (e.g., running, basketball, jogging, hockey, squash, judo, roller skating, vigorous swimming, vigorous long distance bicycling, vigorous aerobic dance classes, heavy weight training)
How many times per typical week do you perform strenuous exercise for 15 minutes or longer?

2. Moderate exercise: not exhausting, light sweating (e.g., fast walking, baseball, tennis, easy bicycling, volleyball, badminton, easy swimming, popular and folk dancing)
How many times per typical week do you perform moderate exercise for 15 minutes or longer?

3. Mild exercise: minimal effort, no sweating (e.g., easy walking, yoga, archery, fishing, bowling, lawn bowling, shuffleboard, horseshoes, golf)
How many times per typical week do you perform mild exercise for 15 minutes or longer?
MDI—Diet and Supplement Subscales

Instructions

Read each item (1-9) carefully and then indicate the degree to which the item is characteristic or true of you by circling the appropriate number corresponding to each statement. There are no right or wrong answers so please respond as honestly as possible. The anonymity of your responses is guaranteed.

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<th>5</th>
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<tbody>
<tr>
<td></td>
<td>Never</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Often</td>
<td>Usually</td>
<td>Always</td>
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</table>

1. I regulate my caloric intake to maximize muscle development.  
   [1 2 3 4 5 6]

2. Before a workout, I consume energy supplements.  
   [1 2 3 4 5 6]

3. I monitor my diet closely to limit my fat intake.  
   [1 2 3 4 5 6]

4. I use supplements to help me recuperate from strenuous workouts.  
   [1 2 3 4 5 6]

5. I control the intake of proteins, carbohydrates, and fats to maximize my muscular development.  
   [1 2 3 4 5 6]

6. I use supplements to increase my lifting performance.  
   [1 2 3 4 5 6]

7. I use nutritional supplements to help me train through injuries.  
   [1 2 3 4 5 6]

8. My diet is regimented to the point that I eat the same foods several days in a row.  
   [1 2 3 4 5 6]

9. I avoid foods high in sodium.  
   [1 2 3 4 5 6]
Perceived Sociocultural Pressure Scale—Original

Using the following scale, please indicate the response that best captures your own experience.

1 = Never
2 = Rarely
3 = Sometimes
4 = Often
5 = Always

1. I’ve felt pressure from my friends to lose weight._____
2. I’ve noticed a strong message from my friends to have a thin body._____
3. I’ve felt pressure from my family to lose weight.____
4. I’ve noticed a strong message from my family to have a thin body._____
5. I’ve felt pressure from people I’ve dated to lose weight._____
6. I’ve noticed a strong message from people I have dated to have a thin body.____
7. I’ve felt pressure from the media (e.g., TV, magazines) to lose weight.____
8. I’ve noticed a strong message from the media to have a thin body.____
**Perceived Sociocultural Pressure Scale—Adapted**

Using the following scale, please indicate the response that best captures your own experience.

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<td>5</td>
</tr>
<tr>
<td>1 = Never</td>
<td>2 = Rarely</td>
<td>3 = Sometimes</td>
<td>4 = Often</td>
<td>5 = Always</td>
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</table>

1. I’ve felt pressure from my friends to lose body fat.______
2. I’ve noticed a strong message from my friends to have a muscular body.____
3. I’ve felt pressure from my family to lose body fat.__
4. I’ve noticed a strong message from my family to have a muscular body.____
5. I’ve felt pressure from people I’ve dated to lose body fat.____
6. I’ve noticed a strong message from people I have dated to have a muscular body.____
7. I’ve felt pressure from the media (e.g., TV, magazines) to lose body fat.____
8. I’ve noticed a strong message from the media to have a muscular body.__
The Drive for Muscularity Scale

Please read each item carefully, then, for each one, circle the number that best applies to you.

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</tr>
<tr>
<td>Never</td>
<td>Rarely</td>
<td>Sometimes</td>
<td>Often</td>
<td>Very often</td>
<td>Always</td>
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1. I wish that I were more muscular.  
2. I lift weights to build up muscle.  
3. I use protein or energy supplements.  
4. I drink weight gain or protein shakes.  
5. I try to consume as many calories as I can in a day.  
6. I feel guilty if I miss a weight training session.  
7. I think I would feel more confident if I had more muscle mass.  
8. Other people think I work out with weights too often.  
9. I think that I would look better if I gained 10 pounds in bulk.  
10. I think that I would feel stronger if I gained a little more muscle mass.  
11. I think that my weight training schedule interferes with other aspects of my life.  
12. I think that my arms are not muscular enough.  
13. I think that my chest is not muscular enough.  
14. I think that my legs are not muscular enough.
**Exercise Dependence Scale**

**Instructions.** Using the scale provided below, please complete the following questions as honestly as possible. The questions refer to current exercise beliefs and behaviors that have occurred in the past 3 months. Please place your answer in the blank space provided after each statement.

