SCALE DEVELOPMENT IN

MUSCLE DYSMORPHIA

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CHAPTER I

INTRODUCTION

Muscle dysmorphia (MD) has recently emerged as a form of body dysmorphic disorder (BDD) in which symptoms include dissatisfaction with current muscular appearance and the perception of small stature, despite the actual muscular physique of these individuals. Individuals exhibiting symptoms of MD are likely to engage in risky health behaviors, such as excessive exercise, overeating, or taking anabolic steroids and other forms of harmful supplements.

In response to the growing body of literature on MD, a variety of measures have been developed for epidemiological and diagnostic purposes. Three instruments in particular, the Muscle Dysmorphic Inventory (MDI), the Muscle Dysmorphic Disorder Inventory (MDDI), and the Muscular Appearance Satisfaction Scale (MASS), have attempted to measure characteristics of MD.

Various problems exist with the three most prominent measures of MD. These problems include gender bias, a misrepresentation of suggested dimensions of MD, and validity. Therefore, researchers of MD have requested the need for future validation of the current MD measurements along with new scale development.

The purpose of this study was to develop a reliable and valid assessment tool for MD beginning from ground zero of scale development. A large set of items was initially developed then evaluated by Subject Matter Experts. Scale development will include actions based in Classical True Score Theory for items by including a panel of Subject Matter Experts (SME). Each SME reported preferred items reflective of the theory based models of MD. The final set of

items was placed on a questionnaire and administered to a college population to evaluate construct validity and reliability.

An exploratory factor analysis (EFA) was used to assess the various measures of validity and reliability. Methods used for an EFA include scree plot evaluation, comparisons of factor loadings and eigenvalues, and reporting of the reliability statistic. A non-orthogonal Oblimin with Kaiser Normalization rotation yielded factor values reflective of the constructs each group of items represents. The final scale specifically evaluates MD in a college population.

Perceived body image is an important area of study. As trends on the ideal body type currently present themselves in the media, there will be a continued need to empirically investigate various perspectives on body dysmorphia. According to Cafri and Thompson (2007), the current self-report questionnaires for MD may not offer enough information on specific symptoms of the disorder. The construct MD is a sub-type of body dysmorphia where symptoms include dissatisfaction with current muscular appearance and the perception of small stature, despite the actual mesomorphic physique of these individuals. Individuals exhibiting symptoms of MD are likely to engage in risky health behaviors, such as excessive exercise, overeating, or taking anabolic steroids (Pope et al., 1997). In response to the growing body of literature on MD, a variety of measures have been developed for epidemiological and diagnostic purposes. Because of their novelty, little is known regarding the psychometric properties of these scales. Therefore, researchers Cafri and Thompson have suggested the need for further scale development and revision in MD (2007).

Traditionally, anorexia nervosa and bulimia nervosa have been associated with an emphasis on body weight and body shape defining self-worth. These eating disorders are historically associated with women (Muller et al., 2004). According to researchers Sokol and

Grey (1998), eating disorders among men are on the rise. The majority of women with eating disorders have a fear of being too large. Perugi et al. (1997) determined men usually desire great muscular development despite a muscular appearance. The rise for concern of MD is reflected in the literature. Thompson and Cafri report an increase of articles with a focus on the muscular ideal increased 731% from 2000 to 2007 (2007). Various labels have been published synonymous of MD such as “bigorexia” (Pope, Phillips, & Olivardia, 2000) and “reverse anorexia” (Pope, Katz, & Hudson, 1993). Eventually Pope et al. (2000) coined the term muscle dysmorphia to describe a specific sub-type of body dysmorphic disorder (BDD). Muscle dysmorphia is not currently listed in t*he Diagnostic and Statistical Manual of Mental Disorders (DSM-I),* however, researchers Muller et al. have proposed a correlation of MD to possible obsessive-compulsive disorder (OCD) tendencies (Muller et al., 2004). These diagnostic criteria are mentioned later in this document.

Persons with MD may expend great efforts to obtain a perceived physique that is genetically impossible. Other characteristics of MD include the obsession that one’s body is not sufficiently lean and muscular, clinical depression, and impaired social and occupational functioning (Muller, et al., 2004). Coping with MD may include taking pharmacological aids and/or dietary supplements in addition to wearing baggy clothes to mask a body being perceived as too small.

Since MD is a relatively new construct, prevalence data for an MD population has not been established. However, Gray and Ginsberg report the rise of the muscular ideal since the turn of the century due to various cultural and social perspectives (2007). In 1972, 25% of men were dissatisfied with their muscular tone (Berscheid et al., 1973). This number has significantly increased to 85% by the year 2000 (Pope et al., 2000). In addition, 56% of women were also

dissatisfied with their muscle tone in the year 2000. Both statistics indicate a shift of emphasis to obtain the muscular ideal body.

Perceptions of muscular preferences are also stunningly high. According to Fredrick, Fessler, and Hazelton (2005), men believe women want more muscle in men than women actually prefer. Women actually prefer a male body that has 15 to 20 fewer pounds of muscle mass than men seek to obtain. In addition, women ranked photos of bodybuilders as repulsive (Pope, Phillips, et al., 2000). The opposite applies for men's perceptions of women's preferences. According to Jacobi and Cash (1994), women believe that men want more muscle in women than men actually do. These discrepancies, which exist for the ideal body type, result in destructive outcomes within individuals desiring to obtain the muscular ideal.

Research of the literature indicates justifications for the current preoccupation with the muscular ideal. Thompson and Cafri distinguish three trends within the past decade which have contributed to muscle obsession (2007). First, various pressures for appearance have evolved recently in our society. These pressures have been induced by the media and interpersonal forces which have produced a society which places extreme pressure for the ideal level of attractiveness (Cash & Pruzinsky, 2002). Efforts to obtain a high level of physical perfection has increased among women and significantly increased among men.

A second justification for the current preoccupation with the muscular ideal is the recent surge in popularity of professional and amateur sports (Thompson & Cafri, 2007). The desire for fame and recognition has resulted in obtaining physical advantages by any means possible. The most apparent example is the use of performance enhancing drugs. Steroids and Human Growth Hormone have emerged as the most popular methods to increase physical stature by adding lean muscle mass. Obviously, ramifications exist if engaging in this type of drug abuse.

The third justification for the current preoccupation with the muscular ideal is the evolvement of a clinical and empirical approach to the ideal body type. MD was first researched in the early 1990's by researchers Pope, Katz, and Hudson. These researchers examined the dissatisfaction of body type in weightlifters who perceived themselves as muscularly small but realistically possessed high muscle striation. A sense of delusion existed in this population examining their own physique. More recently, Pope, Phillips, and Olivardia (2000) described individuals with a type of BDD as susceptible to various health problems. These problems included excessive steroid use, severe depression, low self-esteem, and social avoidance. Individuals exhibiting behaviors which place them at risk for these health problems have provided an area for clinicians to expand research in this area.

Future research in body type preference coupled with MD should provide researchers and clinicians insight into diagnostic and treatment options for this disorder. Additionally, measurement and identification of predictors associated with MD could yield a more preventative approach. The purpose of this study is to reassess the continuum of MD.

Statement of the Problem

The current problem examined and analyzed possible commonalities with various dimensions of MD representative in the form of items. The commonalities are a mere clustering of feelings about a certain behavior, trait, and/or characteristic of MD as presented in a multidimensional model in the literature. The process of scale development followed an eight step recommendation from a ground zero approach. The extension of a solution to the problem is a revised item pool grounded in theory, reviewed by experts, and exposed to a statistical data reduction technique. The factors were then interpreted and evaluated for inter-item correlations which represent the clustering of feelings. A final labeling of the construct is the last step in this

exploratory process of scale development, not to be confused with similar confirmatory approaches.

Purpose of the Study

The concept of MD is a relatively new term. As of January 2008, a total of 58 articles existed which addressed either MD or possible correlates of MD. Only a few scales are currently recognized as "suggested" means for assessing MD in a general population. Due to the perceived novelty of MD to outside researchers, a more evidence based approach for its assessment has been suggested and warranted within the literature. Developmental articles published on the current instruments used to assess MD are lacking. Therefore, a psychometrically sound effort to develop an instrument which assesses MD from a theoretical perspective is inherently needed in the field before MD can be evaluated from a diagnostically recognized position.

This purpose of this study was to develop a psychometrically sound measurement of MD following recommended techniques from scale-developing experts. It was the goal of the researcher to (a) Develop a universal pool of items based on all dimensions within all proposed models of MD; (b) Have the universal pool of items be reviewed by experts recognized with the field of MD; (c) Administer the revised items to a population which contains an extensive amount of variance; (d) Use data reduction techniques, with SPSS, to explore commonalities among MD items; (e) Evaluate the reliability statistic for each dimension of the new scale along with a composite value; (f) Label each new dimension relative to its pool of common items which it represents; (g) Construct a final revised scale to be used in future research for assessing traits of MD within a general population; (h) Make future research recommendations for confirming the newly developed scale in other populations.

Significance of the Study

Leading professionals in the health psychology field have recognized MD as a new and important area of study. Researchers Cafri and Thompson are leading the way in promoting awareness and making recommendations in order to facilitate progress being made on MD assessment. Both researchers have blatantly recommended more research be conducted in the area of assessment related to the muscular ideal and symptoms of MD (2007). The current methods of assessment used to evaluate symptoms of MD lack a solid foundation in true psychometrically sound techniques of scale development.

The majority of research conducted on symptomatic characteristics of MD has been confined to the more generalized construct of BDD (Cafri & Thompson, 2007). Obviously, BDD and MD are directly related. Chapter two briefly discusses how MD is a subtype of BDD. However, health professionals need to be able to differentiate between these two conditions and be able to analyze cause and effect relationships of the latent variables which comprise each condition.

Conceptualization of MD began with qualitative interviews conducted by researchers Pope, Phillips, and Olivardia (2002). Eventually, a handful of researchers were able to hypothesize prospective models diagramming relationship and emergence of latent variables associated with MD. These researchers then proposed scales based on their models to assess characteristics of MD. One may ask why then is it necessary to continually evaluate the means of assessing areas of MD? The problem with the most prevalently used scales is they are too non-orthogonal in nature. The scales have intended to measure latent variables of MD but have not been exposed to standard scale developmental techniques suggested in social science literature. Researchers, such as Gorsuch, Crocker, Algina, and DeVellis, advocate steps necessary to ensure

proper scale development. These steps essentially reduce error variance and increase the opportunity for sound reliability and validity. No current instrument used to assess MD has been grounded in such theory. Therefore, one has to question the basic foundation from which the current scales have been developed

The significance of this study was to provide future researchers with an opportunity to use a scale for confirmatory purposes which has been developed using scale developmental techniques recommended by leading statisticians in the social sciences. The exploratory nature of the project should not decrease its influence on future research, but accentuate the need for proper methods of measurement and evaluation in the field of health psychology.

Research Question

The following research question was investigated:

Ho1: Can a scale for MD be developed using scale developmental techniques within a college population?

CHAPTER II

REVIEW OF LITERATURE

History of MD

Traditionally, anorexia nervosa and bulimia nervosa have been associated with an emphasis on body weight and body shape defining self-worth. These eating disorders are historically associated with women (Muller et al., 2004). According to researchers Sokol and Grey (1998), eating disorders among men are on the rise. The majority of women with eating disorders have a fear of being too large. Perugi et al. (1997) determined men usually desire great muscular development despite a muscular appearance. The rise for concern about MD is reflected in the literature. Thompson and Cafri report the number of articles with a focus on the muscular ideal increased 731% from 2000 to 2007 (2007). Various labels have been published synonymous of MD such as “bigorexia” (Pope, Phillips, & Olivardia, 2000) and “reverse anorexia” (Pope, Katz, & Hudson, 1993). Eventually Pope et al. (2000) coined the term muscle dysmorphia to describe a specific sub-type of body dysmorphic disorder (BDD). Muscle dysmorphia is not currently listed in the DSM-IV, however, researchers Muller et al. have proposed a correlation of MD to possible Obsessive Compulsive Disorder (OCD) tendencies (Muller et al., 2004). These diagnostic criteria are mentioned later in this document.

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Research of the literature indicates justifications for the current preoccupation with the muscular ideal. Thompson and Cafri distinguish three trends within the past decade which have contributed to muscle obsession (2007). First, various pressures for appearance have evolved recently in our society. These pressures have been exacerbated by the media and interpersonal forces which have produced a society which places extreme pressure for the ideal level of attractiveness (Cash & Pruzinsky, 2002). Efforts to obtain a high level of physical perfection has increased among women and significantly increased among men.

A second justification for the current preoccupation with the muscular ideal is the recent surge in popularity of professional and amateur sports (Thompson & Cafri, 2007). The desire for fame and recognition result in obtaining physical advantages by any means possible. The most apparent example is the use of performance enhancing drugs. Steroids and Human Growth Hormone have emerged as the most popular methods to increase physical stature by adding lean muscle mass. Obviously, ramifications exist if engaging in this type of drug abuse.

The third justification for the current preoccupation with the muscular ideal is the evolvement of a clinical and empirical approach to the ideal body type. MD was first researched in the early 1990's by researchers Pope, Katz, and Hudson. These researchers examined the dissatisfaction of body type in weightlifters who perceived themselves as muscularly small but realistically possessed high muscle striation. A sense of distortion existed in this population examining their own physiques. More recently, Pope, Phillips, and Olivardia (2000) described individuals with a type of BDD as susceptible to various health problems. These problems included excessive steroid use, severe depression, low self-esteem, and social avoidance. Individuals exhibiting behaviors which place them at risk for these health problems have provided an area for clinicians to expand research in this area.

Future research in body type preference coupled with MD should provide researchers and clinicians insight into diagnostic and treatment options for this disorder. Additionally, measurement and identification of predictors associated with MD could yield a more preventative approach.

Models of MD

Three models exists exploring relationships of MD with predictor variables. The psychobehavioral model of MD explores relationships between dietary concerns and physique

with MD. This particular model designates subcategories of pharmacological use, supplement use, dietary behavior, physique protection exercise dependence, and body size/symmetry. The context in which this model was initially tested concerns the population of power lifters and weight lifters. It is hypothesized by Lantz, Rhea, and Cornelius that this model can be inferred to other populations exhibiting behaviors associated with MD (2004).

The sociocultural model proposed by Cafri et al., examines behaviors associated with potential symptoms of MD within population of adolescent boys (2006). The categories used for the prediction for desire to increase muscle size and definition are: social, individual-psychological, and biological. Social comparison and body image are determined as mediators for possible MD behavior and health-risk behaviors represent the negative outcomes by exhibiting the possible desire to increase muscle appearance. This model does not specifically state its association with MD, however, Cafri and colleagues do address that behaviors exemplified within their model could be synonymous with MD (2006).

The most recent model was proposed by Grieve in 2007. Grieve conceptualized this model as en etiological presentation of possible influencers for muscle dysmorphic behavior. Grieve emphasizes the need for theoretical models in MD for exploration in research and practice. His model contains four large dimensions with causal relationships of various subdimensions. The four large dimensions and the respected latent variables in each are: socioenvironmental factors (media influences and sport participation), emotional factors (negative affect), psychological factors (body dissatisfaction, ideal body internalization, self-esteem, body distortion, and perfectionism), and physiological factors (body mass) (2007).

Other models for body image dissatisfaction and body dysmorphia exist within the literature. For the purpose of this study, searches were limited to models directly associated with

MD behaviors. Once a proposed model has been tested with confirmatory analyses, other models contained within body dysmorphia could perhaps be expanded to MD.

The Psychobehavioral Model of MD

A 6-factor psychobehavioral model developed by Lantz, Rhea, and Mayhew examines specific psychological and behavioral characteristics in individuals with MD (2001). The two categories consist of nutrition and physique concerns. Nutrition is divided into three subcategories of pharmacological use, supplement use, and dietary behavior. These three behaviors exist within the commonality of individuals ingesting specific foods and dietary supplements to increase muscle size and enhance definition. Physique concern is divided into three subcategories of physique protection, exercise dependence, and body size/symmetry in which individuals exemplify obsessive behaviors regarding their own body image.

Within the nutrition category of pharmacological use, supplement use, and dietary behavior, according to Lantz, Rhea, and Cornelius, pharmacological use involves the use of supplements such as steroids and other synthetic hormones or hormone precursors to enhance muscle size and definition (2004). These are controlled substances OR prescription drugs, primarily not available over the counter. Supplement use is associated with the use of legal, over the counter substances manufactured to increase the quality of workout or aid in post workout recovery. Reckless dietary behavior exists when an individual regulates and monitors protein, carbohydrate, and fat consumption to achieve maximum muscle size and lean definition. A recent study by Olivardia (2001) provides partial evidence supporting that individuals with MD are more likely to engage in these nutritional behaviors than are non-dysmorphic individuals.

