Creating an Assessment Tool for Muscle Dysmorphia

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CREATING AN ASSESSMENT TOOL FOR MUSCLE DYSMORPHIA

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Master of Arts

By
Jennifer Lynne Short

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CREATING AN ASSESSMENT TOOL FOR MUSCLE DYSMORPHIA

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Throughout the years, men have been viewed as having few body appearance problems. However, recent research has begun to acknowledge the presence of body image issues with men. In particular, Muscle Dysmorphia (MD) is a disorder that has received attention in the last decade (Pope, Gruber, Choi, Olivardia, & Phillips, 1997; Olivardia, 2001). Many of the symptoms found in eating disorders and body dysmorphic disorder are similar to those seen in MD. The goal of this study is to create such an assessment tool for use in clinical settings.

Pope et al. (1997) outlined and Olivardia (2001) refined the diagnostic criteria for MD. Individuals with MD believe that they are not muscular enough, and, ironically, many are more muscular than the average person. Persons with MD have a persistent preoccupation with their body shape that causes impairment or distress. Individuals with MD believe that they are smaller than they actually appear. Pope and Katz (1994) estimate that MD is found in 10% of weightlifters; however, this estimate is most likely an upper one.

The goal of the present study was to create an inventory for assessing MD in men through an exploratory factor analysis. Using the etiological model set forth by Grieve (2005), the current study attempted to identify four main factors of MD and discuss the relationship of these factors to the etiological model.
Participants were 304 men all over the age of 18, and the mean age of participants was 20.64. Each participant completed a 32-item demographics questionnaire, the 67-item Muscle Dysmorphia Inventory, and chose both a current and ideal body size from 18 body size pictures. An exploratory factor analysis was conducted in an attempt to reduce the number of items to a smaller and most effective assessment tool.

Employing this method, the original 67-item scale was reduced to a 25-item scale with eight components. The resulting components include Inadequacy, Preoccupation, Compulsivity, Muscularity Drive, Increased Muscularity, Body Anxiety, Social Sacrifice, and Persistence. These components together demonstrated a thorough assessment of the diagnostic areas of MD, and they demonstrated important relationships to the four variables in the etiological model by Grieve (2005).

The results of the present study have great implications for future research into Muscle Dysmorphia. The MDI can be analyzed again in this same method to obtain a measure of test-retest reliability. It can also be compared with other scales, such as the Yale-Brown Obsessive Compulsive Scale (Y-BOCS), the State Trait Anxiety Inventory (STAXI), and the Beck Depression Inventory (BDI), to establish concurrent validity. Further research can be conducted on women to see if the current factor structure remains intact. In addition, a confirmatory factor analysis can be conducted by assessing men who have been diagnosed with MD.

The implications of creating a diagnostic tool for MD are many. As the number of men with characteristics of MD increases, clinicians will be better equipped to diagnose and establish treatment plans. This research may also allow diagnosticians to
identify sub-clinical levels of MD. This present study may also help identify individuals who are at risk to develop symptoms of MD.
Introduction

Throughout the years, men have been viewed as having few body appearance problems. However, recent research has begun to acknowledge the presence of body image issues with men. In particular, Muscle Dysmorphia (MD) is a disorder that has received attention in the last decade (Pope, Gruber, Choi, Olivardia, & Phillips, 1997; Olivardia, 2001). Many of the symptoms of MD mirror those found in eating disorders and body dysmorphic disorder. Several diagnostic criteria have been identified, but no scale has been established to aid in clinical assessment of MD. The goal of this study is to create such a tool to have diagnostic use in clinical settings.

Muscle Dysmorphia

Pope et al. (1997) outlined and Olivardia (2001) refined the diagnostic criteria for MD. Individuals with MD believe that they are not muscular enough, and, ironically, many are more muscular than the average person. Persons with MD have a persistent preoccupation with their body shape that causes impairment or distress. In some cases, body image disturbance is noted; individuals with MD believe that they are smaller than they actually appear. Many times, individuals with MD hide their bodies when in public; arrange their lives so that lifting weights and working out are not interrupted; spend many hours in the weight room, often to the point of impairing social and intimate relationships; and follow a meticulous diet, which can include the use of inappropriate or illegal supplements. Pope and Katz (1994) estimate that MD is found in 10% of weightlifters; however, this estimate is most likely an upper one.
Olivardia (2001) explicitly listed the criteria that characterize individuals with MD. The first criterion is that the person “has a preoccupation with the idea that his or her body is not sufficiently lean and muscular” (p. 255). The second criterion states: The preoccupation causes clinically significant distress or impairment in social, occupational, or other important areas of functioning as demonstrated by at least two of the following four criteria:

a. The individual frequently gives up important social, occupational, or recreational activities because of a compulsive need to maintain his or her workout and diet schedule.

b. The individual avoids situations in which his or her body is exposed to others, or endures such situations only with marked distress or intense anxiety.

c. The preoccupation about the inadequacy of body size or musculature causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.

d. The individual continues to work out, diet, or use performance-enhancing substances despite knowledge of adverse physical or psychological consequences.

(p. 255)

Olivardia (2001) continues that the last criterion for MD is:

the primary focus of the preoccupation and behaviors is on being too small or inadequately muscular, and not on being fat, as in anorexia nervosa, or on other aspects of the appearance, as in other forms of Body Dysmorphic Disorder (BDD) (p. 255).
Please note that although Olivardia (2001) identifies these criteria for MD, the diagnosis of MD is not in the *Diagnostic and Statistical Manual of Mental Disorders*, Text Revised (DSM-IV TR; APA, 2000).

*Muscle Dysmorphia and Eating Disorders*

Although MD has been classified as a sub-category of BDD, it is a disorder that has many similarities with both anxiety disorders and eating disorders. It is important to note that the symptoms of MD are ego-syntonic, and in this way, they bear a striking resemblance to the symptoms of anorexia nervosa (AN). Individuals with MD, AN, and bulimia nervosa (BN) all use their body shape or size to derive their self-opinion. When individuals with these disorders are close to the social ideal body shape, they have a higher self-opinion. The opposite is also true; their self opinion becomes lower as they move further away from the social ideal body shape (Grieve, 2005). The persistent preoccupation with body shape, as well as the changes in eating and exercise habits in MD, are strikingly similar to those seen in persons with BN and AN. The behavioral characteristics of men with MD mimic those of women with BN. One such similarity is binge eating in BN; men with MD engage in similar behaviors by consuming a large number of calories in a meal. There is no conclusive evidence to assert whether or not men feel out of control when participating in such eating practices. Men with MD participate in long sessions of exercise, particularly weight lifting, and this is analogous to the compensatory behavior seen in the non-purging type of BN. Such similarities have influenced current research of MD as well as the development of an etiological model of MD (Grieve, 2005).
A Proposed Model of Etiology

The development of an etiological model allows researchers to explore the framework of a psychological disorder, by examining variables pertinent to a disorder in a more organized manner. Models of etiology also contribute to treatment plans by helping professionals focus on areas of importance as regards the disorder. Pope et al. (2000) have identified and started evaluations on a number of variables thought to impact the development of MD.

Through a consultation with the biopsychosocial model of psychopathology (Kiesler, 1999), four different types of variables have been identified as contributing to the development of MD (Grieve, 2005). As shown in Figure 1, the categories represented in the model are socioenvironmental factors (media pressure, sport participation), emotional factors (body dissatisfaction, negative affect), psychological factors (ideal body internalization, self esteem), and cognitive variables (perfectionism).
Socioenvironmental Factors: Media Pressure and Sport Participation

Two types of socioenvironmental factors that contribute to the development of MD include media pressure and sport participation. Mass media has one of the strongest and most influential roles in shaping our views on what is the cultural ideal. The thin ideal is expressed in society through family members, peers, schools, athletics, health care professionals, and mass media (Thompson & Stice, 2001). Similarly, male action toys (Pope, Olivardia, Gruber, & Borowiecki, 1999), male models in Playgirl centerfolds (Leit, Pope, & Gray, 2001), magazine advertisements (Pope, Olivardia, Boroweicki, & Cohane, 2001), and actors such as Arnold Schwarzenegger, Sylvester Stallone, and Vin Diesel have all impacted the ideal body type for males.