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</table>

1. I exercise to avoid feeling irritable.____
2. I exercise despite recurring physical problems.____
3. I continually increase my exercise intensity to achieve the desired effects/benefits.____
4. I am unable to reduce how long I exercise.____
5. I would rather exercise than spend time with family/friends.____
6. I spend a lot of time exercising.____
7. I exercise longer than I intend.____
8. I exercise to avoid feeling anxious.____
9. I exercise when injured.____
10. I continually increase my exercise frequency to achieve the desired effects/benefits.____
11. I am unable to reduce how often I exercise.____
12. I think about exercise when I should be concentrating on school/work.____
13. I spend most of my free time exercising.____
14. I exercise longer than I expect.____
15. I exercise to avoid feeling tense.____
16. I exercise despite persistent physical problems.____
17. I continually increase my exercise duration to achieve the desired effects/benefits.____
18. I am unable to reduce how intense I exercise.____
19. I choose to exercise so that I can get out of spending time with family/friends.____
20. A great deal of my time is spent exercising.____
21. I exercise longer than I plan.____
Rosenberg Self-Esteem Scale

Directions: For each question, please indicate the degree to which you strongly agree, agree, disagree, or strongly disagree with each statement.

<table>
<thead>
<tr>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>2</td>
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</table>

1. On the whole, I am satisfied with myself. 1 2 3 4
2. At times I think I am no good at all. 1 2 3 4
3. I feel that I have a number of good qualities. 1 2 3 4
4. I am able to do things as well as most other people. 1 2 3 4
5. I feel I do not have much to be proud of. 1 2 3 4
6. I certainly feel useless at times. 1 2 3 4
7. I feel that I am a person of worth, at least on an equal plane with others 1 2 3 4
8. I wish I could have more respect for myself. 1 2 3 4
9. All in all, I am inclined to feel that I am a failure. 1 2 3 4
10. I take a positive attitude toward myself. 1 2 3 4
ATTENTION MEN

Have you ever wondered what your body fat percentage is? A study in the Department of Applied Physiology and Kinesiology is currently exploring the relationship between exercise habits, eating, body image, and body composition. All you need to do to qualify for your FREE body fat estimation is to simply fill out a few surveys (which will take about 20 minutes) – it’s that simple! To make an appointment please email the Exercise Psychology Laboratory (located in FLG 143) at exer.psych.lab@hhp.ufl.edu and include the following information:

- Name
- Phone number
- Age
- Height
- Weight
LIST OF REFERENCES


Eston, R. G. (2002). Use of the body mass index (BMI) for individual counseling: The new section editor for kinanthropometry is “Grade 1 obese, overweight” (BMI 27.3), but dense and “distinctly muscular” (FFMI 23.1)! *Journal of Sports Sciences, 20*, 515–518.


BIOGRAPHICAL SKETCH

Nickles Irvin Chitterester was born on 20 November 1976 in Mason City, Iowa. His parents moved him and his younger sister to Phoenix, Arizona, in 1980, and this is where he was raised. After graduating from Deer Valley High School in Glendale, Arizona, in June of 1995, Nick enrolled at Glendale Community College, where he earned an A.A. (major: psychology) in May of 1998. He enrolled at Arizona State University’s West campus in Phoenix in June of 1997, where he graduated with honors with a B.A. (major: psychology) in May of 1999. In August of 1999, he moved to Pullman, Washington, to pursue a Ph.D. in experimental psychology at Washington State University (WSU). However, in late April of 2001 his advisor, Dr. Lori Irving, passed away unexpectedly from a previously unknown heart condition. He earned an M.S. in experimental psychology from WSU in May of 2003; in August of 2003 he moved to Gainesville, Florida, to attend the University of Florida, where in May of 2007 he earned a Ph.D. in Health and Human Performance with an emphasis in Sport and Exercise Psychology.

Upon completion of his Ph.D. he married Mindy Mansour on 12 May 2007 in Gainesville, Florida. In August of 2007 he began his appointment as an assistant professor of psychology at Concordia University at Austin, Texas.