The second category contained within the psychobehavioral model of MD is physique concerns which include physique protection, exercise dependence, and body size/symmetry. The

category of body size/symmetry is determined by the degree of satisfaction an individual has with muscle size, shape, and definition represented by lean mass. Physique protection involves behaviors which are designed to avoid having one's body viewed by others. Klein (1993) includes behaviors associated with this category as wearing baggy/bulky clothing, scheduling workout times to avoid evaluation by others, and avoiding situations where one's physique may be exposed. Exercise dependence includes obsessive behaviors with exercise. These obsessive behaviors may include: workout scheduling, increasing exercise intensity, to the point of physical failure, feeling remorse when exercise is not obtained, and exercising despite injury and illness. Evidence within this category is supported by a study by Olivardia et al. (2000) which found that dysmorphic weight lifters expressed statistically significant greater body dissatisfaction than did nondysmorphic weight lifters.

Additions to the model by Lantz, Rhea, and Mahew (2001) include negative consequences associated with MD. These negative behaviors include alienation, narcissism, and positive deviance. Also included in this version of the psychobehavioral model of MD are low self-esteem, obsessive-compulsive tendencies, and body dissatisfaction. According to Mueller and colleagues (2004), this particular version of Lantz's original model has not been tested enough to determine outcomes and behavioral trends.

Sociocultural Model

Cafri and colleagues (2006) explored the relationship between various thoughts and behaviors associated with MD. This model describes biological factors, societal factors, and sports participation as influences of social comparisons and body image.

There are seven subcategories within the construct of health-risk behaviors: steroids, steroid precursors, ephedrine, dieting to lose weight, dieting to gain weight, and dieting to

increase muscularity. Much short term research has been conducted on the effects of steroid, steroid precursors, and ephedrine, however, evidence for longitudinal studies will depend on the United States Food and Drug Administration's future handlings of misuse of these supplements (Cafri et al., 2005). It is speculated that adolescent boys will adopt the usage of these supplements to increase and enhance muscularity; however, little research has confirmed this speculation (Cafri et al., 2005).

According to Cafri et al. (2005), adolescent and young males who diet to increase weight and/or muscle size, has been found to range from 21.2% to 47% of the population. Dieting to decrease weight has been found in the range of 12.5% to 26% of the population. A true base of knowledge does not exist that examines dieting behaviors used to pursue a muscular ideal and possible associated negative effects (Cafri et al., 2005).

The construct biological factors, contains three potential contributors: body mass index (BMI), pubertal growth, and pubertal timing. According to Cafri et al., evidence has not yet been determined that confirms the relationship between BMI and the drive for muscularity (2005). The researchers also suggest that BMI is thought to be related to the pursuit of muscularity because a low body fat percentage would suggest a small size and perhaps the desire to increase muscle mass for size. A person with a high BMI could perhaps seek methods to decrease overall fat percentage for more muscle definition. BMI also receives scrutiny as a predictor for body type because alternative methods such as hydrostatic weighing or skin fold calipers provide more accurate body fat assessments. BMI indexes are traditionally used due to low cost and high convenience. Among the population of adolescent males, lower BMI has been shown to predict steroid use, over-eating, and use of food supplements (Bahrke, 2000).

Pubertal timing can be considered as a biological factor because of hormonal influences on musculature. A study by O'Dea & Abraham (1999) found that pre-pubertal boys were significantly more likely to compensate for lack of growth by increasing muscle size. Another study found pubertal growth to be weakly associated with the use of food supplements and behaviors to increase muscle size. Therefore, according to Cafri et al., pubertal timing is more important than pubertal growth when trying to predict drive for muscularity; however, more longitudinal studies need to be conducted (2005).

Sociocultural influencers associated with the desire to increase muscle size are media influences on body image dissatisfaction, media influences on eating pathology, and the media's influence on the drive for thinness among adolescent males. Other potential sociocultural influences include peer and parental influences. Two studies by researchers McCabe and Ricciardelli (2004) showed perceived pressure to increase muscle mass from parents, peers, and media images of adolescent males. These researchers also determined that only males with lower self-esteem and high negative affect who received pressures from family, friends, and the media were more likely to adapt behaviors to increase muscle mass (2004).

Participation in sports among adolescent males has shown a relationship to higher self-esteem. Contrasting evidence exists that supports the view that sports facilitate drug and dieting abuse toward the goal of improving athletic performance (Cafri, 2005). Participation in sports has also been associated with a high risk for eating disorders and disordered eating (Cafri).

Psychological variables which possibly contribute to an adolescent's desire for increased muscle mass are self-esteem and negative affect. In a study conducted by Cafri et al., self-esteem was a major determinant of body dissatisfaction, muscle-enhancement strategies, and eating problems within adolescent males (2001). Steroid use is also significantly higher among

adolescent males with lower levels of self-esteem. According to McCabe and Ricciardelli, negative affect is significantly associated with strategies to increase muscle mass among adolescent boys (2004).

The Grieve Model of MD

The most recent model proposed for contributors of MD adopts a theoretical combination of previous models and recommendations for research. Four major factors are proposed in the Grieve model are: socioenvironmental factors (media influences and sport participation), emotional factors (negative affect), psychological factors (body dissatisfaction, ideal body internalization, self-esteem, body distortion, and perfectionism), and physiological factors (body mass) (2007). The conceptualization of this model is to serve as foundation for examining possible relationships between the factors, which at this point, have not been empirically examined. A brief description of the factors will be contained in the following section. As a reader, one must remember these factors have been proposed and analyzed in a non-orthogonal manner. Recommendations for future research would include examined the nature/degree of correlations between the factors.

Grieve describes body dissatisfaction based on Keeton, Cash, and Brown's definition (1990) as the extent to which there is a discrepancy between individual's perception of the perfect body and their actual physical appearance. Women traditionally view themselves as being unacceptably overweight (Brownell & Rodin, 1994). Recently men have been associated with seeing themselves as too small, the body as a whole, not specifically one physical part (Lantz, Rhea, & Mayew, 2001). As stated earlier, an increase in the number of men reportedly dissatisfied with their body is increasing (Olivardia et al., 2004). This trend has been examined in various populations included athletes, adolescents, and college students.

Grieve has identified two body types common among men dissatisfied with their appearance: those who are obese and want to lose weight, and those who are underweight and want to gain weight (2007). Both types of men wish to obtain a more mesomorphic stature and will use various techniques to reach this goal. Of these two groups, the individuals who view themselves as underweight who are at most risk for exhibiting symptoms of MD. One study examined body dissatisfaction as a predictor for the desire for upper body strength and MD (Henson, 2004). The etiology of MD has a strong possibility with the stratification of the two types of body dissatisfaction previously described.

Grieve places the factor body distortion in the context of eating disorders. The development of MD strongly resembles behaviors of anorexia nervosa identified by the American Psychiatric Association (2000). The key component of this factor is an individual's inaccurate perception of their appearance. For example, McCreary (2002) found that 43% of overweight men perceived themselves to be normal weight. Anderson also found that men felt thin until their weight was as high as 105% of their ideal body weight (2002). Obviously, standard parameters must exist when differentiating between over- and under- weight.

Grieve proposed the factor body mass as a measureable variable of how much weight an individual desires to gain for added muscularity. McCreary and Sasse (2000) determined adding weight to be important various populations of men. Lynch and Zellner (1999) explored the trend of college males' increasing desire to obtain more muscle mass. The creed of lifting weights for health purposes has been skewed by college males who wish to build weight for cosmetic purposes. An estimated 22% of college men lift weights three or more times per week and 53% have an interest to lift weights on a regular basis (1999). The relationship of body mass to other

behavioral variables could provide researchers possible insight into predictions for MD related behaviors.

Media influence is another dimension of Grieve's model. Components of this dimension include various social influences such as family, peers, schools, athletics, health care professionals, and mass media. Groesz, Levine, and Muren (2001) examined the component mass media as the most influential of the social pressures. Their assumption is based on theories and etiologies of the prevalence of eating disorders possibly exhibiting a correlation with mass media influences. Traditionally the impact of mass media has been measured on female populations with regards to body image perceptions. However, in 1991, Richins observed a correlation with mass media and men's body images. He notes that as the number of males presented in mass media increases, so will the tendency for body comparisons. Body-type comparison studies were first examined by researchers Pope and Gray. In 1999, these researchers performed a longitudinal evaluation of the evolution of male models, action figures, and fitness magazine covers. The findings determined social preferences of the male body had changed to a denser muscular figure. Other small scale studies have supported this observation of a more preferred mesomorphic male body type (Smolak et al., 2005).

Grieve has conducted two studies which examine the trend of body distortion presented by the mass media (Lorenzen, Grieve, & Thomas, 2004). He found exposing men to pictures of muscular men leads to body dissatisfaction. In a follow-up study, Grieve and Baird (2006) discovered similar results exposing men to actual magazine advertisements that had male models with highly muscular bodies.

The influences of cultural preferences were previously discussed in the first two models presented in this paper. Grieve conceptualizes the influence of ideal body internalization similar

to eating disorders in women. Ridgeway and Tylka hypothesized for men, obtaining the ideal body type is one of the primary factors influences the desire to add muscle mass (2005). The Grieve model conceptualizes the internalization of the ideal body type presented in the media will increase the likelihood of developing MD. Coupled with low self-esteem, the internalization of the ideal body type could possibly heighten the possibility for MD type behaviors.

Various sports, within a competitive setting, emphasize a distorted weight-to-power ratio. Sports which emphasize an increased amount of muscle mass for power gains, such as football, could place athletes at risk for MD-like symptoms (Grieve, 2007). The physical gains are enhanced by various psychological traits which enhance the likelihood for MD. These psychological traits include: a high level of competitiveness, a high need for control, and perfectionistic tendencies. Researchers Haase, Prapvessis, and Owens examined various pressures towards particular weights and body shapes which are unique to an athlete's sport (2002). These pressures may or may not be present when the athlete is "in season." Grieve recommends more research be conducted in the area of sport participation after sport. He feels sport participation directly influences a mesomorphic body and ideal body internalization.

Nugent defines perfectionism as the pursuit of unrealistic goals (2000). Recently the perfectionism domain has been added to Grieve's model of MD due to its association with women and eating disorders. In 2004, Henson examined the relationship of perfectionism with MD and found it to be a predictor of symptoms characterized within the disorder. Grieve refers to the addition of this domain in his model as the pursuit of the "perfect body".

Within Grieve's model, negative affect exhibits a causal relationship with behavioral symptoms of MD. Negative affect provides a negative reinforcement of MD symptoms similar to

its relationship with eating disorders. According to Grieve, negative affect is influenced by low self-esteem, body dissatisfaction, and body distortion (2007).

All three models of MD presented in this paper demonstrate similarities and differences. The nature of this EFA originates as the examination of orthogonal and non-orthogonal tendencies which serve as latent variables for MD. This paper is not to be seen as a Structure Equation Modeling effort or a Maximum Likelihood Analysis. The newness and unexplored portions of MD research call for an examination of hypotheses and theories since not one model is recognized at the gold standard of the disorder. All three models represent researchers' efforts beginning with qualitative observations and interviews to the confirmation of MD scales. The next section states possible symptoms of MD recognized by the first established group of researchers within this field. The section following the description of possible symptoms describes the pilot study used for the conceptualization of this project.

Possible Symptoms of MD

Finally, Pope and colleagues conceptualized the symptoms of muscle dysmorphia as a form of BDD (1997). These symptoms include three main concepts:

1. First, a person has a preoccupation with the idea that his or her body is not sufficiently lean or muscular.
2. At least two of the four following criteria are met: (a) the individual frequently gives up important social, occupational, or recreational activities because of a compulsive need to maintain his or her workout or 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 with the inadequacy of body size or musculature causes clinically significant distress or

impairment in social, occupational, or other important areas of functioning; and (d) the individual continues to work out, diet, or use performance-enhancing substances despite knowledge of adverse physical and psychological consequences.

3. The primary focus of the preoccupation and behavior is on being too small or inadequately muscular and not on being fat, as in anorexia nervosa, or on other aspects of appearance, as in other forms of BDD.

An MD Pilot Study

The conceptualization of this study resulted from findings which occurred in a pilot study conducted by the researcher and a colleague. This study was approved by the University's Institutional Review Board. The purpose of the pilot study was to examine possible correlates of MD, explore convergent validity with these correlates, and use an EFA to explore the emergence of current and possible unknown latent variables following a statistical exposure to axis rotation. The three most prevalent scales used to assess MD were administered to a sample population. The procedures and results of these findings are presented in the following section.

Questionnaire Development

Items from three MD questionnaires were combined for factor analytical procedures. Common problems in developing a questionnaire include missing data, question wording, question length, question content, question order, questionnaire length, and types of questions. Missing data, question wording, question content, and question order were accounted for by selecting four subject matter experts (SME) to review the questionnaire and determine if each item corresponded with a potential construct to ensure no pertinent data was excluded. The selected SME's helped determine which three MD scales to use for psychometric evaluation. Question length was kept long enough to measure each dimension. Wording of each question

was kept short and direct to prevent losing the respondents attention. Questionnaire length was minimized by printing two pages per sheet front only (to prevent subjects from not answering back). Items were not numbered to prevent subjects from being deterred by a larger amount of items. Likert type scales were used with varying symmetric intervals ranging from one to six. These typal scale questions were used to shorten time for administration and prevent coding problems. The following sections will briefly explain the questionnaires used in this pilot study.

Muscle Dysmorphic Inventory

The Muscle Dysmorphic Inventory (MDI) is a 27 item Likert scale questionnaire based on a conceptual model. A 6-factor psychobehavioral model developed by Lantz, Rhea, and Mayhew (2001) examines specific psychological and behavioral characteristics in individuals with MD. The two categories consist of nutrition concerns and physique concerns. Nutrition is divided into three subcategories of pharmacological use, supplement use, and dietary behavior. These three behaviors exist within the commonality of individuals ingesting specific foods and dietary supplements to increase muscle size and enhance definition. Physique concern is divided into three subcategories of physique protection, exercise dependence, and body size/symmetry in which individuals exemplify obsessive behaviors regarding their own body image. All subscales of the MDI have shown acceptable internal reliability based on Cronbach's alpha (.72 - .94) (Lantz et al., 2001).

Muscle Appearance Satisfaction Scale

The Muscle Appearance Satisfaction Scale (MASS) is a 19 item scale developed to assess body dysmorphic symptoms related to muscle size. The MASS attempts to analyze cognitive, affective, and behavioral domains of muscle dysmorphia. A study by Mayville et al. examined the reliability and validity of the MASS to assess its effectiveness measuring the

construct of muscle dysmorphia (Mayville et al., 2002). The MASS has demonstrated acceptable test-retest reliability based on Cronbach's alpha (.76 - .87) (Mayville). Construct validity has been established on each subscale; however, further validation would be useful (Mayville).

Muscle Dysmorphic Inventory

The Muscle Dysmorphic Disorder Inventory (MDDI) is a 13-item self-report questionnaire based on a 5-point Likert scale (Hildebrandt et al., 2004). The MDDI was developed based on an item pool with specific questions about exercise intensity and frequency of the desire to add muscle mass (Hildebrandt). Internal consistency of the MDDI has been evaluated as good based on Cronbach's alpha (.77 - .85) (Hildebrandt).

Subjects

The survey population for this pilot study included moderately active males and females ages 18-25 currently enrolled in Health and Human Performance classes.

Analytic Procedures

Results of Pilot Study

All 59 items from the three MD instruments were analyzed together using an EFA. A final factor solution was developed to determine redefined subscales. Once factor loadings were evaluated, each item was grouped with its corresponding factor to determine consistencies for construct evaluation. The redefined constructs were then assigned the items which loaded highest according to the Structure Matrix. The reliability of each subscale was then evaluated maximizing the highest possible Cronbach's alpha value. The resulting items will then be grouped together resulting in an optimal assessment of MD for this population.

Confirming the Analyses

A KMO and Bartlett's Test were examined to confirm the data set for EFA. According to the SPSS printout on Table 1, both of these test yielded significant values (KMO = .913; Bartlett's Test: p = .000). Therefore the data chosen for analysis is determined appropriate for the chosen statistical analyses.