Researchers note that prevalence rates of eating disorders in women have emulated the changes in how the media chooses to portray women. For example, as the
media ideal became thinner, BN and AN rates increased (Harrison & Cantor, 1997). For years, our society has viewed men as being immune to the media influences on ideal body types. However, in the past two decades, as the typical male model moved to an extremely muscular standard (Pope et al., 2001), there has been an increase in anxiety concerning body image in men (Wroblewska, 1997). Richins (1991) suggests that media advertisements produce social comparison for women, and the same phenomenon can be seen in men; as the number of male bodies in advertisements increases, so does the likelihood that a man will engage in this comparison process. The adverse effects of such a process are a decrease in current body shape satisfaction (Lorenzen, Grieve, & Thomas, 2004).

It is important to note that the relationship between MD and media exposure is one of a bi-directional nature. Harrison (2000) suggests that, although media consumers are affected by what they see, they may also seek out such media outlets that are congruent with their ideals.

Stoutjesdyk and Jevne (1993) note that participation in sports that focus on weight (e.g., wrestling, track) increases the incidence rate of eating disorders; moreover, individuals who participate in sports that reward high muscle mass are more likely to use/abuse illegal substances such as anabolic steroids (Irving, Wall, Neumark-Sztainer, & Story, 2002). It is important to know that the use of such substances increases the body mass/adiposity of an individual, and high density body mass is thought to be a precursor for MD (Grieve, 2005). Conversely, Ashley, Smith, Robinson, and Richardson (1996) found that athletic participation does not increase the incidence rate of eating disorders.
Although the research is unclear on this matter, sports participation is still tied to many behaviors that could influence the onset and development of eating disorders and MD.

Parks and Read (1997) offered insight into the differing body image concerns by studying two groups of adolescent male athletes: cross country runners and football players. Using measures of self esteem, dieting patterns, and reasons for exercise, the authors found a significant difference between the body satisfaction of cross country runners and football players. The football players demonstrated greater satisfaction with their current body shapes, whereas the cross country runners showed more negative responses regarding their body shapes. Interestingly, both groups expressed a desire to gain weight, and the football players’ average weight was 37 pounds heavier than the cross country runners. Parks and Read (1997) also note that the football players have chosen a sport that conforms to their view of masculinity, one with a strong upper body and a mesomorphic body build.

Emotional Factors: Body Dissatisfaction and Negative Affect

Harmatz, Gronendyke, and Thomas (1985) noted the problems exhibited by underweight men. They explored attitudes about eating and normal weight, self-image, and problems in social relationships of overweight, normal weight, and underweight men and women. Results of this study indicated that underweight men view themselves in a negative manner. The authors discovered that underweight men and overweight women showed some strong similarities in their responses to numerous items.

Similarly, Gray (1977) stated that men are more likely to perceive themselves as underweight, whereas women are more likely to say that they are overweight. It is important to note that both men and women have a distorted view of their weight, and
they create standards that are not congruent with statistical/health model standards (Fallon & Rozin, 1985).

Although body image research in men is lacking, there is agreement regarding weight satisfaction in men. Davis, Elliott, Dionne, and Mitchell (1991) found that 80% of the men in their study were dissatisfied with their current weight. Similarly, Grieve, Wann, Henson, and Ford (in press) found that 64% of a sample of college men reported that they were dissatisfied with their body shape. Most agree that there are two groups of men who are dissatisfied with their weight: men who want to lose weight and men who want to gain weight (Connor-Greene, 1988; Drewnowski & Yee, 1987; Silberstein, Striegel-Moore, Timko, & Rodin, 1988). Davis et al. (1991) discuss the options that men have for achieving their ideal weight. It is noted that they have only one way to obtain their desired physique: vigorous exercises like weight lifting, running, or swimming are the necessary means to an end for men (Davis et al., 1991).

The minimal research investigating the relationship between personality factors and body image in men shows that low self-esteem is closely related to male body dissatisfaction. Franzoi and Shields (1984) identified three primary factors of men’s body esteem through the use of a large factor-analytic study. Two of these factors are upper body strength and physical condition, and these can only be changed through exercise.

Negative affect is the component of the etiological model (Grieve, 2005) that motivates the behaviors that are symptomatic of MD. Low self-esteem, body dissatisfaction, and body distortion all contribute to the negative affect of an individual with MD. These feelings and emotions will also influence low self-esteem, body
distortion, and symptoms of MD. Negative affect is the mechanism through which body dissatisfaction expresses its influence on the symptoms of MD.

Psychological Factors: Ideal Body Internalization and Self-Esteem

When men accept the mesomorphic body shape as the cultural ideal, they are engaged in the process of ideal body internalization. Research supports the notion that such internalization of a thin body ideal, in conjunction with other variables, contributes to the onset of eating disorders (Thompson & Stice, 2001). It is important to note that this same process may influence the onset of MD as well.

According to self discrepancy theory, there are three types of self: the actual self, the ideal self, and the ought self (Higgins, 1987). The actual self includes all the attributes that people or significant others believe they actually possess. The ideal self includes the attributes that people would like to possess. The ought self is representative of the attributes that people believe they are obliged to have. It is important to understand that the ideal and ought selves are self-guides, or mechanisms for evaluating our personal standards. Emotional distress results from a discrepancy between the actual self and the self-guides. Such a result can have a weak influence, leading to problems with disobedience, aggressiveness, and lack of responsibility. However, the influence may be a strong one, and it may lead to increases in the emotional intensity of self-evaluation and the desire to reduce self-discrepancies. While men typically develop weak self-guides, Strauman Vookles, Berenstein, Chaiken, and Higgins (1991) note that there is some evidence that they can develop strong self-guides. It is in this scenario, then, that men are most vulnerable to body dissatisfaction and other maladaptive eating and exercising
patterns. Such an effect is compounded when men internalize and accept the cultural ideal for body image.

Typically, men find their body shapes as too small, and they would like to gain weight (Pinhas, Toner, Ali, Garfinkel, & Stuckless, 1999). Many underweight men report a desire to gain about 17 pounds (Mintz & Betz, 1986), most likely muscle mass. Vartanian, Giant, and Passino (2001) found that nearly 85% of men want to be more muscular. Importantly, Silberstein et al. (1988) found that self-esteem is influenced by how close men are to their perceived body ideal. In this study, 78% of the men chose an ideal body figure that was not congruent with their present body. Moreover, this relationship between perceived size, shape, and attractiveness of the body with self esteem may lead to use of supplements such as androgenic anabolic steroids (Wroblewska, 1997).

Several studies have investigated male perceptions of ideal body shapes. Interestingly, Cohn and Adler (1992) found that their sample of men had an exaggerated view of the desirable male body; these participants rated larger physiques as ideal and attractive. Grieve, Newton, Kelley, Miller, and Kerr (2005) found that men report a body ideal that is more muscular than what women find attractive. In addition, men believe that women desire a more muscular body than women actually report. This stereotypical ideal of what is attractive physically can put males at risk for a number of maladaptive behaviors. A study by Lynch and Zellner (1999) found that college men were more dissatisfied with their bodies than were adult men. This dissatisfaction appears to be a result of their incorrect view of what women find attractive.
Within the proposed etiological model (Grieve, 2005), ideal body internalization can influence both body dissatisfaction and low self-esteem. With body dissatisfaction, an individual with a higher level of ideal body internalization has a higher level of body dissatisfaction. The opposite is true with self-esteem: the more ideal body internalization, the lower the self-esteem.

Low self-esteem can lead to the development of MD. Individuals whose self esteem is dependent on their appearance spend a larger amount of time participating in activities that are related to their appearance, like lifting weights (Crocker, 2002). Mintz and Betz (1986) found a positive relationship between self esteem and body attitudes. In men and women, as attitudes about the body become more positive, self-esteem rises.

Within the proposed etiological model (Grieve, 2005), ideal body internalization, body dissatisfaction, and negative affect all influence low self-esteem. Low self-esteem can also impact body dissatisfaction and negative affect, resulting in a negative spiral. As individuals’ self esteem drops lower, their body dissatisfaction rises higher and higher and their mood worsens.

Cognitive Variables: Perfectionism

Nugent (2000) describes perfectionism as the pursuit of unrealistic goals. Due to the relationship between women with eating disorders and the unrealistic goals they attempt to achieve, it has been hypothesized that men with MD are also influenced by perfectionism.

Within the proposed etiological model (Grieve, 2005), perfectionism exerts a direct influence through the persistent pursuit of the ideal body. An indirect influence is manifested through body dissatisfaction: the larger the discrepancy between the ideal
body and actual body, the more dissatisfaction will be seen with current size. Both direct and indirect influences increase the likelihood of developing MD (Grieve, 2005).

Other Factors: Weight Lifting and Supplement Use

A drive for increased muscularity and leanness together are risk factors for developing MD. MD is most likely to occur and be diagnosed in individuals who are muscular and mesomorphic, and even those who are extremely muscular, or hypermesomorphic. Current research suggests that increasing body mass is extremely important for many individuals. Drewnoski and Yee (1987) found that 40% of men wanted to gain weight. It has also been found that college men are likely to want to increase their muscle mass (Lynch & Zellner, 1999). Grieve et al. (in press) found that about one quarter (27%) of a college sample of men reported currently lifting weights and over half (57%) reported ever lifting weights. Weight gaining activities are also pervasive in the younger population, including adolescents and children (McCabe & Ricciardelli, 2001), and this early awareness may increase the amount of men who are at risk for developing MD. Level of body mass and body dissatisfaction have a negative relationship: lower levels of body mass lead to higher levels of body dissatisfaction (Grieve, 2005).

Past research has noted the relationship between certain variables and weight training. Tucker (1983) conducted research on weight training and self-concept of college men. This study found evidence to assert that regular weight training is related to the enhancement of the self-concepts of college men. Tucker (1983) cites several studies that reaffirm the notion that weight-training programs increase self-esteem and psychic
vigor. Consistent results show, as mentioned in Pope et al. (1997) and Pope et al. (1999), that the muscular body for men is the most desirable and preferred in Western culture.

*Measures of MD*

There are currently two measures to assess MD: Muscle Appearance Satisfaction Scale (Mayville, Williamson, White, Netemeyer, & Drab, 2002) and Muscle Dysmorphic Disorder Inventory (Hildebrandt, Langenbucher, & Schlundt, 2004). The Muscle Appearance Satisfaction Scale (MASS) is a 19-item, self-report measure. Mayville et al. (2002) found a stable five-factor structure, including Bodybuilding Dependence, Muscle Checking, Substance Use, Injury, and Muscle Satisfaction. The MASS was researched to establish adequate internal consistency, test-retest reliability, and construct validity. The Muscle Dysmorphic Disorder Inventory (MDDI) is a 13-item questionnaire. Hildebrandt, Langenbucher, and Schlundt (2004) identified three components within the MDDI: Drive for Size, Appearance Intolerance, and Functional Impairment. The MDDI was researched to establish reliability, internal consistency, and convergent and divergent validity.

*Limitations of Existing Research*

Because research has consistently noted the growing body concern issues in men, clinicians can benefit from the development of a scale to assess MD. The creation of an inventory will provide clinicians with improved abilities for diagnosing and treating MD. The difference in the number of factors of the two scales available to assess MD suggests the need for further exploration and development of measures. Although each scale has shown good psychometric properties, the scales show different factor structures, and they are not tied to a model of etiology. Further research on these scales in conjunction with
the MDI can establish even better psychometric properties, leading to the development of a very useful and reliable tool for clinicians.

**Present Study**

This study intends to create an inventory for assessing MD in men. Using the etiological model set forth by Grieve (2005), the current study will attempt to identify the four main factors of MD. These factors will be used to develop a scale and subsequently to revise the etiological model (Grieve, 2005).
Method

Participants and Design

Participants for the study were 304 men all over the age of 18. The mean age of participants was 20.64 (SD = 4.7). The mean education level for participants was 14.05 (SD = 1.3), which is a sophomore in college. Participants included 159 freshmen in college, 53 sophomores, 36 juniors, 28 seniors, and 27 graduate students. The mean self-reported weight and height for participants was 181.87 lbs. (SD = 37.0) and 71.57 inches (SD = 5.8). The mean Body mass Index (BMI) for participants was 25.66 (SD = 4.6). Participants included 250 Caucasian males (82.2%), 31 African American males (10.2%), 10 Asian males (3.3%), four males from other ethnicities (1.3%), three Biracial/Multiracial males (1.0%), two Hispanic males (0.7%), two Native American males (0.7%), one Middle Eastern/West Asian male (0.3%), and one Pacific Islander male (0.3%).

Of the 304 participants, 174 (57.2%) indicated that they had an active gym membership, and 130 (42.8%) indicated that they did not have an active gym membership. Regarding current weight lifting, 226 participants (74.3%) indicated that they currently lifted weights, while 78 (25.7%) indicated that they did not. Of the 226 participants that indicated that they currently lift weights, 20 (8.8%) indicated that they lift once a week, 39 (17.3%) indicated that they lift twice a week, 71 (31.4%) indicated that they lift three times a week, 70 (31.0%) indicated that they lift four times a week, 20 (8.8%) indicated that they lift five times a week, 4 (1.8%) indicated that they lift six times per week, and 1 (0.4%) indicated that he lifts seven days a week. Of the 226 participants

1 Because all participants in this study were men, the language will reflect this through the use of masculine pronouns.
that indicated that they currently lift weights, 215 (95.1%) indicated that they lift once per
day, 6 (2.7%) indicated that they lift twice per day, 1 (0.4%) indicated that he lifts three
times per day, and 1 (0.4%) indicated that he lifts four times per day. Of the 226
participants that indicated that they currently lift weights, 32 (14.5%) indicated that their
lifting session lasts less than 30 minutes, 114 (50.3%) indicated that their lifting session
lasts between 40 and 60 minutes, 75 (33%) indicated that their lifting session lasts
between 70 and 120 minutes, and 5 (2.2%) indicated that their lifting session lasts
between 150 and 180 minutes. Of the 226 participants that indicated that they currently
lift weights, 136 (59.6%) reported having a scheduled time that they lift, and 90 (39.5%)
reported having no scheduled time to lift. Of the 136 participants who reported having a
scheduled time to lift, 50 (16.4%) reported lifting in the afternoon, 30 (9.9%) reported
lifting in the evening, 29 (9.5%) reported lifting in the morning, 27 (9.2%) reported
lifting in the morning and afternoon, and 1 (0.3%) reported lifting in the morning and
evening.

Of the 304 participants, 108 (35.5%) indicated that they use supplements, and 196
(64.5%) indicated that they do not. Of the 108 participants who indicated that they use
supplements, 23 (7.4%) reported using creatine, 62 (20.1%) reported taking vitamins, 65
(21.1%) reported using protein shakes, and 0 (0%) reported using steroids (Numbers
added up to greater than 108 because some participants reported using more than one
type of supplement). Other supplements that participants reporting using included Amino
Fuel, Arganine, Endurance drinks, fish oil, Guavone, Hydroxycut, NO2, OS, protein bars,
and Xenadrin.
Of the 304 participants, 221 (72.7%) reported participating in some form of cardiovascular exercise, and 82 (27.0%) reported not participating in cardiovascular exercise (one participant did not answer this question). Of the 221 who reported engaging in cardiovascular exercise, 23 (10.4%) reported participating one time a week, 48 (21.7%) reported participating two times a week, 64 (29.0%) reported participating three times a week, 22 (10.0%) reported participating four times a week, 24 (10.9%) reported participating five times a week, 35 (15.8%) reported participating six times a week, and 5 (2.3%) reported participating seven times a week. Of the 221 who reported participating in cardiovascular exercise, 173 (79.0%) reported participating once per day, 35 (16.0%) reported participating twice per day, 8 (3.7%) reported participating three times per day, 1 (0.5%) reported participating four times per day, and 2 (0.9%) reported participating six times per day (two participants did not answer this question). Of the 221 participants who reported participating in cardiovascular exercise, 86 (39.2%) reported participating in cardiovascular exercise for less than 30 minutes, 66 (30.0%) reported participating for 35 to 60 minutes, 22 (10.0%) reported participating for 75 to 90 minutes, and 46 (20.9%) reported participating for 120 to 180 minutes (one participant did not answer the question). Of the 221 who reported participation in cardiovascular activity, 139 (62.9%) reported having a scheduled time, and 82 (37.1%) reported having no scheduled time. Of the 139 who reported having a scheduled time to participate in cardiovascular activity, 53 (17.4%) reported the afternoon, 40 (13.2%) reported evening, and 20 (6.6%) reported mornings (26 participants did not answer the question). Types of cardiovascular exercise listed by participants included basketball, football, jogging, running, ultimate frisbee, racquetball, swimming, soccer, walking, softball, tennis, biking, hiking, lacrosse,
aerobics, disc golf, elliptical, kickboxing, golf, volleyball, yoga, dodge ball, kickball, and martial arts. Participants reported previous participation in the following organized sports: badminton, volleyball, baseball, basketball, swimming, football, soccer, track, golf, cycling, cross country, tennis, softball, hockey, lacrosse, diving, gymnastics, wrestling, rugby, boxing, and fencing. Participants reported current participation in football (27 participants) and swimming (33 participants).