EFA

A principle axis factor analysis with Oblimin and Kaiser normalization rotation method was used to examine the factor structure of all three instruments. A scree plot also provided a visual cut-off for a five factor solution. After evaluating the SPSS printout, a five factor solution was chosen accounting for 67% of the total variance (See Table 2). Only Eigenvalues >3.0 were considered when determining the final factor solution. Eigenvalues ranged from 3.0 to 24.544 (See Table 3) accounting for 67% of the total variance.

Factor loadings were considered when determining corresponding items. The highest loadings were assigned to items first. A total list of items was developed for each factor. The researcher then determined which items would remain for each factor resulting in an item defined construct (See Table 4). Each factor and set of items was run through a reliability analysis using Cronbach's Alpha which ranged from .764 to .927 (See Table 4).

Discussion

The results of this analysis provided the researcher with enough evidence to support the validity of a new instrument. This new instrument will be compiled with five constructs measuring tendencies in individuals towards MD. The five constructs chosen for this optimal instrument are discussed below.

Social Avoidance

Factor one was labeled as “Social Avoidance”. Factor loadings ranged from .509 to .873 which a reliability of .764 (See Table 4). The six items chosen for this construct will measure social situations in which individuals with MD avoid due to a structured workout schedule and low body image perception. For example, item 13 on the MDDI states “I pass up chances to meet new people because of my workout schedule”. The reliability for this construct was considered acceptable by the researcher.

Workout Priority

Factor two was labeled as “Workout Priority”. Factor loadings ranged from .467 to .778 with a reliability of .836 (See Table 4). The seven items chosen for this construct will measure the extent which an individual places emphasis on working out over other daily activities. For example, item 2 on the MASS states “If my schedule forces me to miss a day of working out with weights, I feel very upset”. The reliability for this construct was considered acceptable by the researcher.

Desire for Hypertrophy

Factor three was labeled as “Desire for Hypertrophy”. Factor loadings ranged from .645 to .855 with a reliability of .927 (See Table 4). The nine items chosen for this construct will measure the emphasis an individual with MD places on gaining muscle size and body mass. For example, item 10 on the MDI states “My workouts are designed to develop the maximum amount of muscle mass”. The reliability for this construct was considered acceptable by the researcher.

Body/Muscle Satisfaction

Factor four was labeled as “Body/Muscle Satisfaction”. Factor loadings ranged from .468 to .766 with a reliability of .773 (See Table 4). The four items chosen for this construct will measure the extent on which an individual is dissatisfied with his/her body and muscle tone. For example, item 7 on the MDDI states “I feel like I have too much body fat”. The reliability for this construct was considered acceptable by the researcher.

Supplement Use

Factor five was labeled as “Supplement Use”. Factor loadings ranged from .490 to .880 with a reliability of .852 (See Table 4). The five items chosen for this construct will measure the importance an individual with MD has for using an ergogenic aid to increase muscle mass/definition. For example, item 5 on the MASS states “I often spend money on muscle-building supplements”. The reliability for this construct was considered acceptable by the researcher.

Conclusions and Future Research

Three existing instruments measuring MD were given to a sample of college students ages 18-25. An EFA was conducted to determine which constructs could be used in developing an optimal scale for MD assessment. Following statistical analyses, the researcher identified five factors with acceptable reliability to compose a new multi-dimensional scale for evaluating individuals for MD.

This pilot study is to be interpreted as exploratory in nature. It does not rationalize, but instead, justifies the need for sound psychometric development of a MD scale based on current models within the literature. Results, conclusions, and discussions of the current study should

have a more logical position within the field of MD. Therefore, the following sections will outline an elaborate method of scale development for the multifaceted construct of MD.

CHAPTER III

METHODOLOGY

Subjects

The survey population for this study included males and females ages 18-25 currently enrolled in Health and Human Performance (HHP) 2603: Total Wellness and in the University subject pool system, SONA. The SONA system is a subject pool system located in the Psychology Department. Students sign up for the study via this system. They are then linked to the survey's website. Following completion of the survey, students are administered credit for their participation. The proposal for this study was accepted and signed by committee members using the SONA system and HHP courses. Possible limitations to the study were increased by eliminating the opportunity to recruit subjects from a more heterogeneous population in. However, combination of the two sampling techniques, HHP courses and SONA, will add to the overall variance need to be distributed among the large set of items. Large variances in populations are ideal for EFA techniques to ensure strong loadings and non-orthogonal factors (Crocker & Algina, 1986).

Target Population

By definition, a target population is the population a researcher would like to be able to draw inference or generalize to (Crocker & Algina, 1986). For the purposes of this study, our target population is any male or female ages 18-25.

Survey Population

A survey population is defined as the population to which a researcher can draw valid statistical inference. The results obtained from the sample population will be used to generalize to the target population. The survey population chosen for this study included males and females ages 18-25 currently enrolled at Oklahoma State University Stillwater Campus in Fall 2008.

SONA

The Psychology Department at Oklahoma State University implemented a subject pool technique for study participant recruitment purposes. This system is operated and managed within the Psychology Department. The College of Education has access to post research studies for participant recruitment. This study was posted for a one month period on the SONA system. Subjects were granted credit for their participation via the SONA system upon completion of the survey. The system explained the study, consent, and credit procedures to students prior to their participation. Subjects were then linked to a website from which the survey was posted. Credit was then granted by the researcher for the students to use in their coursework. Data was directly dumped into an Excel file from which sorting techniques were used to examine the subjects' qualifications for the study's demographic parameters.

Sample Size Choice

An EFA was the statistical method of data evaluation chosen for this study. An assumption in EFA is that sampling error is nonexistent. EFA is a multivariate technique which requires a relatively large sample size. In EFA, small samples can lead to biased estimates therefore attaining a large enough sample size is crucial for valid inferences. Previous research states several rules of thumb when determining sample size when using EFA. For example, Kahn (2006) states one rule of thumb for EFA suggests 200 cases provide a fair representation for

construct validity. Another method to calculate sample size is based on a ratio of subjects per dependent variable. For exploratory factor analytical techniques, a rule of thumb for subject to dependent variable ratio is 4:1 (Crocker and Algina, 1986). The revised item pool used for data collection contains 180 items. Therefore, using a 4:1 ratio, a total of 720 subjects must be recruited for adequate sample size.

In order to obtain at least 720 valid surveys, the researchers decided to over-sample to correct for potential missing data cases. A total of 750 students were initially targeted for the survey.

Choice of Sampling Method

The choice of method for sampling utilized a sample of convenience for this study. A sample of convenience was chosen because the accessibility to the survey population. Reasons for easy access to the specified survey population include: relationships between the researchers and instructors, the survey population mirrors the target population, and access to subjects the SONA system.

Procedures

Procedures for scale development will be based on recommendations made by DeVellis in his text Scale Development: Theory and Applications (2003). This is an eight step process highly regarded in the social sciences. The step recommendations are as follows:

1. Determine clearly what it is to be measured.
2. Generate an item pool.
3. Determine the format for measurement.
4. Have the initial item pool reviewed by experts.
5. Consider the inclusion of validation items.

6. Administer items to a developmental sample.
7. Evaluate the items.
8. Optimize scale length.

Initial Item Development- Steps 1 and 2

Once a theoretical construct was designated for measurement, a large set of items was generated. According to DeVellis, more than enough items should be generated before the final selection is made (2003). A homogenous scale's items are reflective of the latent variable(s) variance.

Each item was written reflecting the construct of interest as indicated in Appendix 1: SME Request Letter. This is reflected in the wording used for each item. Each item will measure only one construct. According to Shultz and Whitney, the first set of items should be chosen from the universe of items relating to the construct of interest (2005). Therefore, the scale is a direct result of the items in which it contains. A homogenous scale's items are reflective of the latent variable causing them. This point should be reflected in the wording used for each item. Each item should measure only one construct. Poorly worded items will contain erroneous variance not associated with the construct it is actually intended to measure. When constructing the original pool of items, it is better to be redundant than fall short of true measurement. Common problems in developing a questionnaire include missing data, question wording, question length, question content, question order, questionnaire length, and types of questions. Missing data, question wording, question content, and question order were accounted for by selecting three subject matter experts (SME) from those named in Appendix 2: Subject Matter Expert Contact List to review the questionnaire and determine if each item corresponded with a potential construct to ensure no pertinent data was excluded.

The draft set of items was based on various constructs from the MD models explained previously in Chapter 2 of this paper. Each set of items was prompted with a short description of the dimension they were to represent.

The following section will briefly present the dimension, description of the dimension, and researchers who proposed the dimension.

Body Dissatisfaction

This dimension includes thoughts and behaviors an individual has regarding her/his body type and degree to which they are content with this body type compared to an external point of reference. The body dissatisfaction dimension was proposed by Grieve in 2007 and describes the extent to which there is a discrepancy between individuals' perception of the perfect body and their actual physical appearance. A sample item included in this section is, "My body is not the ideal body type." For a full list of the items, see Appendix 3: MD Draft Item Pool. Twenty items were evaluated by the SME's. Following revision, 13 items were retained for subject administration.

Body Distortion

This dimension included thoughts an individual experiences which are inaccurate concerning the actual size of her/his body. The body distortion dimension was proposed in the Grieve 2007 model and describes the inaccuracy men believe in which their body is too small. A sample item included in this section is "When I look in the mirror I see myself as too small." For a full list of the items, please see Appendix 3. Twelve items were evaluated by the SME's. Following revision, six items were retained for subject administration.

Body Mass

This dimension included thoughts an individual experiences believing a large, low fat body type is the ideal body. The body mass dimension was proposed by Cafri and Thompson in their book The Muscular Ideal (2007). Individuals who pursue the ideal body type concern themselves with adding muscle weight and loosing body fat to increase appearance of musculature and striation. A sample item in this section is "I lift weights to build muscle mass." For a full list of the items, please see Appendix 3. Thirteen items were evaluated by the SME's. Following revision, seven items were retained for subject administration.

Media Influences

This dimension includes thoughts and behaviors possibly affected by the perception of the ideal body type by sources of media. Media influences was proposed by Grieve (2007) and describes the means from which the muscular ideal is conveyed to the population via social influences such as peers, schools, athletics, and mass media. A sample item from this section is "Most athletes have ideal body types." For a full list of the items, please see Appendix 3. Sixteen items were initially developed for this dimension. Following revisions by the SME's, seven items were retained for subject administration.

Ideal Body Internalization

This dimension includes thoughts as precursors for actions in the pursuit of the muscular ideal. Ideal body internalization was first conceived by Ridgeway and Tylka (2005) then proposed in the Grieve 2007 model. One who exhibits this dimension will embrace cultural influences as one of the dominant factors to obtain the ideal muscular shape. A sample item from this section is "A lean, muscular body is the gold standard for the ideal body type." For a full list

of the items, please see Appendix 3. Fifteen items were initially developed for this dimension. Following revisions by the SME's, ten items were retained for subject administration.

Sport Participation

This dimension includes thoughts of the ideal body type which a person associates with her/his affiliation with sports. This concept has been tested primarily on athletes with eating disorders. The 2007 Grieve model explores the relationship between the muscular ideal and an individual's sport preference. Past research has demonstrated persons participating in certain weight specific sports will exhibit disordered eating practices (Stoutjesdyk & Jevne, 1993). A sample item from this section is "My muscle mass is determined by which sport is in season." For a full list of the items, please see Appendix 3. Twenty items were initially written and submitted to the SME's. Following revision, six items were retained for subject administration.

Low Self-Esteem

This dimension includes a correlation with an individual's self-esteem the obtainment of the muscular ideal. Originally, Olivardia proposed this relationship in 2004, stating men and women who had positive attitudes about their bodies had higher self-esteem. The 2007 Grieve model explores the negative relationship between self-esteem and MD. A sample item from this section is "Days when I feel more muscular are great days." For a full list of the items, please see Appendix 3. Twenty-two items were initially written and submitted to the SME's for revision. Following revision, twenty items were retained for subject administration.

Perfectionism

This dimension explores an individual's pursuit of unrealistic goals. Nugent proposed the concept of perfectionism as a precursor for many negative behaviors (2000). The Grieve model explores the relationship between MD and the pursuit of the unobtainable body type (2007). A

sample item from this section is “My workout goal is to obtain the perfect body.” For a full list of the items, please see Appendix 3. Twenty-one items were initially written and submitted to the SME’s for revision. Following revision, 13 items were retained for subject administration.

Negative Affect

This dimension explores the influence various negative thoughts oneself has on her/his behavior. The 2007 Grieve model proposes that negative affect is influenced by low self-esteem, body dissatisfaction, and body distortion which lead to an overall negative persona due to possible symptoms of MD. A sample item from this section is “I become angry if I miss a workout.” For a full list of the items, please see Appendix 3. Fifteen items were initially written and submitted to the SME’s for revision. Following revision, five items were retained for subject administration.

Health Risk Behaviors

This dimension examines possible risky behaviors one engages in due to a distorted image of their ideal body type and its obtainment. Cafri and Thompson originally reported these behaviors in their proposed 2005 model which includes steroids, steroid precursors, ephedrine, dieting to lose weight, dieting to gain weight, and dieting to increase muscularity. Each one of these behaviors has a set of items written specifically for characteristics and causes of the risky behaviors. The following nine sections are health risk behaviors from which items were developed.

Steroids

This dimension is contained in the health risk behavior section and explores the use of steroids as a catalyst for the muscular ideal (Cafri & Thompson, 2005). A sample item from this section is “I have purchased steroids from a member of the gym I workout in.” For a full list of

the items, please see Appendix 3. Twenty items were initially drafted and submitted to the SME's for revision. Following revision, 13 items were retained for subject administration.

Steroid Precursors

This dimension is contained in the health risk behavior section and explores the use of steroid precursors such and Andro and Creatine as a catalyst for the muscular ideal (Cafri & Thompson, 2005). A sample item from this section is "I currently use Andro or a similar product." For a full list of the items, please see Appendix 3. Ten items were initially drafted and submitted to the SME's for revision. Following revision, five items were retained for subject administration.

Ephedrine

This dimension is contained in the health risk behavior section and explores stimulants and other related products as catalysts for the muscular idea (Cafri & Thompson, 2005). A sample item from this section is "I use energy drinks to suppress my appetite." For a full list of the items, please see Appendix 3. Fourteen items were initially drafted and submitted to the SME's for revision. Following revision, seven items were retained for subject administration.

Dieting to Lose Weight

This dimension is contained in the health risk behavior section and explores behaviors associated with erratic eating tendencies targeted at obtaining the muscular ideal (Cafri & Thompson, 2005). A sample item from this section is "I am constantly trying new diets to shed a few extra pounds." For a full list of the items, please see Appendix 3. Eighteen items were initially drafted and submitted to the SME's for revision. Following revision, eleven items were retained for subject administration.

Dieting to Gain Weight

This dimension is contained in the health risk behavior section and explores behaviors associated with erratic eating tendencies targeted at obtaining the muscular ideal (Cafri & Thompson, 2005). A sample item from this section is "I increase my protein intake to add muscle mass." For a full list of the items, please see Appendix 3. Fourteen items were initially drafted and submitted to the SME's for revision. Following revision, six items were retained for subject administration.

Dieting to Increase Muscularity

This dimension is contained in the health risk behavior section and explores behaviors associated with erratic eating tendencies targeted at obtaining the muscular ideal (Cafri & Thompson, 2005). A sample item from this section is "I restrict my diet to enhance my muscular striations." For a full list of the items, please see Appendix 3. Eighteen items were initially drafted and submitted to the SME's for revision. Following revision, nine items were retained for subject administration.

Supplement Use

This dimension is separate from the Cafri and Thompson model mentioned in the previous sections. The inclusion of this dimension is to include health behaviors which are not contained in the Cafri and Thompson model of 2005. Lantz, Rhea, and Cornelius conceptualized this dimension to include ergogenic supplements which primarily can be purchased over-the-counter (2001). A sample item from this section is "I stay updated on the new supplement trends. For a full list of the items, please see Appendix 3. Nineteen items were initially drafted and submitted to the SME's for revision. Following revision, seven items were retained for subject administration.

Physique Protection

This dimension explores possible behaviors an individual will exhibit attempting to hide the actually size and shape of her/his body. Physique protection was originally conceptualized in the 2001 Lantz, Rhea, and Cornelius model. Various negative behaviors are contained in this dimension such as social avoidance and isolated exercise environments. A sample item from this section is "I prefer to work out alone." For a full list of the items, please see Appendix 3. Thirty items were initially drafted and submitted to the SME's for revision. Following revision, twenty items were retained for subject administration.