Of the 304 participants, 19 (6.3%) reported using topical analgesics before exercise, and 284 (93.7%) reported not using topical analgesics before exercise (one participant did not answer this question). Of the 304 participants, 34 (11.2%) reported using topical analgesics after exercise, and 269 (88.8%) reported not using topical analgesics after exercise (one participant did not answer this question). Of the 304 participants, 51 (16.8%) reported using pain medication before exercise, and 252 (83.2%) reported not using pain medication before exercise (one participant did not answer this question). Of the 304 participants, 96 (31.7%) reported using pain medication after exercise, and 207 (68.3%) reported not using pain medication after exercise (one participant did not answer this question). Of the 304 participants, 54 (17.8%) reported having a medical condition that would limit or inhibit exercise. The conditions listed include allergies, panic disorder, ankle problems, arthritis, asthma, knee problems, back problems, epilepsy, diabetes, heart condition, shoulder problems, osteoporosis, low blood sugar, and tendonitis. Of the 304 participants, 70 (23.0%) reported that they are currently on over the counter or prescription medication. The reported medications included Adderall, Advair, Albuterol, Aleve, Allegra, Benadryl, Clarinex, Claritin, Concerta, Cortozone, Darvocet, Depakote, Diovan, Flexeril, Fosomax, Hydrocodone, ibuprofen,
Insulin, Lexapro, Lipitor, Lortab, No Doze, Paxil, Plavix, Prevacid, Singulair, Trazadone, Tylenol, Zoloft, and Zyrtec.

Participants were also asked to look at 18 body shapes and choose the best one that represents what they currently look like. As shown in Table 1, 82 (27%) of the participants identified their current body shape as O, which falls in between thin and muscular. Additionally, participants selected an ideal body shape, and 103 (33.9%) participants selected P, which is closer to the muscular end of the continuum. Furthermore, 95 (31.3%) and 53 (17.4%) participants chose O and Q, respectively, and both of these body shapes fall in the muscular range. It is important to note that there was more variability among the participants’ ratings of current body shapes than the ideal body shapes. Specifically, 251 (82.6%) of the participants rated their ideal body shape as muscular (body shapes O, P, and Q), and only 113 (37.2%) of the participants indicated that their current body size was in the same range. These data highlight a discrepancy between participants’ ideal and current body sizes.
Table 1

*Number of Participants Endorsing Different Drawings on Current Body Shape and Ideal Body Shape*

<table>
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<tr>
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<th>Current</th>
<th>Ideal</th>
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<tbody>
<tr>
<td>Obese</td>
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</tr>
<tr>
<td>A</td>
<td>1 (0.3%)</td>
<td>3 (1.0%)</td>
</tr>
<tr>
<td>B</td>
<td>2 (0.7%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>C</td>
<td>8 (2.6%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>D</td>
<td>23 (7.6%)</td>
<td>2 (0.7%)</td>
</tr>
<tr>
<td>E</td>
<td>32 (10.5%)</td>
<td>5 (1.6%)</td>
</tr>
<tr>
<td>F</td>
<td>20 (6.6%)</td>
<td>1 (0.3%)</td>
</tr>
<tr>
<td>G</td>
<td>8 (2.6%)</td>
<td>2 (0.7%)</td>
</tr>
<tr>
<td>H</td>
<td>1 (0.3%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>Thin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>1 (0.3%)</td>
<td>1 (0.3%)</td>
</tr>
<tr>
<td>J</td>
<td>0 (0.0%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>K</td>
<td>3 (1.0%)</td>
<td>0 (0.0%)</td>
</tr>
<tr>
<td>L</td>
<td>9 (3.0%)</td>
<td>2 (0.7%)</td>
</tr>
<tr>
<td>M</td>
<td>35 (11.5%)</td>
<td>6 (2.0%)</td>
</tr>
<tr>
<td>N</td>
<td>44 (14.5%)</td>
<td>10 (3.3%)</td>
</tr>
<tr>
<td>O</td>
<td>82 (27%)</td>
<td>95 (31.3%)</td>
</tr>
<tr>
<td>P</td>
<td>25 (8.2%)</td>
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<tr>
<td>Q</td>
<td>6 (2.0%)</td>
<td>53 (17.4%)</td>
</tr>
<tr>
<td>Muscular</td>
<td></td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>2 (0.7%)</td>
<td>19 (6.3%)</td>
</tr>
</tbody>
</table>
The design of the study was correlational, conducting an exploratory factor analysis on the Muscle Dysmorphia Inventory. Using the four criteria of Muscle Dysmorphia, as outlined by Olivardia (2001), questions were developed in an attempt to create a psychometrically sound self-report tool.

Measures

Demographics. Participants completed a 32-item questionnaire assessing age, gender, height, weight, ethnicity, educational level, exercise history, and health history (See Appendix A).

Muscle Dysmorphia Inventory (MDI). Using the criteria outlined in Olivardia (2001) for Muscle Dysmorphia, items were created to assess each of the four facets of this disorder (See Appendix B). These criteria include the following: a preoccupation with the idea that one’s body is insufficiently lean and muscular; an individual’s neglect of important social, occupational, or recreational activities due to the compulsive need to maintain a strict workout and/or diet schedule; avoidance of situations where his/her body may be seen by others; preoccupation with one’s body size that causes significant distress or impairment; persistence to his/her workout, diet, or use of substances such as anabolic steroids, despite being informed of possible adverse effects; and thoughts and feelings of anxiety if they are unable to work out or deviate from their diet. Items were also constructed based on previous research in eating disorders and body dysmorphia. The original MDI contained 67 items that were answered on a 6-point, Likert-type scale, ranging from 1 (Strongly Disagree) to 6 (Strongly Agree). Participants responded to items such as “I am more muscular than others,” and “I am ashamed of my body shape or size.”
Procedure

Participants were recruited from graduate and undergraduate psychology courses and the Western Kentucky University swimming and football teams. After obtaining Human Subjects Review Board (HSRB) approval, the primary researcher described the details of the study to participants, including voluntary participation and confidentiality. Before participating in the study, all participants completed an informed consent document (See Appendix C). Each participant then completed the demographics questionnaire, the MDI, and chose both a current and ideal body size from 18 body size pictures (See Appendix D). Completion of this study took between 10 and 15 minutes. The overwhelming majority of participants received either extra credit or research credit for their psychology courses. Debriefing occurred after participants finished completing the questionnaires (See Appendix E).
An exploratory factor analysis was performed with the data. This method narrowed down the original 67-item scale to a 25-item scale. Principal Components Analysis (PCA) was used to reduce the information in the variables, extracting components with Eigenvalues over 1.0 and using a Varimax rotation. Then, the significance of loadings and correlations between components were analyzed. As shown in Table 2, 16 factors were identified with Eigenvalues over 1.0. Together, these factors accounted for 67.12% of the variance.

Table 2

*Factor Eigenvalues and the Variance Accounted for by Each.*

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<tr>
<th>Factors</th>
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<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
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<tr>
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<td>4.37</td>
<td>3.57</td>
<td>2.36</td>
<td>2.03</td>
<td>1.78</td>
<td>1.68</td>
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<tr>
<td>% of Variance Explained</td>
<td>19.40</td>
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<td>3.53</td>
<td>3.03</td>
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</table>

<table>
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<tr>
<th>Factors</th>
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<th>13</th>
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<th>16</th>
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<tbody>
<tr>
<td>Eigenvalues</td>
<td>1.66</td>
<td>1.51</td>
<td>1.37</td>
<td>1.28</td>
<td>1.26</td>
<td>1.14</td>
<td>1.13</td>
<td>1.06</td>
</tr>
<tr>
<td>% of Variance Explained</td>
<td>2.47</td>
<td>2.25</td>
<td>2.05</td>
<td>1.90</td>
<td>1.89</td>
<td>1.70</td>
<td>1.69</td>
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</table>
Using the data shown in Table 2, the strongest item loadings for each component were identified. After examining all items that loaded highly for each component, a combination of strength of correlation and theoretical reasoning was used to determine the best questions to retain. After this analysis, eight components remained, each of which was named to describe the common theme of the items within it.