Exercise Dependency

This dimension explores obsessive thoughts and behaviors associated with exercise. This is not to be confused with addiction. Exercise dependency was originally conceptualized in the 2001 Lantz, Rhea, and Cornelius model. One who exhibits this type of behavior becomes so reliant on exercise that it borders on compulsive behavior. A sample item from this section is "I will exercise even if my body is sore in order to maintain my training schedule." For a full list of the items, please see Appendix 3. Thirty-four items were initially drafted and submitted to the SME's for revision. Following revision, eighteen items were retained for subject administration.

Response Format- Step 3

The continuum chosen for this set of items is a 5-point Likert format. High scores indicate a strong presence of the latent variable, in the case characteristics of MD. Responses for items in this study were developed based on Likert scale specifications in health research. McDermott & Sarvela suggest basic techniques for Likert type item response development (1999). These techniques include responses:

- Develop, select, and assemble a large number of items related to the attitude studied that are both favorable and unfavorable.
- Administer the items to a representative sample of the large population.
- Score the items so that the most favorable attitudes receive the highest values.
- Score each person's scale by adding up the items.
- Use discrimination indices to determine which items differentiate most clearly between those people who have favorable and unfavorable responses towards the attitude.
- An evaluator must make sure that the items selected meet the instrument's specifications to ensure content validity.

Review by Subject Matter Experts- Step 4

Item pool review, by SME's, ensures the questionnaire's attempt to maximize content validity. A total of nine SME's were contacted via the USPS, provided a cover letter, a copy of the item pool, and an envelope with pre-paid postage for return to sender. Refer to Appendices 1-3 for copies of these documents which were mailed to the SME's.

A time frame of eight weeks was allowed for the item review process. Four weeks into this time frame, the researcher sent a reminder email to each SME to enhance the response rate of the survey. Two packets were returned with SME's citing time constraints as the reason she/he could not fulfill their suggested role as reviewer of the large item pool. Fortunately, three SME's returned their packets fully completed to be used for item retention. All three SME provided thorough review of the large set of items developed by the research. This step ensures the content validity and reliability of the items developed to measure characteristics of MD.

The researcher reviewed the scale to evaluate which items to retain for the final scale to be administered to subjects. Only items which scored a 3, 4, or 5 by the SME's were retained for final scale administration. As a result, 180 items were retained for scale administration. Refer to Appendix 4 for a complete list of items retained as administered to subjects.

Validation of Items- Step 5

Validation of these items is a product of the items' development within the three models of MD previously discussed.

Administration of Items- Step 6

Target and Survey Population

For the purposes of this study, the target population is any male or female ages 18-25 enrolled at Oklahoma State University Stillwater. According to researchers McCaulay, Mintz, and Glenn (1998), college students are a high risk population for MD. Therefore, the researcher would prefer to draw inferences to a random University student body. Potential subjects were chosen via a sample of convenience from a subject pool research system called SONA and HHP courses.

The final set of items was placed on a website for subjects to complete. The website offered participants the opportunity to "Agree or Decline" to participate in the survey. After participants select the "Submit" button, the FrontPage program automatically transfers responses to a coded Excel spreadsheet. Each response button was tested for rater reliability prior to publishing the website for access to participation. This method ensures coding problems associated with hand entry of data. The concept of missing data due to non-response to items was addressed by the researcher. Lines of data were excluded in final analysis using the "casewise" feature in SPSS during data analysis.

Evaluation of Items and Final Scale Length- Steps 7 and 8

Items were evaluated for scale retention. As mentioned earlier, items should exemplify high correlation with each latent variable represented in the survey population.

For the purposes of this scale development piece, an EFA method of analysis was determined appropriate.

Determining the impact of latent variables underlying a group of items is the method by which EFA finalizes the scale. Once latent variables have been identified and evaluated, a final decision can be made regarding the items contributing to the most communality in the variable set. The intercorrelations between items can be assessed through factor analytical methods leading to item retention. The communalities reflected by the items can assist researchers in determining the construct actually being measured. A scale with poorly written items will have low communalities between the item set and the factor. Factor loadings, non-loadings, and cross loadings are indicators of the effectiveness of how the item was worded. Good items will yield clean solutions and simple structure if an underlying construct is present. Once a solution has been decided, the researcher can identify which items to retain and which to dispose.

Prior to item retention, determining whether the sample population is appropriate for using factor analytical techniques will be needed. This can be accomplished by confirming the analysis. A KMO and Bartlett's Test was used to confirm the data set for EFA.

Following confirmation of the data and assessment of the original correlation matrix, examination of the scree plot and factor loadings (within the structure matrix) was used. The scree plot examination provided a visual representation of which factors were selected for the final analysis. The factor solution was based on the criteria of factor loadings contained on the

SPSS generated Structure Matrix. Only items over .40 were interpreted. Cross loadings were taken into account for the final solution.

Once the final factor solution has been selected, with the appropriate number of items, a reliability analysis was conducted. Various reasons exist why bad items contribute to poor reliability (in this case, alpha). According to Schultz and Whitney, item problems which reduce power include: a non-central mean, poor variability, negative correlations among items, low item-scale correlations, and weak inter-item correlations (2005). Evaluating reliability indicates how effective the researcher has been in eliminating the poor items and retaining the good ones. Reliability is an indicator of the proportion of variance in the scale scores that is attributable to the actual (true) score (Crocker & Algina, 1986). Nunnally (1978) suggests reliability coefficient of at least .70 as the lower bound acceptable value for scale reliability.

Following test administration and factor interpretation, a reliability value was considered to determine which items to retain. A two-factor solution may have to be evaluated as a one-factor solution while comparing the reliability coefficients to determine which set of items has the most meaning. By merely dropping items, the reliability of the scale may not increase if the items are poorly written. Hence, reliability should only be used as a last method to determine which items to retain following EFA.

Labeling of the Constructs

Latent variables, or constructs, which emerge following DeVellis' eight recommended steps for scale development, provided the dimensions for the final scale. Construct names are reflective of the commonalities each group of items shares.

CHAPTER IV

RESULTS AND FINDINGS

Following administration of the items to a developmental sample, items were evaluated for scale retention. As mentioned earlier, items should exemplify high correlation with each latent variable represented in the survey population. Evaluating item intercorrelations begins with examination of the correlation matrix. This chapter will describe data reduction techniques used by the researcher for convergence of the items on MD. Processes used for the statistical data reduction included: determining if the sample is appropriate for factor analytical techniques, viewing of the original correlation matrix, scree plot evaluation, comparisons of factor loadings and eigenvalues, and reporting of the reliability statistic.

Prior to item retention, the researcher must determine whether the sample population is appropriate for using factor analytical techniques. This can be accomplished by confirming the analysis. A KMO and Bartlett's Test was used to confirm the data set for EFA.

According to Crocker and Algina, factor analysis can be used to identify or confirm the underlying dimensionality of a newly developed scale (1986). EFA should not be confused with confirmatory factor analysis in which an already developed scale's dimensionality is assessed. Within the context of scale development, EFA can be used to determine if the unidimensional scale is reflected by the items. Shultz and Whitney refer to EFA as a method to reduce the number of interrelated items without losing too much information from the original responses

(2005). For the purposes of this scale development piece, an EFA method of analysis was determined appropriate.

Determining the impact of latent variables underlying a group of items is the method by which EFA finalizes the scale. Once latent variables have been identified and evaluated, a final decision can be made regarding the items contributing to the most communality in the variable set. The intercorrelations between items can be assessed through factor analytical methods leading to item retention. The communalities reflected by the items can assist researchers in determining the construct actually being measured. A scale with poorly written items will have low communalities between the item set and the factor. Factor loadings, non-loadings, and cross loadings are indicators of the effectiveness of how the item was worded. Good items will yield clean solutions and simple structure if an underlying construct is present. Once a solution has been decided, the researcher can identify which items to retain and which to dispose.

Following confirmation of the data and assessment of the original correlation matrix, examination of the scree plot and factor loadings (within the structure matrix) was conducted. A scree plot examination provides a visual representation of which factors will be selected for the final analysis. The factor solution was based on the criteria of factor loadings contained on the SPSS generated Structure Matrix. Only items over .50 factor loading values were interpreted due to the large set of items being analyzed. Cross loadings were verified and taken into account for the final solution. Items which cross load on multiple factors were not included in the final solution unless the multiple factors represented one latent variable (dimension).

Once the final factor solution was selected with the appropriate number of items, a reliability analysis was conducted. Various reasons exist why bad items contribute to poor reliability (in this case, alpha). According to Schultz and Whitney, item problems which reduce

power include: a non-central mean, poor variability, negative correlations among items, low item-scale correlations, and weak inter-item correlations (2005). Evaluating reliability indicates how effective the researcher has been in eliminating the poor items and retaining the good ones. Reliability is an indicator of the proportion of variance in the scale scores that is attributable to the actual (true) score (Crocker & Algina, 1986). Nunnally (1978) suggests reliability coefficient of at least .70 as the lower bound acceptable value for scale reliability. For the purpose of scale development within this data set, only reliability coefficients greater than .80 were retained for the final instrument. Traditionally the .70 cutoff is used for exploratory purposes. However, this is a judgment call by the researcher. A .80 reliability coefficient eliminated possible latent variables which have moderate item correlations but low factor correlations with the overall MD dimension.

Results of Analyses

A total of 180 items were exposed to data reduction techniques via SPSS. These were the final 180 items chosen by the SME prior to test administration. Data was collected for a five-week period using methods described in the previous chapters. September 30th was determined the final day for data collection to allow the researcher enough time to report findings and results.

Demographic Reports

A total of 879 subjects submitted data for this study. Clean-up of the data included identifying non-responses following submitted the data to a database. This procedure yielded 827 cases which could be used for the EFA. Therefore, a final subject to variable ratio of 4.59 was determined. The 827 subjects represent an appropriate amount of total variance as determined by Bartlett's Test of Sphericity (chi = 105663; p = .000).

Demographic data can be found on Tables 5-7. The researcher has determined the sample to be reflective of the intended sample population based on the reported values in these tables. The data set is representative of the target college population in which the demographics are similar from the sample to entire college population. From an exploratory perspective, the large N of 827, as a representative sample from the target population, allows for recommendations in confirmatory studies.

Confirming the Analyses

Prior to data reduction, a Kaiser-Meyer-Olkin Measure of Sampling Adequacy and a Barlett's Test of Sphericity were performed to determine if the sample contained enough variance and commonalities for EFA techniques. According to the SPSS printout, as seen on Table 8, both of these tests yielded statistically significant values (KMO = .948; Barlett's Test of Sphericity: chi = 105663.1, p = .000). Such a large KMO value indicates small partial correlations between items which load on a particular factor. Therefore, the KMO value of this sample would fall into the very acceptable range. Such a large Chi Squared value obtained with Bartlett's Test of Sphericity indicates the original correlation matrix is not an identity matrix. Simply put, the correlation matrix will not have 1.0 on the diagonals and 0.0 on the off-diagonals as in an identity matrix. This allows for items to correlate with the factors and not represent variables themselves. If this test would have been non-significant, 180 factors would have emerged matching the same number of items. The proof of these two tests allowed for this data set to be exposed to an EFA with limited error variance.

EFA Techniques

A Principle Axis Factor analysis with Oblimin and Kaiser normalization rotation was used to examine the factor structure. This rotation method allows for the factors to be correlated.

This was an a priori decision made by the researcher. The intentions of this study are to identify commonalities among items correlating with a single dimension. Items must share commonalities with other items with each group of items sharing variance with the single MD dimension.

Factor rotation, using non-orthogonal techniques, mirror concepts of developing multi-dimensions from a one-dimensional set of items/feelings. A Principle Axis analysis with a non-orthogonal rotation is best suited for exploratory efforts of data reduction (DeVellis 2003). Therefore, this data set was determined an appropriate match for the type of factor analytical methods used.

Once the data was exposed to this rotation method, the researcher used the following techniques to determine which items and factors to retain. Following the measures of sampling adequacy, a Principle Axis Factor analysis with Oblimin and Kaiser normalization rotation was used. The first method used to determine item correlations was the original correlation matrix. The researcher scanned the matrix for indications of a simple structure. This was determined by scanning the original correlation matrix to ensure it was not similar to an identity matrix.

Second, the amount of variance explained by each factor was analyzed. According to the SPSS printout, a 32 factor solution appeared with eigenvalues >1.0. The researcher then determined to use eigenvalues >2.0, which would account for 50% of the total variance. This became a judgment call based on the impact of eigenvalues on total variance. Since an eigenvalue is the sum of all bivariate correlations within the associated factor, the higher its value, the more impact it has on the final solution. If an item's eigenvalue is 2.0, it would account for 1% of all variance within the solution (with 180 items). Therefore, eigenvalues retained less than 2.0 would represent less than 1% of the solution. For the purpose of this study,

each item needs to account for at least 1% of the final solution. Therefore, using the Total Variance Explained Table, the researcher determined a 13-factor solution as indicated by Table 8. This is the first solution prior to analyzing items for possible overlying dimensions prior to any reliability evaluation.

Thirdly, Cattell's scree plot produced by the data was analyzed for possible breaks in the loadings. Scree plot analyses use eigenvalues' relative position rather than their absolute position within the factor solution. Successive factors are plotted on the y-axis. Once the information from the previous eigenvalue has been partialed out, the next eigenvalue is plotted. Each eigenvalue is extracted from the previous data matrix (calculated by SPSS) and its value (the sum of all bivariate correlations) is placed on the graph. Cattell (1966) calls for retention of factors that lie above the elbow of the plot. This can be a subjective call. Scree plot analyses should only be used in combination with other data reduction methods discussed in this paper.

According to the scree plot generated by this data set, a possible seven, nine, or thirteen factor solution can be explored, according to Table 9. This is an example of the subjectivity associated with EFA techniques. However, this method, when used with others discussed, provides one more justification of the multivariate data reduction technique EFA represents. The researcher decided to force a seven, nine, and thirteen factor solution to determine if one solution was cleaner than the other. This effort resulted in an unresolved decision until reliability values were assigned to each factor. Also, each item was taken into account for the factor it loads on. Reliability does not indicate validity. The true nature of the solution lies in the final interpretation of the structure matrix with evaluation of the items loaded on each factor. Multivariate EFA techniques are based on matrix algebra in three dimensional space. Basing item retention decisions on these algorithms will not always yield the best solution. The

researcher used these algorithms as indications of tendencies, not as answers. The solution was a combination of decisions based on facts and interpretations.

Fourthly, the Factor Structure Matrix generated by SPSS was analyzed for factor loadings following rotation. According to Crocker and Algina (1986) this matrix provides the researcher with the most unbiased form of item clustering among factors. Factor loadings represent the correlation coefficients between the items and factors. These are similar to Pearson's r. The cutoff value for item retention, based on factor loading values from the Structure Matrix, is a subjective procedure. In EFA techniques, a less stringent cutoff value should be used. For the purpose of this study, a cutoff value for factor loadings on the Structure Matrix was set at .50. Initially, the researcher used .40 as the cutoff. After evaluating the cross loadings, the researcher examined the wording of items clustered on factors with .40-.50 loading values. These items seemed to be somewhat ambiguous and detrimental to the clean solution preferred by the researcher. It should be noted, however, these lower loadings could possibly be associated with smaller latent variables which should be accounted for as subtypes of each dimension. The researcher recommends a Discriminate Analysis along with exploring values produced by Canonical Correlations as areas for future research. Due to the large sample size and large set of items, a more stringent value of .50 for factor loadings was used for this study.

Following item retention based on the Factor Structure Matrix (values retained greater than + or - .50), the researcher exposed each of the thirteen factors to a reliability analysis. Factor reliability was determined using Cronbach's Alpha values. According to Nunnally (1978), alpha values >.70 indicate acceptable reliability. However, this value can be altered based on the researcher's intention of the analyses. For this particular project, a Cronbach Alpha value of .80 or greater was determined to be acceptable. The researcher examined alpha values for each factor

based on items retained from the Structure Matrix. After obtaining this value, the researcher eliminated factors which had smaller loadings to evaluate change in alpha. Items which seemed to contribute less to the factor, were eliminated and the reliability analysis was conducted until the maximum alpha was obtained with an appropriate amount of items. Obviously, since the items are dependent variables in this case, a listwise reduction could result in a one item factor. Thus, the researcher placed more emphasis on factor loadings than reliability values. Therefore, item retention was based on the optimal amount of items (based on factor loadings) and the highest amount of reliability. This paradox is often referred to as the reliability paradox. Please refer to the previous chapters for reference on Classical Test Theory and reliability analyses. The beauty of scale developmental procedures is represented by the combination of decisions for item retention based on theory, expertise, and algorithms. Therefore, my impetration of the matrices and alpha values could be different than an outsider's interpretation. Factor loading values and reliability values are reported in the following section as the factors are subjected to interpretation.