Table 3

*Item Loading for Each Component.*

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<th>Item</th>
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</tbody>
</table>

Note: Bold items reflect main factor loadings.

After excluding items that theoretically or statistically did not fit, a second factor analysis was conducted on the remaining items to verify each component's items. The result was eight factors, and each of the 25 items continued to load on the original
component established in the first factor analysis. These results are shown in Table 4 and Table 5.

Table 4

*Final Factor Eigenvalues and the Variance Accounted for by Each.*

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<th>6</th>
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<th>8</th>
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Table 5

*Final Item Loading for Each Component*

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Table 5, Continued.

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<td>0.23</td>
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<td>0.04</td>
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</tbody>
</table>

Note: Bold items reflect main factor loadings.

The resulting components include Inadequacy, Preoccupation, Compulsivity, Muscularity Drive, Increased Muscularity, Body Anxiety, Social Sacrifice, and Persistence. The component Inadequacy includes five items (60, 61, 62, 64, and 66), and
it provides a measure of the second criterion, part c, of Muscle Dysmorphia. The component Preoccupation includes four items (41, 42, 43, and 44), and it provides a measure of the first criterion. The component Compulsivity includes three items (6, 51, and 52), and it provides a measure of the second criterion, part a. The component Muscularity Drive includes four items (1, 2, 3, and 4), and it provides a measure of an overall drive for muscularity. The Increased Muscularity component includes two items (5 and 24), and it provides a measure of a desire to increase muscle mass. The Body Anxiety component includes three items (45, 46, and 50), and it provides a measure for the second criterion, part b. The Social Sacrifice component includes two items (21 and 22), and it provides a measure for the second criterion, part a. The Persistence component includes two items (54 and 55), and it provides a measure for the second criterion, part d. See Appendix F for the revised MDI containing these 25 items.

It is important to note that the amount of variance caused by components shifted after the first analysis. When poor items were eliminated from the MDI, extraneous variance did not exert as much of an effort on the component loadings. More specifically, the Preoccupation component moved from accounting for the third largest amount of variance to accounting for the second largest amount of variance, the Compulsivity component moved from accounting for the fifth largest amount of variance to accounting for the third largest amount of variance, the Muscularity Drive component moved from accounting for the second largest amount of variance to accounting for the fourth largest amount of variance, the Increased Muscularity component moved from accounting for the fourth largest amount of variance to accounting for the fifth largest amount of variance, the Social Sacrifice component moved from accounting for the eighth largest amount of variance, the...
variance to accounting for the seventh largest amount of variance, and the Persistence component moved from accounting for the seventh largest amount of variance to accounting for the eighth largest amount of variance. This realignment is a natural result of removing items, which allows the remaining items to account for more variance.

Cronbach’s Alpha was calculated on the final MDI to determine the consistency or reliability of the scale’s questions. Cronbach’s Alpha for the final MDI is 0.87, which shows a high level of reliability and suggests that the questions are strongly related to one another. Additionally, Cronbach’s Alpha was calculated for each of the components: Inadequacy is 0.89, Preoccupation is 0.84, Compulsivity is 0.74, Muscularity Drive is 0.74, Increased Muscularity is 0.75, Body Anxiety is 0.72, Social Sacrifice is 0.92, and Persistence is 0.83. These data suggest that each component has a high amount of consistency among its questions. Correlations were also calculated between each of the components. The correlations and significance values are presented in Table 6. These data provide evidence that the relationships between the components is generally weak (average correlation = 0.23), suggesting that the components are measuring different constructs.
Table 6

*Inter-Component Correlations.*

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<td>.27</td>
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</table>

Note: Correlations are on the bottom of the table; significance values are on the top of the table.

Component 1: Inadequacy; Component 2: Preoccupation; Component 3: Compulsivity; Component 4: Muscularity Drive; Component 5: Increased Muscularity; Component 6: Body Anxiety; Component 7: Social Sacrifice; Component 8: Persistence.
Discussion

This study was completed in order to create a psychometrically sound diagnostic tool for MD. Using the etiological model proposed by Grieve (2005) and previous research on eating disorders and Muscle Dysmorphia, 67 items were created in order to identify common factors of Muscle Dysmorphia. After analyzing the data, eight components were identified, creating a scale of 25 items.

The etiological model presented by Grieve (2005) identifies four types of factors that influence the manifestation of Muscle Dysmorphia, including socioenvironmental (media pressure, sport participation), emotional (body dissatisfaction, negative affect), psychological (ideal body internalization, self esteem), and cognitive (perfectionism). These variables can be compared with components identified in the present study to establish several relationships. For example, the Inadequacy component can be directly related to the psychological variable self-esteem. An individual who feels inadequate about his body size or shape will presumably have a lower amount of self-esteem. Both the Preoccupation and Body Anxiety components relate well to the emotional variable body dissatisfaction. An individual who is uneasy or apprehensive about his body may become preoccupied with his physique, furthering the level of body dissatisfaction. The components Increased Muscularity and Persistence reflect the concept of perfectionism. An individual who is concerned with more muscle mass and more muscle tone may show high levels of persistence to obtain his goals; such a scenario exemplifies a drive for perfectionism. Compulsivity and Social Sacrifice also fit in well with perfectionism; the compulsive need to work out despite social sacrifice and adverse physical conditions demonstrates a desire for perfection. The component Muscularity Drive can be tied to
socioenvironmental variables including media and sports. Individuals who fall prey to
the ideal of an extremely muscular male internalize the views of society, leading to a
greater drive for muscularity.

It is important to note the strong likelihood for interaction among the
aforementioned variables. As the etiological model proposed by Grieve (2005)
demonstrates, some variables may interact with more than one variable. For example, in
his model, Grieve (2005) proposes that ideal body internalization can lead to low self
esteem as well as body dissatisfaction. Furthermore, some variables may have a two-way
relationship; for example, negative affect can result in low self-esteem, and low self-
estee can result in negative affect.

When reviewing the results of the present study, attention must be given to the
eight components established within the MDI. As the goal of this study stated, these
components are strongly related to the symptoms of Muscle Dysmorphia. The resulting
components are not identical to the criteria set forth by Olivardia (2001) or the etiological
model proposed by Grieve (2005); instead, the components are a combination of the two,
creating a unique outcome.

The component Inadequacy provides a measure of the second criterion, part c,
that states the following: “the preoccupation about the inadequacy of body size or
musculature causes clinically significant distress or impairment in social, occupational, or
other important areas of functioning” (Olivardia, 2001, p. 255). The component
Preoccupation provides a measure of the first criterion that states that the person “has a
preoccupation with the idea that his or her body is not sufficiently lean and muscular”
(Olivardia, 2001, p. 255). The component Compulsivity provides a measure of the second
criterion, part a, that states that the individual “frequently gives up important social, occupational, or recreational activities because of a compulsive need to maintain his or her workout and diet schedule” (Olivardia, 2001, p. 255).

The component Muscularity Drive provides a measure of an overall drive for muscularity. The Increased Muscularity component provides a measure for a desire to increase muscle mass. The Body Anxiety component provides a measure for the second criterion, part b, which states that the individual “avoids situations in which his or her body is exposed to others, or endures such situations only with marked distress or intense anxiety” (Olivardia, 2001, p. 255). The Social Sacrifice component provides a measure for the second criterion, part a, that states that the individual “frequently gives up important social, occupational, or recreational activities because of a compulsive need to maintain his or her workout and diet schedule” (Olivardia, 2001, p. 255). The Persistence component provides a measure for the second criterion, part d, that states that the individual “continues to work out, diet, or use performance-enhancing substances despite knowledge of adverse physical or psychological consequences” (Olivardia, 2001, p. 255).

It is also necessary to explore the breakdown of the 25 items maintained on the MDI. The component Inadequacy accounted for the most variance within the MDI, and there were five items that best reflected this component. These items include the following: “I am ashamed of my body shape or size”; “When I see my reflection in the mirror or a window, I feel badly about my body size or shape”; “When I see muscular men, it makes me feel badly about my body shape or size”; “I feel that I am way too focused on my body shape or size”; and “I feel insecure about my body.” These questions provide a measure for the criterion that states the following: “preoccupation
about the inadequacy of body size or musculature causes clinically significant distress or impairment in social, occupational, or other important areas of functioning” (Olivardia, 2001, p. 255).