Factor Interpretations

The results of this analysis provided the researcher with enough evidence to support the exploration of a new instrument for identifying characteristics of MD. Following examination of the Factor Structure Matrix and reliability values, a final set of 12 latent variables was determined. Therefore, the final scale derived from the previously mentioned scale developmental techniques, yielded a multidimensional scale with nine dimensions. These dimensions are grounded in theory, have been exposed to SME reviews, and exposed to statistical, data reduction procedures. The following section explains the nature of the factors based on the researcher's interpretations of the item commonalities. Tables at the end of this text

contain more detail concerning factor loading values associated with each item and its related factor. The nine constructs chosen for the new MD instrument are discussed below.

Factor One- MD Internalization

Factor one was labeled as "MD Internalization". Factor loadings for this construct ranged from .504 to .757 (See Table 10). The 13 items chosen for this factor indicate common feelings of low self-esteem, negative body internalization, and low body imaging which correspond with the three models mention in Chapter 2. Items and their loadings can be found on Table 10. Examples of the items include "If I have a bad workout, I feel bad the rest of the day," and "The more muscular I am, the better I feel about myself." Cronbach's Alpha for this factor is .924. For more detailed information concerning this factor and its items, refer to Table 10.

Factor Two- Risky Steroid Use

Factor two was labeled as "Risky Steroid Use". This factor aligns with factors mentioned in the previous models of MD in Chapter 2. Factor loadings for this construct ranged from .522 to .881 (See Table 11). The 13 items chosen for this factor indicate common behaviors for obtaining the ideal body type, specifically on of mesomorphic stature. Items and their loadings can be found on Table 11. Examples of the items include "I have used steroids for non-medical purposes," and "I use steroids even though I am aware of the side effects." Cronbach's Alpha for this factor is .946. For more detailed information concerning this factor and its items, refer to Table 11.

Factor Three- Desire for Muscle Mass

Factor three was labeled as "Desire for Muscle Mass". This factor corresponds with an individual's feelings to obtain a more muscular physique, specifically an increase in muscle size. As discussed in Chapter Two, individuals who exhibit MD type behaviors are determined to

build muscle size not necessarily lean muscle. Factor loadings for this construct ranged from .504 to .761 (See Table 12). The seven items chosen for this factor indicate common behaviors for obtaining a body with increased muscle hypertrophy. Items and their loadings can be found on Table 12. Examples of the items include “I would like to gain more muscle in my upper body,” and “I wish I had more muscle mass.” Cronbach’s Alpha for this factor is .873. For more detailed information concerning this factor and its items, refer to Table 12.

Factor Four- Dietary Supplementation

Factor four was labeled as “Dietary Supplementation”. This factor represents feelings and behaviors of dietary restrictions and supplementation. An individual, who is concerned with increasing musculature, consistently ponders methods to alter diet enhancing striations of muscle appearance. As discussed in Chapter Two, dietary restrictions and supplementation are “legal” methods to speed recovery and drastically increase muscle size. Factor loadings for this construct ranged from .771 to .864 (See Table 13). The 14 items retained for this factor indicate common thoughts and behaviors an individual with MD may present in order to increase muscle mass. Items and their loadings can be found on Table 13. Examples of the items include “Most foods I eat are to enhance the muscle I have,” and “I supplement protein shakes to add weight.” Cronbach’s Alpha for this factor is .962. For more detailed information concerning this factor and its items, refer to Table 13.

Factor Five- Idealization of the Perfect Body

Factor five was labeled as “Idealization of the Perfect Body.” This factor represents feelings of comparisons an individual has concerning their body and the “ideal body”. Such feelings lead to negative thoughts and low self-esteem, both related to MD like symptoms. As discussed in Chapter Two, pressures to obtain the perfect body correspond with negative

thoughts and behaviors. Factor loadings for this construct ranged from .525 to .779 (See Table 14). The 11 items retained for this factor indicate common thoughts of body comparisons to the ideal body type. Items and their loadings can be found on Table 14. Examples of the items loading on this factor include "My workout goal is to obtain the perfect body," and "I feel pressure to obtain the ideal body type." Cronbach's Alpha for this factor is .921. For more detailed information concerning this factor and its items, refer to Table 14.

Factor Six- Body and Sport

Factor six was labeled as "Body and Sport". This factor represents the impact an individual's sport preference and/or participation has on her/his body size. As discussed in Chapter Two, participation in sport and/or preference of sport will impact feelings and behaviors an individual has toward obtaining the preferred body type of that sport. This is not a factor which is limited to professional or recreational athletes. Individuals may play the role as spectator and still be influenced by the sport's ideal body type. Factor loadings for this construct ranged from .500 to .685 (See Table 15). The five items retained for this factor indicate a relationship between sport and MD. Items and their loadings can be found on Table 15. Examples of the items loading on this factor include "My body size is determined by the sport which I play or played," and "My workout program is centered on the sport which I am interested in." Cronbach's Alpha for this factor is .809. For more detailed information concerning this factor and its items, refer to Table 15.

Factor Seven- Workout Priority

Factor seven was labeled as "Workout Priority". This factor represents the influence of the desire for muscle has on an individual's daily routine. Individuals who exhibit these thoughts and behaviors depend on exercise as a part of daily functioning. Any and all barriers which

inhibit this exercise will be overcome in the pursuit of the perfect body. As discussed in Chapter Two, individuals with MD like symptoms have a high priority for their workouts. Factor loadings for this construct ranged from .502 to .813 (See Table 16). The 11 items retained for this factor indicate a relationship between the desire for muscles and overcoming barriers to meet this desire. Items and their loadings can be found on Table 16. Examples of the items loading on this factor include "My workout is high priority," and "Pretty much nothing will get in the way of my workout." Cronbach's Alpha for this factor is .921. For more detailed information concerning this factor and its items, refer to Table 16.

Factor Eight- Physique Concern

Factor eight was labeled as "Physique Concern". This factor represents the impact perceptions have on one's physique (muscle mass). Individuals who possess MD symptoms will either hide or attempt to accentuate their physique to improve self-esteem. As discussed in Chapter Two, pursuit of the ideal body type comes with many consequences. Individuals who attempt to protect their physique are masking underlying psychological disorders such as low self-esteem and negative affect. Factor loadings for this factor indicate a desire to either accentuate or hide one's musculature from others. Factor loadings for this construct ranged from .532 to .633 (See Table 17). Examples of the items loading on this factor include "I wear bulky clothes when going to and from the gym," and "I flex in front of the mirror at home." Cronbach's Alpha for this factor is .819. For more detailed information concerning this factor and its items, refer to Table 17.

Factor Nine- Social Constraints

Factor nine was labeled as "Social Constraints." This factor represents the pressures and fears an individual with MD has in public situations. To mask these feelings of inadequacy,

strange behaviors of physique protection are exhibited. As discussed in Chapter Two, individuals with MD like symptoms are highly concerned with others' perceptions of their body type and body size. These feelings of inadequacy lead to social avoidance and/or awkward social behavior. Factor loadings for this factor indicate a desire to hide ones physique from others; also referred to as physique protections on the previously mentioned models of MD. Factor loadings for this construct ranged from .504 to .641 (See Table 18). Examples of the items loading on this factor included "I will not take off my shirt unless I have recently worked out," and "I will avoid certain social situations if I feel out of shape." Cronbach's Alpha for this factor is .836. For more detailed information concerning this factor and its items, refer to Table 18.

Final Factor Solution

The previous sections in this chapter identified methods used for item retention for the final factor solution. The composite Cronbach's Alpha for the nine factor solution was .911. The final scale determined by EFA is to be viewed by readers as a new scale, identifying common feelings of individuals with MD like symptoms. This scale has been grounded in theory (based on three MD models), reviewed by a panel of SME's (identified in Chapter 3), and exposed to factor analytical techniques. The scale must be taken for what it is. This is not a proposition for a new model in MD nor is it a confirmatory study on already existing models of MD. This new scale represents a springboard into new areas of exploratory research for diagnosis and treating individuals with MD. The final chapter of this project will summarize findings and make recommendations for future researchers.

CHAPTER V

SUMMARY, FINDINGS, and RECOMMENDATIONS

Summary

The previous chapters have reviewed, proposed, explored, and finalized a new scale for identifying common feelings of MD. This study is to be viewed as an exploratory piece of research. The following section summarizes findings, proposed conclusions, and makes recommendations for future studies in MD. The significance of this study is to provide future researchers with an opportunity to use a scale for confirmatory purposes which has been developed using recommend scale developmental techniques by leading statisticians in the social sciences. The exploratory nature of the project should not decrease its influence on future research, but accentuate the need for proper methods of measurement and evaluation in the field of health psychology.

The following research question was investigated in this study: Can a scale for MD be developed using scale developmental techniques within a college population? Assessment of this question was obtained by an extensive review of the literature, consultation with Subject Matter Experts, and evaluation with statistical analyses. According to the previous chapter, the research question was retained. This is a brief summary of the findings.

First a universal item pool was developed based on an extensive review of the literature. The item pool was based on three current models presented in the MD literature. Next a panel of specialists was generated by the researcher. These specialists represent the most knowledgeable

panel of experts in the field of MD. Following solicitation of the experts, three item pools were used to generate a scale for a sample size of 827 to complete. This scale contained 180 items concerning feelings and behaviors associated with MD. Following administration of this scale to subjects, the data set was exposed to data reduction methods to determine a final solution. A nine factor scale was determined the best solution for this data set.

The results of these findings are not final statements. Conclusions based solely on these ignore the importance of the actual processes of this study. The final factor solution was based on the research question, however, conclusions were based on theory driven interpretation of the factors and their correlated items. Therefore, inferences based only on these conclusions will be inaccurate. The final solution should be used as a spring board for future research and confirmatory analyses.

Findings

A New Scale- Hale's Scale

The concept of MD is a relatively new term. As of January 2008, a total of 58 articles existed which addressed either MD or possible correlates of MD. Only a few scales are currently recognized as "suggested" means for assessing MD in a general population. Due to the perceived novelty of MD to outside researchers, a more evidence approach for its assessment has been suggested and warranted within the literature. Developmental articles published on the current instruments used to assess MD are lacking. Therefore, a psychometrically sound effort to develop an instrument which assesses MD from a theoretical perspective is inherently needed in the field before MD can be evaluated from a diagnostically recognized position.

The result of this study is a new scale for MD developed with proper scale developmental techniques (See Table 20). The name of this new instrument is "Hale's Scale (HAS)" Nine factors (with 85 items total) exist within this new scale with alpha ranging from 809 to .962. The

composite alpha for all nine dimensions is .912. These new factors represent commonalities of feelings reflected by the samples within the proposed sample parameters. The nine factors are: MD internalization, Risky Steroid Use, Desire for Muscle Mass, Dietary Supplementation, Idealization of the Perfect Body, Body and Sport, Workout Priority, Physique Concern, and Social Constraints. A more intensive analysis of the factors is recommended to examine causal relationships and the predictive nature of the variables. Also, convergent reliability should be explored in a follow-up analysis before this scale should be used for diagnoses.

Recommendations

The HAS was developed through recommendations by DeVellis for data reduction procedures. However, various limitations exist before its usage can be inferred to other populations containing individuals with MD. The next step is to analyze convergent validity with a similar type of psychological assessment. Possible confirmatory analyses could then detect the effectiveness of the HAS in various populations. The HAS should be viewed as an important piece of scale development eliminating perceptions of MD as a novelty and unrecognized disorder. This scale needs to be validated in other populations, specifically populations with high incidences of MD.

The HAS is based on three models of MD. Future research should be conducted examining possible correlations of the nine factors with factors in each of the three models. This can be accomplished through discriminate analysis and/or canonical correlation. Also, structure equation modeling analysis could examine the path relationships between each of the nine factors. Thus, a nine factor scale could be reduced to a scale with fewer dimensions measuring the same latent variables associated with MD.

The final factor solution should be tested for correlation among factors. This is accomplished using higher order factoring techniques. Simply put, higher order factoring is exposing the final set of dimensions to a separate factor analysis, aka factoring of factors. Therefore, higher order factoring of the HAS would confirm the final solution determined by EFA techniques.

In conclusion, the scale presented here is a preliminary approach within the etiology of MD. Its development represents psychometrically sound techniques for exploratory purposes. The development of the HAS is proposed to initiate the research process and further the exploration of MD. The newness of this disorder begins with promoting awareness, analyzing tendencies, and recommending interventions for prevention and treatment. The HAS is not a solution but a tool within the due process of psychological evaluation.

TABLES

Table 1
KMO and Bartlett's Test
Pilot Study

KMO Sampling Adequacy	0.931
Bartlett's Test of Sphericity	p = .000

Table 2
Factor Correlation Matrix
Pilot Study

Factor	1	2	3	4	5
1	1.000	0.21	-0.312	0.107	0.418
2	0.210	1.000	0.222	0.047	0.361
3	-0.312	-0.222	1.000	-0.053	-0.379
4	0.107	0.047	-0.053	1.000	0.075
5	0.418	0.361	-0.379	0.075	1.000

Table 3
Five Factor Solution
Principle Axis—Oblimin and Kaiser Normalization
Pilot Study

	Initial Eigenvalues		
Factor	Total	% of Variance	Cumulative %
1	24.544	42.318	42.318
2	4.436	7.648	49.966
3	3.668	6.324	56.29
4	3.537	6.098	62.388
5	3.02	5.207	67.505

Table 4
Final Item Analysis
Pilot Study

Factor	Scale and Item Number	Item Description	Factor Loadings	Cronbach's Alpha
Social Avoidance	MASS: 12	time at the gym	0.509	
	MDI: 21	avoid weight room social situations	0.861	
	MDI: 24	keeping other from seeing muscles	0.873	
	MDDI: 11	passing up social activities	0.677	0.764
	MDDI 12	feel depressed to miss workout	0.546	
	MDDI: 13	passing up meeting new people	0.717	
Workout Priority	MASS: 2	missing workout upsets	0.544	
	MASS: 8	bad workout has negative effect	0.467	
	MASS: 10	keep working out even if in pain	0.524	0.836
	MDI: 3	maintain a strict workout schedule	0.778	
	MDI: 13	bothers to miss a workout	0.745	
	MDI: 18	time off from training	0.733	
	MDDI: 10	anxious when a workout is missed	0.728	
Desire for Hypertrophy	MDI: 10	workouts for developing mass	0.715	
	MDI: 15	developing mass is important	0.767	
	MDI: 17	benefit from large muscles	0.672	
	MDI: 20	preoccupied to be larger	0.645	0.927
	MDDI: 1	I think my body is too small	0.802	
	MDDI: 4	I wish I could get bigger	0.855	
	MDDI: 5	my chest is too small	0.7	
	MDDI: 6	my legs are too thin	0.689	
	MDDI: 8	I wish my arms were bigger	0.772	
Body/Muscle Satisfaction	MDI: 14	working out alone	0.468	
	MDDI: 3	I hate my body	0.722	0.773
	MDDI: 7	feel too fat	0.766	
	MDDI: 9	shy about being seen in swimsuit	0.691	
Supplement Use	MASS: 5	spending money on supplements	0.796	
	MASS: 17	gaining mass by any means	0.88	
	MASS: 9	trying anything to increase mass	0.863	0.852
	MDI: 9	supplements to increase performance	0.669	
	MDI: 12	supplements to aid recovery	0.49	

Table 5
Demographic Data
Age and Gender

	%	N	Mean Age
Males	37.1	305	
Females	62.9	518	19.68

Table 6
Demographic Data
Ethnicity

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	African American	41	5.0	5.0	5.0
	Asian	21	2.5	2.6	7.5
	Caucasian	674	81.5	82.0	89.5
	Hispanic	20	2.4	2.4	92.0
	Native American	43	5.2	5.2	97.2
	Pacific Islander	1	.1	.1	97.3
	Other	22	2.7	2.7	100.0
	Total	822	99.4	100.0	
Missing	System	5	.6		
Total		827	100.0		

Table 7
Demographic Data
Classification

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Freshman	343	41.5	41.7	41.7
	Sophomore	250	30.2	30.4	72.1
	Junior	134	16.2	16.3	88.3
	Senior	96	11.6	11.7	100.0
	Total	823	99.5	100.0	
Missing	System	4	.5		
Total		827	100.0		

Table 8
Total Variance Explained

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings(a)
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	36.588	20.327	20.327	36.129	20.072	20.072	15.833
2	17.363	9.646	29.973	16.927	9.404	29.476	7.526
3	10.339	5.744	35.716	9.870	5.483	34.959	15.459
4	6.851	3.806	39.523	6.383	3.546	38.505	10.755
5	4.078	2.266	41.788	3.663	2.035	40.540	22.521
6	3.736	2.075	43.864	3.249	1.805	42.345	6.168
7	3.410	1.894	45.758	2.925	1.625	43.970	15.195
8	2.796	1.553	47.311	2.294	1.274	45.244	13.133
9	2.685	1.492	48.803	2.150	1.195	46.439	9.412
10	2.520	1.400	50.203	2.015	1.119	47.558	3.189
11	2.351	1.306	51.509	1.851	1.028	48.587	21.072
12	2.092	1.162	52.671	1.582	.879	49.466	10.014
13	2.044	1.135	53.807	1.480	.822	50.288	11.301
14	1.926	1.070	54.877				
15	1.708	.949	55.826				
16	1.678	.932	56.758				
17	1.616	.898	57.656				
18	1.494	.830	58.486				
19	1.471	.817	59.304				
20	1.412	.784	60.088				
21	1.378	.766	60.854				
22	1.321	.734	61.587				
23	1.292	.718	62.305				
24	1.229	.683	62.988				
25	1.214	.674	63.663				
26	1.181	.656	64.319				
27	1.171	.650	64.969				
28	1.099	.611	65.580				
29	1.063	.591	66.171				
30	1.047	.582	66.752				
31	1.041	.579	67.331				
32	1.014	.563	67.894				

Table 9
Scree Plot

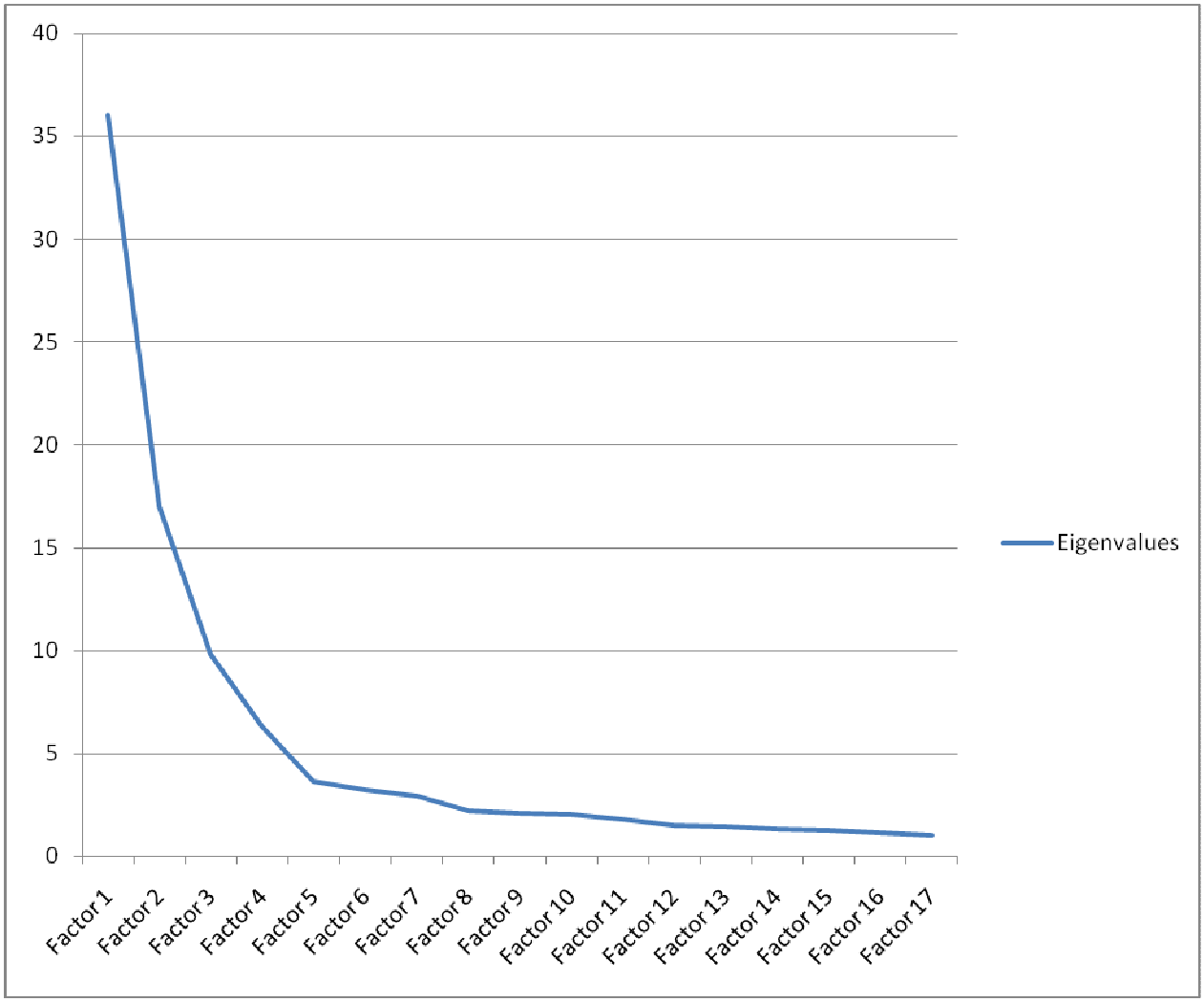

Table 10
Final Item Analysis
Factor One

Factor 1	Item Description	Factor Loadings	Cronbach's Alpha
MD Internalization	1. I feel pressure to be muscular.	0.504	0.924
	2. If I have a bad workout, I feel bad the rest of the day.	0.554	
	3. My muscle size determines how I feel about myself.	0.757	
	4. The more muscle mass I have, the better I feel about myself.	0.647	
	5. Less muscle mass equals poor self-esteem.	0.642	
	6. My self-esteem is influenced by my muscle mass.	0.710	
	7. The more muscular I am, the better I feel about myself.	0.579	
	8. I am a foul mood if I miss a training session.	0.617	
	9. My mood is determined by the amount of muscle I have.	0.757	
	10. My mood is bad if I feel small.	0.642	
	11. I become angry if I feel bad about my body.	0.549	
	12. I think about my musculature many times throughout the day.	0.582	
	13. I become angry if I miss a workout.	0.709	

Table 11
Final Item Analysis
Factor Two

Factor 2	Item Description	Factor Loadings	Cronbach's Alpha
Risky Steroid Use	14. I have used steroids not prescribed by a doctor.	0.800	0.946
	15. I cycle steroids more than once a year.	0.656	
	16. I have purchased steroids over the internet.	0.709	
	17. I have purchased steroids from a member of the gym I workout in.	0.881	
	18. I have injected steroids with a needle.	0.786	
	19. I have ingested steroids orally.	0.650	
	20. I prefer to use steroids over other types of supplements.	0.870	
	21. I have bought steroids from a country other than the one in which I live.	0.792	
	22. I use steroids even though I am aware of the side effects.	0.819	
	23. I have used steroids for non-medical purposes.	0.813	
	24. I prefer to stack steroids with other muscle building supplements.	0.808	
	25. I have used over-the-counter steroid precursors to build muscle mass.	0.745	
	26. I currently use "Andro" or a similar steroid precursor.	0.654	

Table 12
Final Item Analysis
Factor Three

Factor 3	Item Description	Factor Loadings	Cronbach's Alpha
Desire for Muscle Mass	27. I wish I had more muscle mass.	0.752	0.873
	28. I would like to build muscle.	0.761	
	29. I wish my arms were more muscular.	0.738	
	30. I wish my chest was more muscular.	0.661	
	31. I would like to gain more muscle in my upper body.	0.726	
	32. I am not muscular enough.	0.616	
	33. I am worried about not being muscular enough.	0.593	

Table 13
Final Item Analysis
Factor Four

Factor 4	Item Description	Factor Loadings	Cronbach's Alpha
Dietary Supplementation	34. I have used meal replacements to add weight.	0.711	0.962
	35. I supplement protein shakes to add weight.	0.771	
	36. I have tried "weight gainer" products.	0.829	
	37. Most foods I eat are to gain more muscle mass.	0.603	
	38. I restrict my diet to enhance my muscle striations.	0.770	
	39. I restrict my diet to enhance my muscle striations.	0.854	
	40. I eat foods which will enhance muscle recovery.	0.753	
	41. I eat foods which will speed muscle growth.	0.864	
	42. Most foods I eat are to enhance the muscles I have.	0.821	
	43. Most foods I eat are to enhance the muscles I have.	0.829	
	44. I use supplements to add muscle mass.	0.852	
	45. Supplementation is critical to gaining muscle mass.	0.817	
	46. I discuss supplement use with my peers.	0.773	

Table 14
Final Item Analysis
Factor Five

Factor 5	Item Description	Factor Loadings	Cronbach's Alpha
Idealization of the Perfect Body	47. I would like to have the perfect body.	0.695	0.921
	48. Obtaining the perfect body is a goal of mine.	0.721	
	49. My workout goal is to obtain the perfect body.	0.714	
	50. I want to close the gap between my body and the perfect body.	0.725	
	51. Other people influence the way I feel about my body.	0.613	
	52. I want to obtain the ideal body.	0.774	
	53. I am constantly thinking about my body type.	0.639	
	54. I feel there are always improvements I can make to my body type.	0.529	
	55. If my body is not perfect, I feel dissatisfied.	0.603	
	56. I compare my body with those of movie stars.	0.639	
	57. I feel pressure to obtain the ideal body.	0.517	

Table 15
Final Item Analysis
Factor Six

Factor 6	Item Description	Factor Loadings	Cronbach's Alpha
Body and Sport	58. My body size is determined by the sport which I play or played.	0.629	0.809
	59. I will add muscle mass if playing a sport which requires more size.	0.652	
	60. I will lose weight if playing a sport which requires lean mass.	0.500	
	61. My muscle mass is determined by which sport is in season.	0.652	
	62. My workout program is centered on the sport which I am interested in.	0.685	

Table 16
Final Item Analysis
Factor Seven

Factor 7	Item Description	Factor Loadings	Cronbach's Alpha
Workout Priority	63. I exercise more than 5 days per week.	0.670	0.921
	64. I will exercise even if my body is sore.	0.599	
	65. My workout is a high priority.	0.802	
	66. I schedule my workouts days in advance.	0.616	
	67. Lifting weights is a very important part of my life.	0.813	
	68. Pretty much nothing will get in the way of my workout.	0.629	
	69. I would feel lost without exercise.	0.726	
	70. My recovery/off days seem to last forever.	0.740	
	71. I want to lift weights my entire life.	0.649	
	72. I will do whatever it takes to obtain the perfect body.	0.598	

Table 17
Final Item Analysis
Factor Eight

Factor 8	Item Description	Factor Loadings	Cronbach's Alpha
Physique Concern	73. I wear bulky clothes when going to and from the gym.	0.567	0.819
	74. I flex in front of the mirror at home.	0.643	
	75. Most days I exercise my upper body.	0.576	
	76. I prefer to wear sleeveless shirts when lifting my upper body.	0.563	
	77. I would like to gain 5-15 pounds of muscle.	0.564	
	78. I sometimes feel people are checking out my muscle size in public.	0.589	

Table 18
Final Item Analysis
Factor Nine

Factor 9	Item Description	Factor Loadings	Cronbach's Alpha
Social Constraints	79. I am constantly thinking of new ways to lose weight.	0.534	0.836
	80. I will not take off my shirt unless I have recently worked out.	0.504	
	81. I feel depressed on days which I am bloated.	0.532	
	82. I workout before going to the beach or pool.	0.633	
	83. If I have not worked out recently, I will wear baggy clothes.	0.635	
	84. I will avoid certain social situations if I feel "out of shape".	0.641	
	85. I will try any extreme of dieting to lose weight.	0.563	

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APPENDICES

Appendix 1

MD SME Request Letter

Dear MD Expert:

For my dissertation, I am developing a scale to measure muscle dysmorphic behaviors in a general college population. The purpose of this project is to explore the possibility of combing current methods used to evaluate health risk behaviors in the context of muscle dysmorphia. The finished product will be an exploratory instrument to be used for future research endeavors for scale development in muscle dysmorphia (MD).

The current scale development process for this project follows recommended scale development techniques supported within the literature. An over inclusive item pool has been generated which is included in this packet. This item pool needs to be reviewed by Subject Matter Experts (SMEs). To ensure the validity of this scale, items must represent appropriate feelings in an unambiguous manner. This set of items was generated using concepts from proposed MD models presented in the literature. Once all SMEs have reviewed the initial item pool, the revised set of items will be administered to a college population. Following that data collection, the items will be subjected to an exploratory factor analysis to assess commonalities among the items. The final scale derived from this process will be used for future research on MD as well as continued scale development.

Your help in this process will be of enormous value. I see this as an opportunity for potential growth in the awareness of MD and, for the finished product, I will acknowledge your contribution to this project. I will also provide a final copy of the finished dissertation and scale for you to use as a resource.

A return envelope has been provided to ensure the timeliness of this matter. Please feel free to make any suggestions you deem appropriate for the validity of this scale. The Instructions for your review are located at the top of the item pool document. I do not want to burden you with time constraints, however, a hasty return will allow for a hastier dissertation defense. Thanks again for your time and effort with this project. Please feel free to contact me at any time via email at d.hale@okstate.edu.

Sincerely,

William Davis Hale

Enclosure

Appendix 2

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Appendix 3

MD DRAFT ITEM POOL

Name:
Institution:

Please rate each item on a scale of 1-5 to the extent which it contributes to the validity of the proposed construct. *Feel free to make any suggestions on the items or in the spaces provided after item.*

Body Satisfaction- 2007 Grieve model- "Body satisfaction refers to the extent to which there is a discrepancy between individuals' perception of the perfect body and their actual physical appearance (Keeton, Cash, & Brown, 1990)."	**Scale**				
	Poor		**Good**		**Excellent**
I am dissatisfied with my body.	1	2	3	4	5
I feel overweight.	1	2	3	4	5
I wish I had more muscle mass.	1	2	3	4	5
My body is not the ideal body type.	1	2	3	4	5
I would like to lose fat and gain muscle.	1	2	3	4	5
I would like to build muscle.	1	2	3	4	5
I wish my arms were more muscular.	1	2	3	4	5
I wish my thighs were more muscular.	1	2	3	4	5

MD DRAFT ITEM POOL

I wish my chest was more muscular.	1	2	3	4	5
Overall, my body is too small.	1	2	3	4	5
Overall, my body is too big.	1	2	3	4	5
I prefer lean muscles over muscle mass.	1	2	3	4	5
I wish my abs were more defined.	1	2	3	4	5
I wish my back was more defined.	1	2	3	4	5
I would like to gain more muscle in my upper body.	1	2	3	4	5
I would like to gain more muscle in my lower body.	1	2	3	4	5
I feel better about myself after a workout.	1	2	3	4	5
My appearance is more appealing after a workout.	1	2	3	4	5
I am more satisfied with my body after a workout than before.	1	2	3	4	5
I would be happier if I lost more weight.	1	2	3	4	5
Body Distortion- 2007 Grieve model- "The distortion is that men believe they are smaller than what they appear (Olivardia, 2001)."	**Scale**				
	Poor		**Good**		**Excellent**
I believe my body size is within the "normal" range.	1	2	3	4	5

MD DRAFT ITEM POOL

I consider myself overweight.	1	2	3	4	5
I consider myself thin.	1	2	3	4	5
Other people consider me overweight.	1	2	3	4	5
Other people consider me underweight.	1	2	3	4	5
My body type is the “ideal” type.	1	2	3	4	5
Other people feel I should gain weight.	1	2	3	4	5
Other people feel I should lose weight.	1	2	3	4	5
When I look in the mirror, I see myself as too big.	1	2	3	4	5
When I look in the mirror, I see myself as too small.	1	2	3	4	5
I compare my body size to others at the gym.	1	2	3	4	5
I worry or obsess about my body not being small/thin.	1	2	3	4	5
Body Mass- 2007 model- “For the development of MD, both the perception of low body weight as well as a muscular body shape appear to be necessary.”	**Scale**				
	Poor		**Good**		**Excellent**
Are you concerned your body is not muscular enough?	1	2	3	4	5
I lift weights to build muscle mass.	1	2	3	4	5