The component Preoccupation accounted for the second largest amount of variance, and four items were maintained to reflect this component. The items include the following: “I have difficulty focusing on schoolwork because of thoughts about my body”; “I have difficulty focusing on schoolwork because of thoughts of working out”; “I have difficulty maintaining relationships because of thoughts about my body”; and “I have difficulty maintaining relationships because of thoughts of working out.” These questions provide a measure for the criterion that states the following: the person “has a preoccupation with the idea that his or her body is not sufficiently lean and muscular” (Olivardia, 2001, p. 255).

The component that accounted for the third largest amount of variance is Compulsivity, and there were three items maintained to reflect this component. The items include the following: “I feel badly when I do not get to work out”; “I feel anxious when I miss a workout”; and “I feel anxious when I deviate from my diet.” These questions provide a measure for the criterion that states the following: “the individual frequently gives up important social, occupational, or recreational activities because of a compulsive need to maintain his or her workout and diet schedule” (Olivardia, 2001, p. 255).

The component that accounted for the fourth largest amount of variance is Muscularity Drive, and four items were maintained to reflect this component. The items include the following: “I am more muscular than others”; “I am not as muscular as
others”; “I am muscular enough”; and “I am not muscular enough.” Within this component, the items “I am more muscular than others” and “I am muscular enough” were reverse scored. These questions provide a measure of an overall drive for muscularity. Although this component does not measure a criterion of MD, it is a critical factor in assessing the disorder. This concept is integral because individuals who have strong feelings about the importance of muscularity are at risk for developing MD.

The component that accounted for the fifth largest amount of variance is Increased Muscularity, and two items were maintained to reflect this component. The items include the following: “I want to be more muscular than I currently am” and “If I could increase my muscle mass, I would.” These questions provide a measure of a desire to increase muscle mass.

The component that accounted for the sixth largest amount of variance is Body Anxiety, and three items were maintained to reflect this component. The items include the following: “I would not be inclined to participate in activities that require minimal clothing”; “I would not be inclined to participate in activities that require wearing swimsuits”; and “The less clothing I wear the more anxious I become.” These questions provide a measure for the criterion of MD that states the following: “the individual avoids situations in which his or her body is exposed to others, or endures such situations only with marked distress or intense anxiety” (Olivardia, 2001, p. 255).

The component that accounted for the seventh greatest amount of variance is Social Sacrifice, and two items were maintained to reflect this component. The items include the following: “Working out causes problems in my romantic relationships” and “Working out causes problems in my friendships.” These questions provide a measure
for the criterion that states the following: “the individual frequently gives up important social, occupational, or recreational activities because of a compulsive need to maintain his or her workout and diet schedule” (Olivardia, 2001, p. 255).

The component that accounted for the least amount of variance is Persistence, and two items were maintained to reflect this component. The items include the following: “I would be inclined to work out against doctor’s orders” and “I would be inclined to work out when I am sick.” These questions provide a measure for the criterion that states the following: “the individual continues to work out, diet, or use performance-enhancing substances despite knowledge of adverse physical or psychological consequences” (Olivardia, 2001, p. 255).

Further exploration of the breakdown of items to component also provides future consideration for the MDI. Some of the components appear to have an adequate item pool to assess the particular area of Muscle Dysmorphia, while others do not. More specifically, Compulsivity, Increased Muscularity, Body Anxiety, Social Sacrifice, and Persistence, contain, on average, two to three items each. Ideally, each component should contain at least four items to provide the best possible measurement. Future research on the MDI should include creation of additional questions to assess these areas.

Possible questions to assess the component Compulsivity include “I feel stressed when I am unable to work out”; “I must work out a specific number of times each week”; “I never miss a workout”; and “All plans and engagements are tentative until my workouts have been completed.” A possible question to assess the component Increased Muscularity is “I would like to increase the size of my muscles.” Possible questions for the component Body Anxiety include “I worry about how I look in my clothes” and “I do
not like people discussing body shape in front of me.” Examples of questions for the component Social Sacrifice include “I often have to break plans with my family and friends to finish my workouts” and “I often miss fun events or activities because of workout schedule.” Examples of questions to assess the component Persistence include “I would be inclined to skip class to complete my workout”; “I would be inclined to call in sick to get my workout finished”; and “I would work out while experiencing pain due to injury.”

Cronbach’s Alpha on the revised MDI determined the internal consistency of the scale’s questions to be 0.87. This alpha reflects a high level of reliability and suggests that the questions are strongly related to one another. Cronbach’s Alpha for each of the components revealed that each component has a high level of consistency among its questions. The correlations calculated between each of the components provides evidence that the relationships between each of the components is generally weak, suggesting that the components are measuring different constructs. It is important to note that some of the correlations between components were statistically significant. However, this outcome is to be expected with a large number of comparisons. The strongest correlation was just under 0.50, meaning that 25% of the variance is shared, and 75% of the variance is unexplained. Therefore, some of the correlations are statistically significant, but not clinically meaningful.

As with any type of research, there are several limitations to the present study. The first limitation is generalizability. Because the participants in this study included men of a specific age range at a southeastern university, the data collected may not apply to the general population. It is also important to note that the overwhelming majority of
participants were Caucasian. For this reason, the study’s results may not be generalized to other ethnicities. Although these limitations are present, individuals most susceptible to developing MD are college-aged, Caucasian men (Pope et al., 1997). Future researchers may want to explore the relationship between symptoms of Muscle Dysmorphia and different ethnicities. The principal limitation of the present study is the dependence on self-report data for results. Self-report studies assume that participants understand and appropriately interpret questions as well as answer in an honest manner (Schwarz, 1999). When reviewing the results of the current study, it is imperative that these factors are taken into consideration.

The results of the present study have great implications for future research into Muscle Dysmorphia. Psychometric properties, including test-retest reliability of the MDI, need to be examined. The MDI can also be correlated with other scales, such as the Yale-Brown Obsessive Compulsive Scale (Y-BOCS), the State Traït Anxiety Inventory (STAXI), and the Beck Depression Inventory (BDI), to establish concurrent validity.

The implications of creating a diagnostic tool for MD are many. As the number of men with characteristics of MD increases, clinicians will be better equipped to diagnose and establish treatment plans. This research may also allow diagnosticians to identify sub-clinical levels of MD. The MDI may also help identify individuals who are at risk to develop symptoms of MD.
References


Appendix A

Demographics Survey
DEMOGRAPHICS SURVEY
PLEASE CIRCLE OR FILL IN THE APPROPRIATE INFORMATION.

GENERAL INFORMATION

1. AGE: ____

2. GENDER: MALE
   FEMALE

3. HEIGHT: ______

4. WEIGHT: ______

5. ETHNICITY: WHITE/NON-HISPANIC
   AFRICAN AMERICAN
   HISPANIC
   ASIAN
   MIDDLE EASTERN/WEST ASIAN
   NATIVE AMERICAN
   PACIFIC ISLANDER
   BIRACIAL/MULTIRACIAL
   OTHER

6. EDUCATIONAL LEVEL: FRESHMAN
   SOPHOMORE
   JUNIOR
   SENIOR
   GRADUATE

EXERCISE HISTORY

7. DO YOU HAVE AN ACTIVE GYM MEMBERSHIP? YES NO

8. DO YOU LIFT WEIGHTS? YES NO

9. IF YOU LIFT WEIGHTS, HOW MANY DAYS PER WEEK DO YOU ENGAGE IN THESE ACTIVITIES? ________________

10. HOW MANY TIMES PER DAY DO YOU LIFT WEIGHTS? ________________

11. HOW LONG DOES EACH WEIGHT LIFTING SESSION LAST? ____________

12. DO YOU HAVE A SCHEDULED TIME THAT YOU LIFT WEIGHTS? YES NO
13. IF SO, WHAT TIME/S OF DAY DO YOU TYPICALLY LIFT WEIGHTS?

14. DO YOU USE SUPPLEMENTS? YES  NO

15. WHICH OF THE FOLLOWING SUPPLEMENTS DO YOU CURRENTLY USE?
STEROIDS ___
CREATINE ___
VITAMINS ___
PROTEIN SHAKES ___

PLEASE LIST ANY OTHER SUPPLEMENTS THAT YOU USE:

16. DO YOU PARTICIPATE IN CARDIOVASCULAR EXERCISE (e.g. TREADMILL, SWIMMING, ELLIPTICAL TRAINER, BIKE, AEROBICS, ETC.)? YES  NO

17. IF YOU PARTICIPATE IN CARDIOVASCULAR EXERCISE, HOW MANY DAYS PER WEEK DO YOU ENGAGE IN THESE ACTIVITIES? ________________

18. HOW MANY TIMES PER DAY DO YOU PARTICIPATE IN CARDIOVASCULAR EXERCISE? ________________

19. HOW LONG DOES EACH CARDIOVASCULAR SESSION USUALLY LAST? ________________

20. DO YOU HAVE A SCHEDULED TIME THAT YOU PARTICIPATE IN CARDIOVASCULAR EXERCISE? YES  NO

21. WHAT TIME/S OF DAY DO YOU PARTICIPATE IN CARDIOVASCULAR EXERCISE? ________________

22. LIST ALL FORMS OF EXERCISE THAT YOU DO.
23. LIST ALL THE ORGANIZED SPORTS THAT YOU HAVE EVER PLAYED (e.g. BASEBALL, FOOTBALL, BASKETBALL).

24. LIST ALL THE ORGANIZED SPORTS THAT YOU CURRENTLY PLAY.

HEALTH HISTORY

25. DO YOU HAVE TO USE TOPICAL ANALGESICS (e.g. ICY HOT, BENGAY, FLEXALL 454) BEFORE YOU ENGAGE IN ANY TYPE OF EXERCISE? YES NO

26. DO YOU HAVE TO USE TOPICAL ANALGESICS (e.g. ICY HOT, BENGAY, FLEXALL 454, CAPCASIN) AFTER YOU FINISH EXERCISING? YES NO

27. DO YOU EVER HAVE TO USE PAIN MEDICATION BEFORE YOU EXERCISE (e.g. ANTI-INFLAMMATORIES, OVER-THE-COUNTER OR PRESCRIPTION PAIN MEDICINES)? YES NO

28. DO YOU EVER HAVE TO USE PAIN MEDICATION AFTER YOU EXERCISE (e.g. ANTI-INFLAMMATORIES, OVER-THE-COUNTER OR PRESCRIPTION PAIN MEDICINES)? YES NO

29. DO YOU HAVE ANY MEDICAL CONDITIONS THAT WOULD LIMIT OR INHIBIT EXERCISE? YES NO

30. IF SO, PLEASE LIST THE CONDITIONS.

31. ARE YOU PRESENTLY ON ANY MEDICATIONS (OVER THE COUNTER OR PRESCRIPTION)? YES NO

32. IF SO, PLEASE LIST THESE MEDICATIONS.
Appendix B

Muscle Dysmorphia Inventory
**MUSCLE DYSMORPHIA INVENTORY**

**INSTRUCTIONS:** Please respond to each of the following statements. Circle response choice that best describes you.

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<th>STRONGLY DISAGREE</th>
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1. I am more muscular than others.
   1 2 3 4 5 6

2. I am not as muscular as others.
   1 2 3 4 5 6

3. I am muscular enough.
   1 2 3 4 5 6

4. I am not muscular enough.
   1 2 3 4 5 6

5. I want to be more muscular than I currently am.
   1 2 3 4 5 6

6. I feel badly when I do not get to work out.
   1 2 3 4 5 6

7. Others see me as more muscular than I am.
   1 2 3 4 5 6

8. Others see me as less muscular than I am.
   1 2 3 4 5 6

9. I feel anxious prior to working out.
   1 2 3 4 5 6

10. I feel depressed prior to working out.
    1 2 3 4 5 6

11. I feel energetic prior to working out.
    1 2 3 4 5 6

12. I feel vigorous prior to working out.
    1 2 3 4 5 6

13. I feel anxious after my workout.
    1 2 3 4 5 6

    1 2 3 4 5 6

15. I feel energetic after my workout.
    1 2 3 4 5 6

16. I feel vigorous after my workout.
    1 2 3 4 5 6

17. I feel more muscular before my workout.
    1 2 3 4 5 6

18. I feel less muscular before my workout.
    1 2 3 4 5 6

19. I feel more muscular after my workout.
    1 2 3 4 5 6
20. I feel less muscular after my workout.
   1 2 3 4 5 6

21. Working out causes problems in my romantic relationships.
   1 2 3 4 5 6

22. Working out causes problems in my friendships.
   1 2 3 4 5 6

23. If I could increase my body weight, I would.
   1 2 3 4 5 6

24. If I could increase my muscle mass, I would.
   1 2 3 4 5 6

25. If I could decrease my body weight, I would.
   1 2 3 4 5 6

26. If I could decrease my muscle mass, I would.
   1 2 3 4 5 6

27. If I could change my body type, I would.
   1 2 3 4 5 6

28. I much prefer to exercise than to engage in any academic activity.
   1 2 3 4 5 6

29. I would rather work out at the gym than to engage in social activities with friends.
   1 2 3 4 5 6

30. I feel more muscular when I double up on my workouts.
   1 2 3 4 5 6

31. I feel less muscular when I have not burned off enough calories.
   1 2 3 4 5 6

32. I consider myself a perfectionist.
   1 2 3 4 5 6

33. I consider myself overweight.
   1 2 3 4 5 6

34. I consider myself underweight.
   1 2 3 4 5 6

35. I dislike people who are less muscular than me.
   1 2 3 4 5 6

36. I dislike people who are more muscular than me.
   1 2 3 4 5 6

37. I dislike people who do not work out.
   1 2 3 4 5 6

38. I dislike people who work out.
   1 2 3 4 5 6

39. I dislike people who work out more than me.
   1 2 3 4 5 6

40. My workouts prevent me from spending time with my family.
   1 2 3 4 5 6
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</table>

41. I have difficulty focusing on schoolwork because of thoughts about my body.
   1 2 3 4 5 6

42. I have difficulty focusing on schoolwork because of thoughts of working out.
   1 2 3 4 5 6

43. I have difficulty maintaining relationships because of thoughts about my body.
   1 2 3 4 5 6

44. I have difficulty maintaining relationships because of thoughts of working out.
   1 2 3 4 5 6

45. I would not be inclined to participate in activities that require minimal clothing.
   1 2 3 4 5 6

46. I would not be inclined to participate in activities that require wearing swimsuits.
   1 2 3 4 5 6

47. I would not be inclined to undress in locker rooms in front of other people.
   1 2 3 4 5 6

48. I am sensitive about my body in public.
   1 2 3 4 5 6

49. I like to wear tank tops or other shirts that show my arms.
   1 2 3 4 5 6

50. The less clothing I wear the more anxious I become.
    1 2 3 4 5 6

51. I feel anxious when I miss a workout.
    1 2 3 4 5 6

52. I feel anxious when I deviate from my diet.
    1 2 3 4 5 6

53. Steroids have more benefits than drawbacks.
    1 2 3 4 5 6

54. I would be inclined to work out against doctor's orders.
    1 2 3 4 5 6

55. I would be inclined to work out when I am sick.
    1 2 3 4 5 6

56. I feel that my body size or shape is unfavorable in comparison to other men.
    1 2 3 4 5 6

57. I feel fat or weak when I eat sweets, cakes, or any high calorie food.
    1 2 3 4 5 6

58. I feel that my muscle tone is too low.
    1 2 3 4 5 6

59. I feel excessively large and rounded (i.e. fat).
    1 2 3 4 5 6

60. I am ashamed of my body shape or size.
    1 2 3 4 5 6

61. When I see my reflection in the mirror or a window, I feel badly about my body size or shape.
    1 2 3 4 5 6
62. When I see muscular men, it makes me feel badly about my body shape or size.
   1 2 3 4 5 6

63. I worry so much about my body size or shape that I have been thinking I should diet.
   1 2 3 4 5 6

64. I feel that I am way too focused on my body shape or size.
   1 2 3 4 5 6

65. Others tell me that I am way too focused on my body shape or size.
   1 2 3 4 5 6

66. I feel insecure about my body.
   1 2 3 4 5 6

67. Others tell me that I am insecure about my body.
   1 2 3 4 5 6
Appendix C

Informed Consent
Informed Consent Document
Men’s Body Image

You are being asked to participate in a study looking at Men’s Body Image. Please read the following material carefully. It describes the purpose of the study, the procedure to be used, risks and benefits of your participation, and what will happen to the information collected from you. This study is being conducted through Western Kentucky University. The University requires that you give your signed agreement to participate in this study.