MD DRAFT ITEM POOL

Gaining too much muscle mass is not a concern of mine.	1	2	3	4	5
I lift weights to build lean muscles.	1	2	3	4	5
My body composition is important to me.	1	2	3	4	5
Gaining weight is not a concern of mine if I am gaining muscle mass.	1	2	3	4	5
I lift weights to gain weight.	1	2	3	4	5
I lift weights to gain tone.	1	2	3	4	5
Are you concerned your body is not muscular enough?	1	2	3	4	5
I lift weights to build muscle mass.	1	2	3	4	5
Gaining too much muscle mass is not a concern of mine.	1	2	3	4	5
I lift weights to gain weight.	1	2	3	4	5
I lift weights to increase muscle tone.	1	2	3	4	5
Media Influences- 2007 Grieve model- "The muscular ideal is conveyed to the population via a number of social influences, including family members, peers, schools, athletics, and healthcare professionals, and mass media" (Smolak et al., 2005; Stanford & McCabe, 2005).	**Scale**				
	Poor		**Good**		**Excellent**
I compare my body to athletes.	1	2	3	4	5
Most celebrities have ideal body types.	1	2	3	4	5

MD DRAFT ITEM POOL

Most athletes have ideal body types.	1	2	3	4	5
Male models are portrayed with the ideal body type.	1	2	3	4	5
Female models are portrayed with the ideal body type.	1	2	3	4	5
Most magazine models have the ideal body type.	1	2	3	4	5
I compare my body to those on the cover of magazines.	1	2	3	4	5
The ideal body type portrayed in the media is tall and muscular.	1	2	3	4	5
I would like to have the same body type as muscular magazine models.	1	2	3	4	5
I compare my body with those of movie stars.	1	2	3	4	5
I would like to have the same body type as professional athletes.	1	2	3	4	5
I would like to have the same musculature as a professional basketball player.	1	2	3	4	5
I would like to have the same musculature as a professional distance runner.	1	2	3	4	5
I would like six pack abs like most fitness magazine models.	1	2	3	4	5
I am more likely to purchase a magazine if the cover model has a nice body.	1	2	3	4	5
I would like my photographs to be airbrushed like some magazine cover models.	1	2	3	4	5

Ideal Body Internalization- 2007 Grieve model **"Ideal body internalization involves the acceptance of the cultural ideal. For men, this cultural ideal is a mesomorphic body shape. For men, acquiring a certain body shape is one of the primary factors influencing their desire to gain muscle (Ridgeway & Tylka, 2005)."**	**Scale** **Poor**		**Good**		**Excellent**
A muscular body is the ideal body type.	1	2	3	4	5
A lean, muscular body is the "gold standard" for the ideal body type.	1	2	3	4	5
I feel pressure to obtain the ideal body.	1	2	3	4	5
I feel pressure to be muscular.	1	2	3	4	5
Women desire men who are tall and muscular.	1	2	3	4	5
Men desire women who are lean and muscular.	1	2	3	4	5
I feel depressed if others do not approve of my body.	1	2	3	4	5
Women prefer men who have increased muscle mass.	1	2	3	4	5
Men prefer women who have increased muscle mass.	1	2	3	4	5
Other people influence the way I feel about my body.	1	2	3	4	5
I want to obtain the ideal body.	1	2	3	4	5
I am constantly thinking about my body type.	1	2	3	4	5
I structure my diet to obtain the ideal body type.	1	2	3	4	5
I structure my workouts to obtain the ideal body type.	1	2	3	4	5

Society determines the ideal body type.	1	2	3	4	5
Sport Participation- 2007 Grieve model "It has been established that participation in sports that focus on weight (e.g., wrestling, track) increases the incidence rates of eating disorders (Stoutjesdyk & Jevne, 1993). For MD, the stage may be set by participating in sports that reward high muscle mass, such as football."	**Scale Poor**		**Good**		**Excellent**
My body size is determined by the sport which I play or played.	1	2	3	4	5
I will add muscle mass if playing a sport which requires more size.	1	2	3	4	5
I will lose weight if playing a sport which requires lean mass.	1	2	3	4	5
I would use a muscle building supplement to add mass.	1	2	3	4	5
I monitor the amount of protein I consume.	1	2	3	4	5
My muscle mass is determined by which sport is in season.	1	2	3	4	5
My weight varies during the off-season.	1	2	3	4	5
I monitor my diet depending on the sport which I play/played.	1	2	3	4	5
I cut weight during season.	1	2	3	4	5
My workout program is centered on the sport which I am interested in.	1	2	3	4	5
I have used steroids to build muscle mass.	1	2	3	4	5
I have used muscle building supplements to add mass.	1	2	3	4	5
Watching sports encourages me to workout.	1	2	3	4	5
I monitor daily caloric intake to increase my muscularity.	1	2	3	4	5

I will only participate in sports if I feel “in shape”.	1	2	3	4	5
I would use steroids to build muscle mass.	1	2	3	4	5
I would use or have used supplements to help with muscle recovery.	1	2	3	4	5
My diet is centered on the sport which I am interested in.	1	2	3	4	5
I will sacrifice eating to maintain the body type I am interested in.	1	2	3	4	5
My workout is the most important part of my day.	1	2	3	4	5
Low Self-esteem- 2007 Grieve model “Men and women who had more positive attitudes about their bodies had higher levels of self-esteem. There is a negative relationship between self-esteem and MD symptoms; men with lower self-esteem report higher levels of MD” (Olivardia et al., 2004).	**Scale Poor**		**Good**		**Excellent**
I feel bad about myself if I miss a workout.	1	2	3	4	5
If I have a bad workout, I feel bad the rest of the day.	1	2	3	4	5
Days when I feel more muscular are great days.	1	2	3	4	5
I sometimes workout when I feel bad about myself.	1	2	3	4	5
A good workout can save a bad day.	1	2	3	4	5
A bad day in the gym is better than a good day at work.	1	2	3	4	5
Sometimes I will work out on my day of rest if feeling bad about myself.	1	2	3	4	5
My muscle size will determine how I feel about myself.	1	2	3	4	5

The more muscle mass I have, the better I feel about myself.	1	2	3	4	5
Less muscle mass equals low self-esteem.	1	2	3	4	5
My self-esteem is influence by my muscle mass.	1	2	3	4	5
My workout determines how I feel about myself.	1	2	3	4	5
I am dissatisfied with my body if I miss a workout.	1	2	3	4	5
The more muscular I am, the better I feel about myself.	1	2	3	4	5
I envy others with defined musculature.	1	2	3	4	5
If I were injured and could not train, I may become depressed.	1	2	3	4	5
My mood is better after a workout.	1	2	3	4	5
I will be in a foul mood if I miss a training session.	1	2	3	4	5
My mood is determined by the amount of muscle I have.	1	2	3	4	5
My mood will be bad if I feel skinny.	1	2	3	4	5
The “pump” I feel from lifting weights helps my mood.	1	2	3	4	5
I may become angry if I feel bad about my body.	1	2	3	4	5

Perfectionism- 2007 Grieve model **"Perfectionism has been defined as the pursuit of unrealistic goals (Nugent, 2000). Since men with MD also are struggling to reach an unattainable body shape, it is hypothesized that perfectionism will influence the development of this disorder."**	**Scale** **Poor**		**Good**		**Excellent**
I think about my musculature many times throughout the day.	1	2	3	4	5
I feel there are always improvements I can make to my body type.	1	2	3	4	5
I feel compelled to follow my workout routine strictly.	1	2	3	4	5
I am constantly trying to tweak my body for a better look.	1	2	3	4	5
I would like to have the "perfect" body.	1	2	3	4	5
Obtaining the perfect body is a goal of mine.	1	2	3	4	5
I set high workout goals.	1	2	3	4	5
My workout goal is to obtain the perfect body.	1	2	3	4	5
I want to close the gap between my body and the perfect body.	1	2	3	4	5
I am constantly thinking about my next workout.	1	2	3	4	5
I will train through illness and injury to reach my fitness goals.	1	2	3	4	5
Maintaining muscle size is a big priority in my life.	1	2	3	4	5
My training sometimes interferes with other commitments in my life.	1	2	3	4	5
I will do whatever it takes to obtain the perfect body.	1	2	3	4	5

I measure my fitness goals by the size of my muscles.	1	2	3	4	5
The perfect body can be obtained.	1	2	3	4	5
The perfect body is very muscular.	1	2	3	4	5
Elite bodybuilders have close to perfect bodies.	1	2	3	4	5
Long distance runners have close to perfect bodies.	1	2	3	4	5
If my body is not perfect, I will feel dissatisfied.	1	2	3	4	5
I enjoy the pursuit for the perfect body.	1	2	3	4	5
Negative Affect-2007 Grieve model "Negative affect is influenced by low self-esteem, body dissatisfaction, and body distortion. In return, it influences low self-esteem, body distortion, and symptoms of MD."	**Scale**				
	Poor		**Good**		**Excellent**
I feel tired if I do not work out.	1	2	3	4	5
My daily energy level depends on how I feel about my body.	1	2	3	4	5
I feel lethargic if I cannot train.	1	2	3	4	5
I have more energy if I feel good about my body.	1	2	3	4	5
I sometimes feel tense if I cannot train.	1	2	3	4	5
I become angry if I miss a workout.	1	2	3	4	5
I feel jittery if I miss a workout.	1	2	3	4	5

I use supplements to “energize” my workout.	1	2	3	4	5
I use stimulants throughout the day.	1	2	3	4	5
I am tired most days.	1	2	3	4	5
Most days I feel tense.	1	2	3	4	5
I feel lethargic most days.	1	2	3	4	5
I have trouble falling asleep.	1	2	3	4	5
I have trouble waking up in the morning.	1	2	3	4	5
I am fearful I may miss a workout.	1	2	3	4	5
Health risk behaviors- 2005 Cafri and Thompson model: Steroids, steroid precursors, ephedrine, dieting to lose weight, dieting to gain weight, dieting to increase muscularity. **Steroids**	**Scale** **Poor**		**Good**		**Excellent**
I have used steroids prescribed by a doctor.	1	2	3	4	5
I have used steroids not prescribed by a doctor.	1	2	3	4	5
My friends use steroids.	1	2	3	4	5
I cycle steroids more than once a year.	1	2	3	4	5
I have purchased steroids over the internet.	1	2	3	4	5
I have purchased steroids from a member of the gym I workout in.	1	2	3	4	5

I have injected steroids with a needle.	1	2	3	4	5
I have ingested steroids orally.	1	2	3	4	5
I prefer to use steroids over other types of supplements.	1	2	3	4	5
I have bought steroids from a country other than the one in which I live.	1	2	3	4	5
I use steroids even though I am aware of the side effects.	1	2	3	4	5
I have noticed a dramatic increase in my musculature from using steroids.	1	2	3	4	5
I am aware of the various types of steroids.	1	2	3	4	5
I have used steroids for non-medical purposes.	1	2	3	4	5
I use steroids to add lean muscle mass.	1	2	3	4	5
I am aware of the health risks associated with steroid use.	1	2	3	4	5
I have felt pressure from my peers to use steroids	1	2	3	4	5
Other people in my gym have encouraged me to try steroids.	1	2	3	4	5
I use other supplements along with using steroids.	1	2	3	4	5
I prefer to stack steroids with other muscle building supplements.	1	2	3	4	5

Health risk behaviors- 2005 Cafri and Thompson model: Steroids, steroid precursors, ephedrine, dieting to lose weight, dieting to gain weight, dieting to increase muscularity. **Steroid Precursors- Prohormones: 2005 Cafri and Thompson model**	**Scale** **Poor**		**Good**		**Excellent**
I have used over-the-counter steroid precursors to build muscle mass.	1	2	3	4	5
I have used over-the-counter steroid precursors in the last month.	1	2	3	4	5
I am aware some of the over-the-counter supplements may contain steroids.	1	2	3	4	5
I currently use “Andro” or a similar product.	1	2	3	4	5
I have tried supplementing Andro products.	1	2	3	4	5
I use over-the-counter steroid precursors even though there may be health risks.	1	2	3	4	5
I have tried the over-the-counter steroid precursor DHEA.	1	2	3	4	5
I am aware over-the-counter steroid precursors may increase blood estrogen levels.	1	2	3	4	5
My mood varies while using over-the-counter steroid precursors.	1	2	3	4	5
I have a discount card to a nutrition store.	1	2	3	4	5

Health risk behaviors- 2005 Cafri and Thompson model: Steroids, steroid precursors, ephedrine, dieting to lose weight, dieting to gain weight, dieting to increase muscularity. **Ephedrine: 2005 Cafri and Thompson model**	**Scale** **Poor**		**Good**		**Excellent**
I currently use supplements with ephedrine.	1	2	3	4	5
I use ephedrine products to suppress my appetite.	1	2	3	4	5
I use ephedrine products to increase my metabolism.	1	2	3	4	5
I use ephedrine products for weight loss.	1	2	3	4	5
I use energy drinks to suppress my appetite.	1	2	3	4	5
I use caffeine to suppress my appetite.	1	2	3	4	5
I use caffeine prior to working out.	1	2	3	4	5
I have supplemented ephedrine within the past year.	1	2	3	4	5
I have used or use ephedrine even thought there are health risks.	1	2	3	4	5
I prefer to lift weights after consuming a stimulant.	1	2	3	4	5
I use herbal supplements which promote fat loss.	1	2	3	4	5
I have used herbal supplements within the past year.	1	2	3	4	5
Using stimulants is an effective method to build lean mass.	1	2	3	4	5
Supplementing ephedrine is an effective method to lose weight.	1	2	3	4	5

Health risk behaviors- 2005 Cafri and Thompson model: Steroids, steroid precursors, ephedrine, dieting to lose weight, dieting to gain weight, dieting to increase muscularity. **Dieting to lose weight: 2005 Cafri and Thompson model**	**Scale** **Poor**		**Good**		**Excellent**
I regularly monitor my caloric intake.	1	2	3	4	5
I have attempted to lose weight by fasting.	1	2	3	4	5
My weight fluctuates.	1	2	3	4	5
I have attempted to lose weight with a high protein diet.	1	2	3	4	5
My diet hinders the types of foods I can eat.	1	2	3	4	5
Restricting calories is an effective method to lose weight.	1	2	3	4	5
I am constantly trying new diets to shed a few extra pounds.	1	2	3	4	5
Occasionally I will use laxatives to lose weight.	1	2	3	4	5
I have tried “cleansing” formulas to take off a few pounds.	1	2	3	4	5
My food choices reflect my desire to gain muscle.	1	2	3	4	5
Losing weight will help enhance my muscular physique.	1	2	3	4	5
I want to lose weight to enhance my “six pack” abs.	1	2	3	4	5
Dieting is an effective method to enhance my body type.	1	2	3	4	5
I am constantly thinking of ways to lose weight.	1	2	3	4	5

I use meal replacements to lose weight.	1	2	3	4	5
I would like to lose 5-15 pounds.	1	2	3	4	5
I would like to lose more than 15 pounds.	1	2	3	4	5
I will try any extreme of dieting to lose weight.	1	2	3	4	5
Health risk behaviors- 2005 Cafri and Thompson model: Steroids, steroid precursors, ephedrine, dieting to lose weight, dieting to gain weight, dieting to increase muscularity. **Dieting to gain weight: 2005 Cafri and Thompson model**	**Scale** **Poor**		**Good**		**Excellent**
I am constantly trying to add weight.	1	2	3	4	5
My diet is high calorie.	1	2	3	4	5
I use meal replacements to add weight.	1	2	3	4	5
My diet is centered on gaining weight.	1	2	3	4	5
I supplement protein shakes to add weight.	1	2	3	4	5
I wish I could gain weight.	1	2	3	4	5
I would like to gain 5-15 pounds.	1	2	3	4	5
I would like to gain over 15 pounds.	1	2	3	4	5
I have tried “weight gainer” products	1	2	3	4	5
I would try any extreme of dieting to gain weight.	1	2	3	4	5

My diet is high protein.	1	2	3	4	5
Most foods I eat are to gain more muscle mass.	1	2	3	4	5
No matter how much I eat, I cannot gain muscle mass.	1	2	3	4	5
Gaining weight is an important fitness goal of mine.	1	2	3	4	5
Health risk behaviors- 2005 Cafri and Thompson model: Steroids, steroid precursors, ephedrine, dieting to lose weight, dieting to gain weight, dieting to increase muscularity. **Dieting to increase muscularity: 2005 Cafri and Thompson model**	**Scale** **Poor**		**Good**		**Excellent**
My diet reflects the amount of muscle I want to show off.	1	2	3	4	5
I restrict my diet to enhance my muscle striations.	1	2	3	4	5
I try supplements which are designed to enhance muscularity.	1	2	3	4	5
I eat foods which add muscle mass.	1	2	3	4	5
I restrict my water intake to enhance my muscle striations.	1	2	3	4	5
I avoid foods which may cause water retention.	1	2	3	4	5
I follow a strict diet.	1	2	3	4	5
I eat foods which will enhance muscle recovery.	1	2	3	4	5
I eat foods which will speed muscle growth.	1	2	3	4	5
Most foods I eat are to enhance the muscles I have.	1	2	3	4	5