The investigator will explain to you in detail the purpose of the study, the procedures to be used, and the potential benefits and risks of participation. You may ask him/her any questions you have to help you understand and discuss with the researcher any questions you may have.

If you then decide to participate in the study, please sign on the next page of this form in the presence of the person who explained the study to you. You should be given a copy of this form to keep.

1. Nature and Purpose of the Project: This study is looking at men’s body image. The data collected in this study will be used as part of the master’s thesis of a psychology graduate student.

2. Explanation of Procedures: Your participation in this study will require you to complete two questionnaires. The first is a demographics survey. You will also be asked to complete the Muscle Dysmorphia Inventory, a 67-item measures used to assess current workout habits, eating patterns, and feelings about the body. It should take approximately 15-20 minutes to complete all the materials.

3. Discomfort and Risks: The risks to participation appear to be small. There is always a small chance that any question could bring about problems. Please let the researcher know if a question has bothered you.

4. Benefits: You may be able to receive extra credit for your psychology course, if your instructor offers such credit (be sure to check with you instructor). It is the responsibility of the instructor to offer alternate opportunities to receive extra credit for those individuals who are unable to participate or who choose not to participate.

5. Confidentiality: Your identity will be completely anonymous. There will be no way for researchers to know who completed which questionnaires. The data collected from you will be combined with data collected from other people. If the data is presented in a journal article or at a conference, the data will be presented
as averages, which makes it impossible for people to identify any single participant.

6. Refusal/Withdrawal: Refusing to be in this study will have no effect on any future services you may receive from Western Kentucky University. Anyone who agrees to participate in this study is free to quit at any time with no penalty.

7. Questions: If you have any questions about the study, please ask them at this point. If you think of questions later on, direct them to Jenny Short or Rick Grieve, Ph.D., at (270) 745-4417, Monday-Friday from 9:00 A.M. until 4:30 P.M.

You understand also that it is impossible to identify all potential risks in an experimental procedure, and you believe that reasonable safeguards have been taken to minimize both the known and potential but unknown risks.

________________________________________  __________________________
Signature of Participant                           Date

________________________________________  __________________________
Signature of Witness                                Date

THE DATED APPROVAL ON THIS CONSENT FORM INDICATES THAT THIS PROJECT HAS BEEN REVIEWED AND APPROVED BY THE WESTERN KENTUCKY UNIVERSITY HUMAN SUBJECTS REVIEW BOARD

Dr. Phillip E. Myers, Human Protections Administrator

TELEPHONE : (270) 745-4652
Appendix D

Body Size Pictures
Body Size Pictures

1. Please choose the letter that is representative of how your body currently looks.

2. Please choose the letter that is representative of how your ideal body would look.
Appendix E

Debriefing
DEBRIEFING STATEMENT

Thank you for participating in this research study. We are interested in creating a scale to assess muscle dysmorphia (MD) in men. MD is a disorder that shares many symptoms of eating disorders and body dysmorphic disorder. The first criterion is that the person has a preoccupation with the idea that his or her body is not sufficiently lean and muscular. The second criterion states that the preoccupation causes clinically significant distress or impairment in social, occupational, or other important areas of functioning as demonstrated by at least two of the following four criteria:

a. The individual frequently gives up important social, occupational, or recreational activities because of a compulsive need to maintain his or her workout and diet schedule.

b. The individual avoids situations in which his or her body is exposed to others, or endures such situations only with marked distress or intense anxiety.

c. The preoccupation about the inadequacy of body size or musculature causes clinically significant distress or impairment in social, occupational, or other important areas of functioning.

d. The individual continues to work out, diet, or use performance-enhancing substances despite knowledge of adverse physical or psychological consequences.

The last criterion states that the primary focus of the preoccupation and behaviors is on being too small or inadequately muscular, and not on being fat, as in anorexia nervosa, or on other aspects of the appearance, as in other forms of Body Dysmorphic Disorder (BDD) (Olivardia, 2001). Although these diagnostic criteria have been identified, only two scales have been established to aid in clinical assessment of MD. If you have any questions regarding research or if you would like a final copy of the research project, please contact either Jenny Short at (270) 745-4417 or Dr. Rick Grieve at (270) 745-4417 or at the Department of Psychology, Western Kentucky University, 1 Big Red Way, Bowling Green, Kentucky, 42101. The final copies will not be available until after August 1, 2005.

References

Appendix F

Revised Muscle Dysmorphia Inventory
MUSCLE DYSMORPHIA INVENTORY

INSTRUCTIONS: Please respond to each of the following statements. Circle response choice that best describes you.

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</table>

*1. I am more muscular than others.
   1  2  3  4  5  6

2. I am not as muscular as others.
   1  2  3  4  5  6

*3. I am muscular enough.
   1  2  3  4  5  6

4. I am not muscular enough.
   1  2  3  4  5  6

5. I want to be more muscular than I currently am.
   1  2  3  4  5  6

6. I feel badly when I do not get to work out.
   1  2  3  4  5  6

7. Working out causes problems in my romantic relationships.
   1  2  3  4  5  6

8. Working out causes problems in my friendships.
   1  2  3  4  5  6

9. If I could increase my muscle mass, I would.
   1  2  3  4  5  6

10. I have difficulty focusing on schoolwork because of thoughts about my body.
    1  2  3  4  5  6

11. I have difficulty focusing on schoolwork because of thoughts of working out.
    1  2  3  4  5  6

12. I have difficulty maintaining relationships because of thoughts about my body.
    1  2  3  4  5  6

13. I have difficulty maintaining relationships because of thoughts of working out.
    1  2  3  4  5  6

14. I would not be inclined to participate in activities that require minimal clothing.
    1  2  3  4  5  6

15. I would not be inclined to participate in activities that require wearing swimsuits.
    1  2  3  4  5  6

16. The less clothing I wear the more anxious I become.
    1  2  3  4  5  6

17. I feel anxious when I miss a workout.
    1  2  3  4  5  6

18. I feel anxious when I deviate from my diet.
    1  2  3  4  5  6
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19. I would be inclined to work out against doctor's orders.
   1 2 3 4 5 6

20. I would be inclined to work out when I am sick.
   1 2 3 4 5 6

21. I am ashamed of my body shape or size.
   1 2 3 4 5 6

22. When I see my reflection in the mirror or a window, I feel badly about my body size or shape.
   1 2 3 4 5 6

23. When I see muscular men, it makes me feel badly about my body shape or size.
   1 2 3 4 5 6

24. I feel that I am way too focused on my body shape or size.
   1 2 3 4 5 6

25. I feel insecure about my body.
   1 2 3 4 5 6
Appendix G

Human Subjects Review Board Approval
WESTERN KENTUCKY UNIVERSITY
Human Subjects Review Board
Office of Sponsored Programs
106 Foundation Building
270-745-4652; Fax 270-745-4211
E-mail: Sean.Rubino@wku.edu

In future correspondence please refer to HS05-086, February 11, 2005

Jennifer Short
850 Wilkinson Trace #37
Bowling Green, KY 42103

Dear Jennifer:

Your revision to your research project, “Creating an Assessment Tool for Muscle Dysmorphia,” was reviewed by the HSRB and it has been determined that risks to subjects are: (1) minimized and reasonable; and that (2) research procedures are consistent with a sound research design and do not expose the subjects to unnecessary risk. Reviewers determined that: (1) benefits to subjects are considered along with the importance of the topic and that outcomes are reasonable; (2) selection of subjects is equitable; and (3) the purposes of the research and the research setting is amenable to subjects’ welfare and producing desired outcomes; that indications of coercion or prejudice are absent, and that participation is clearly voluntary.

1. In addition, the HSRB found that you need to orient participants as follows: (1) signed informed consent is required; (2) Provision is made for collecting, using and storing data in a manner that protects the safety and privacy of the subjects and the confidentiality of the data. (3) Appropriate safeguards are included to protect the rights and welfare of the subjects.

   This project is therefore approved at the Expedited Review Level until August 1, 2005.

2. Please note that the institution is not responsible for any actions regarding this protocol before approval. If you expand the project at a later date to use other instruments please re-apply. Copies of your request for human subjects review, your application, and this approval, are maintained in the Office of Sponsored Programs at the above address. Please report any changes to this approved protocol to this office. A Continuing Review protocol will be sent to you in the future to determine the status of the project.

Sincerely,

Sean Rubino, M.P.A.
Compliance Manager
Office of Sponsored Programs
Western Kentucky University