I am concerned with certain foods on the glycemic index.	1	2	3	4	5
I eat a high protein diet to enhance my musculature.	1	2	3	4	5
I eat at least 6 eggs per day.	1	2	3	4	5
I only eat egg whites.	1	2	3	4	5
I use supplements to suppress my appetite.	1	2	3	4	5
I consume more water than needed because of creatine supplementation.	1	2	3	4	5
I sometimes skip meals to workout.	1	2	3	4	5
My diet reflects the amount of muscle I want to obtain.	1	2	3	4	5
Supplement use: 2001 Lantz, Rhea, and Cornelius model	**Scale** **Poor**		**Good**		**Excellent**
I use supplements to add muscle mass.	1	2	3	4	5
I have a discount card to a nutrition store.	1	2	3	4	5
I purchase supplements over the internet.	1	2	3	4	5
My gym sells nutritional supplements.	1	2	3	4	5
Using nutritional supplements is an effective method to add muscle mass.	1	2	3	4	5
I have been pressured to use supplements from my peers.	1	2	3	4	5

Internet blogs provide good information about supplement use.	1	2	3	4	5
I frequent websites which review new supplements.	1	2	3	4	5
Supplementation is critical to gaining muscle mass.	1	2	3	4	5
I spend over $100.00 a month on muscle building supplements.	1	2	3	4	5
I only use over-the-counter supplements.	1	2	3	4	5
Pre-workout supplements are critical to my training.	1	2	3	4	5
Post-workout supplements are critical to my training.	1	2	3	4	5
I subscribe to a muscle and/or fitness magazine.	1	2	3	4	5
I try to stay updated on the new supplement trends.	1	2	3	4	5
I discuss supplement use with my peers.	1	2	3	4	5
My muscle size has increased after supplement use.	1	2	3	4	5
Over-the-counter supplementation is a must when building muscle mass.	1	2	3	4	5
I stay current on muscle building supplement trends.	1	2	3	4	5
Physique protection: 2001 Lantz, Rhea, and Cornelius model	**Scale**				
	Poor		**Good**		**Excellent**
I prefer to workout alone.	1	2	3	4	5

I prefer to wear loose fitting clothes when working out.	1	2	3	4	5
I will not take off my shirt unless I have recently worked out.	1	2	3	4	5
If I know I will be going to the beach or pool, I structure my workouts so I look good with in my swim suit.	1	2	3	4	5
I sometimes feel people are checking out my muscle size in public.	1	2	3	4	5
I like to workout my “beach” muscles.	1	2	3	4	5
I wish gyms did not have mirrors.	1	2	3	4	5
Occasionally I will flex in front of the mirrors on the gym floor.	1	2	3	4	5
I wear bulky clothes when going to and from the gym.	1	2	3	4	5
I feel most confident about my body right after I finish lifting weights.	1	2	3	4	5
The best time to show-off my body is coming from the weight room.	1	2	3	4	5
I will do an extra set of pushups right before going out to the beach or pool.	1	2	3	4	5
I prefer others do not see me with my shirt off.	1	2	3	4	5
I flex in front of the mirror at home.	1	2	3	4	5
I enjoy wearing tight fitting shirts.	1	2	3	4	5
I am primarily concerned with my upper body muscle size.	1	2	3	4	5
I wear loose fitting pants.	1	2	3	4	5
Most days I exercise my upper body.	1	2	3	4	5

I am not concerned with my lower body muscle size.	1	2	3	4	5
I wear sleeveless shirts when lifting my upper body.	1	2	3	4	5
If I have not workout recently, I will wear baggy clothes.	1	2	3	4	5
I have used a tanning bed in the past 3 months.	1	2	3	4	5
I have a tanning bed membership.	1	2	3	4	5
I frequently shave my arms.	1	2	3	4	5
I frequently shave my legs.	1	2	3	4	5
I frequently shave my chest.	1	2	3	4	5
I frequently shave my abdomen.	1	2	3	4	5
I have tattoos on my arms.	1	2	3	4	5
I will avoid certain social situations if I feel “out of shape”.	1	2	3	4	5
I feel depressed on days which I am bloated.	1	2	3	4	5

Exercise dependency: 2001 Lantz, Rhea, and Cornelius model	Scale				
	Poor		Good		Excellent
I exercise more than 5 days per week.	1	2	3	4	5
There is no “off-season”.	1	2	3	4	5
I will exercise even if my body is sore to maintain my training schedule.	1	2	3	4	5
I have trained through injury.	1	2	3	4	5
My workout is a high priority.	1	2	3	4	5
I feel angry if I miss a workout.	1	2	3	4	5
I feel depressed if I miss a workout.	1	2	3	4	5
My training is my number one priority.	1	2	3	4	5
I only take a recovery day if I am really sick.	1	2	3	4	5
Pain is temporary, pride is forever.	1	2	3	4	5
I schedule my workouts weeks in advance.	1	2	3	4	5
I will do whatever it takes to get my workout in.	1	2	3	4	5
If traveling, I will find a gym close by.	1	2	3	4	5

I will do pushups if I do not have access to a gym.	1	2	3	4	5
I keep a training log.	1	2	3	4	5
My ideal job would be a personal trainer.	1	2	3	4	5
I would like to work in a gym setting.	1	2	3	4	5
I will lift weights no matter what happens in my day.	1	2	3	4	5
Lifting weights is a very important part of my life.	1	2	3	4	5
Weight lifting is more than a recreation for me.	1	2	3	4	5
I stay current on muscle building trends.	1	2	3	4	5
Pretty much nothing will get in the way of my workout.	1	2	3	4	5
I have a gym membership.	1	2	3	4	5
I own a home gym.	1	2	3	4	5
I would feel lost without exercise.	1	2	3	4	5
When at the gym, I am really focused on my workout.	1	2	3	4	5
I like to socialize at the gym.	1	2	3	4	5
My recovery/off days seem to last forever.	1	2	3	4	5
I will do cardio on recovery/off days.	1	2	3	4	5
I take adequate time for recovery.	1	2	3	4	5

I use pain relievers to speed recovery.	1	2	3	4	5
I use pain relievers to mask muscle soreness.	1	2	3	4	5
I work certain muscle groups every day.	1	2	3	4	5
I want to lift weights my entire life.	1	2	3	4	5

Appendix 4

Scale Development Following Review by SME's

PLEASE READ THE STATEMENT AND DECIDE WHETHER OR NOT YOU AGREE WITH IT. THERE ARE NO CORRECT ANSWERS.

	Disagree 1	**2**	**Neutral 3**	**4**	**Agree 5**
I am dissatisfied with my body.	1	2	3	4	5
I feel overweight.	1	2	3	4	5
I wish I had more muscle mass.	1	2	3	4	5
My body is not the ideal body type.	1	2	3	4	5
I would like to lose fat and gain muscle.	1	2	3	4	5
I would like to build muscle.	1	2	3	4	5
I wish my arms were more muscular.	1	2	3	4	5
I wish my chest was more muscular.	1	2	3	4	5
Overall, my body is too small.	1	2	3	4	5
I wish my abs were more defined.	1	2	3	4	5
I would like to gain more muscle in my upper body.	1	2	3	4	5
I feel better about myself after a workout.	1	2	3	4	5
My appearance is more appealing after a workout.	1	2	3	4	5
I believe my body size is within the "normal" range.	1	2	3	4	5
Other people consider me over-muscular.	1	2	3	4	5
Other people consider me skinny, puny.	1	2	3	4	5

PLEASE READ THE STATEMENT AND DECIDE WHETHER OR NOT YOU AGREE WITH IT. THERE ARE NO CORRECT ANSWERS.

When I look in the mirror, I see myself as too small.	1	2	3	4	5
I compare my body size to others at the gym.	1	2	3	4	5
I worry or obsess about my body being too small/thin.	1	2	3	4	5
I am not muscular enough.	1	2	3	4	5
I lift weights to build muscle mass.	1	2	3	4	5
Gaining too much muscle mass is not a concern of mine.	1	2	3	4	5
My body composition is important to me.	1	2	3	4	5
Gaining weight is not a concern of mine if I am gaining muscle mass.	1	2	3	4	5
I lift weights to gain weight.	1	2	3	4	5
I am worried about not being muscular enough.	1	2	3	4	5
I compare my body to athletes.	1	2	3	4	5
Most athletes have ideal body types.	1	2	3	4	5
Male models are portrayed with the ideal body type.	1	2	3	4	5
The ideal body type portrayed in the media is tall and muscular.	1	2	3	4	5
I would like to have the same body type as muscular magazine models.	1	2	3	4	5
I compare my body with those of movie stars.	1	2	3	4	5
I would like six pack abs like most fitness magazine models.	1	2	3	4	5
A muscular body is the ideal body type.	1	2	3	4	5
A lean, muscular body is the "gold standard" for the ideal body type.	1	2	3	4	5
I feel pressure to obtain the ideal body.	1	2	3	4	5
I feel pressure to be muscular.	1	2	3	4	5

PLEASE READ THE STATEMENT AND DECIDE WHETHER OR NOT YOU AGREE WITH IT. THERE ARE NO CORRECT ANSWERS.

Women desire men who are tall and muscular.	1	2	3	4	5
I feel depressed if others do not approve of my body.	1	2	3	4	5
Women prefer men who have increased muscle mass.	1	2	3	4	5
Other people influence the way I feel about my body.	1	2	3	4	5
I want to obtain the ideal body.	1	2	3	4	5
I am constantly thinking about my body type.	1	2	3	4	5
My body size is determined by the sport which I play or played.	1	2	3	4	5
I will add muscle mass if playing a sport which requires more size.	1	2	3	4	5
I will lose weight if playing a sport which requires lean mass.	1	2	3	4	5
My muscle mass is determined by which sport is in season.	1	2	3	4	5
My workout program is centered on the sport which I am interested in.	1	2	3	4	5
I will sacrifice eating to maintain the body type I am interested in.	1	2	3	4	5
My workout is the most important part of my day.	1	2	3	4	5
I feel bad about myself if I miss a workout.	1	2	3	4	5
If I have a bad workout, I feel bad the rest of the day.	1	2	3	4	5
Days when I feel more muscular are great days.	1	2	3	4	5
I sometimes workout when I feel bad about myself.	1	2	3	4	5
A good workout can save a bad day.	1	2	3	4	5
A bad day in the gym is better than a good day at work.	1	2	3	4	5
Sometimes I will workout on my day of rest if feeling bad about myself.	1	2	3	4	5
My muscle size determines how I feel about myself.	1	2	3	4	5

PLEASE READ THE STATEMENT AND DECIDE WHETHER OR NOT YOU AGREE WITH IT. THERE ARE NO CORRECT ANSWERS.

The more muscle mass I have, the better I feel about myself.	1	2	3	4	5
Less muscle mass equals poor self-esteem.	1	2	3	4	5
My self-esteem is influenced by my muscle mass.	1	2	3	4	5
The more muscular I am, the better I feel about myself.	1	2	3	4	5
I envy those with defined musculature.	1	2	3	4	5
If I were injured and could not train, I would become depressed.	1	2	3	4	5
My mood is better after a workout.	1	2	3	4	5
I am a foul mood if I miss a training session.	1	2	3	4	5
My mood is determined by the amount of muscle I have.	1	2	3	4	5
My mood is bad if I feel small.	1	2	3	4	5
The "pump" I feel from lifting weights helps my mood.	1	2	3	4	5
I become angry if I feel bad about my body.	1	2	3	4	5
I think about my musculature many times throughout the day.	1	2	3	4	5
I feel there are always improvements I can make to my body type.	1	2	3	4	5
I feel compelled to follow my workout routine strictly.	1	2	3	4	5
I would like to have the perfect body.	1	2	3	4	5
Obtaining the perfect body is a goal of mine.	1	2	3	4	5
My workout goal is to obtain the perfect body.	1	2	3	4	5
I want to close the gap between my body and the perfect body.	1	2	3	4	5
I will train through illness and injury to reach my fitness goals.	1	2	3	4	5
My training sometimes interferes with other commitments in my life.	1	2	3	4	5

PLEASE READ THE STATEMENT AND DECIDE WHETHER OR NOT YOU AGREE WITH IT. THERE ARE NO CORRECT ANSWERS.

I will do whatever it takes to obtain the perfect body.	1	2	3	4	5
If my body is not perfect, I feel dissatisfied.	1	2	3	4	5
I enjoy the pursuit of the perfect body.	1	2	3	4	5
I feel tired if I do not workout.	1	2	3	4	5
I sometimes feel tense if I cannot workout.	1	2	3	4	5
I become angry if I miss a workout.	1	2	3	4	5
I feel jittery if I miss a workout.	1	2	3	4	5
I have trouble falling asleep if I miss a workout.	1	2	3	4	5
I have used steroids prescribed by a doctor.	1	2	3	4	5
I have used steroids not prescribed by a doctor.	1	2	3	4	5
I cycle steroids more than once a year.	1	2	3	4	5
I have purchased steroids over the internet.	1	2	3	4	5
I have purchased steroids from a member of the gym I workout in.	1	2	3	4	5
I have injected steroids with a needle.	1	2	3	4	5
I have ingested steroids orally.	1	2	3	4	5
I prefer to use steroids over other types of supplements.	1	2	3	4	5
I have bought steroids from a country other than the one in which I live.	1	2	3	4	5
I use steroids even though I am aware of the side effects.	1	2	3	4	5
I have used steroids for non-medical purposes.	1	2	3	4	5
I am aware of the health risks associated with steroid use.	1	2	3	4	5
I prefer to stack steroids with other muscle building supplements.	1	2	3	4	5

PLEASE READ THE STATEMENT AND DECIDE WHETHER OR NOT YOU AGREE WITH IT. THERE ARE NO CORRECT ANSWERS.

I have used over-the-counter steroid precursors to build muscle mass.	1	2	3	4	5
I currently use "Andro" or a similar steroid precursor.	1	2	3	4	5
I use ephedrine products to suppress my appetite.	1	2	3	4	5
I use ephedrine products to increase my metabolism.	1	2	3	4	5
I use energy drinks to suppress my appetite.	1	2	3	4	5
I use caffeine prior to working out.	1	2	3	4	5
I have used ephedrine even though there are health risks.	1	2	3	4	5
Using stimulants is an effective method to build lean muscle mass.	1	2	3	4	5
Supplementing ephedrine is an effective method to lose weight.	1	2	3	4	5
I regularly monitor my caloric intake.	1	2	3	4	5
I have attempted to lose weight by fasting.	1	2	3	4	5
I have attempted to lose weight with a high protein diet.	1	2	3	4	5
My diet hinders the types of foods I can eat.	1	2	3	4	5
I am constantly trying new diets to shed a few extra pounds.	1	2	3	4	5
Occasionally I have used laxatives to lose weight.	1	2	3	4	5
Losing weight will help enhance my muscular physique.	1	2	3	4	5
I want to lose weight to enhance my "six pack" abs.	1	2	3	4	5
I am constantly thinking of new ways to lose weight.	1	2	3	4	5
I would like to lose 5-15 pounds of fat.	1	2	3	4	5
I will try any extreme of dieting to lose weight.	1	2	3	4	5
I am constantly trying to put on weight.	1	2	3	4	5

PLEASE READ THE STATEMENT AND DECIDE WHETHER OR NOT YOU AGREE WITH IT. THERE ARE NO CORRECT ANSWERS.

I have used meal replacements to add weight.	1	2	3	4	5
I supplement protein shakes to add weight.	1	2	3	4	5
I would like to gain 5-15 pounds of muscle.	1	2	3	4	5
I have tried "weight gainer" products.	1	2	3	4	5
Most foods I eat are to gain more muscle mass.	1	2	3	4	5
I restrict my diet to enhance my muscle striations.	1	2	3	4	5
I try supplements which are designed to enhance muscularity.	1	2	3	4	5
I restrict my water intake to enhance my muscle striations.	1	2	3	4	5
I eat foods which will enhance muscle recovery.	1	2	3	4	5
I eat foods which will speed muscle growth.	1	2	3	4	5
Most foods I eat are to enhance the muscles I have.	1	2	3	4	5
I am concerned with certain foods on the glycemic index.	1	2	3	4	5
I eat a high protein diet to enhance my musculature.	1	2	3	4	5
I only eat egg whites.	1	2	3	4	5
I use supplements to add muscle mass.	1	2	3	4	5
I purchase supplements over the internet.	1	2	3	4	5
Supplementation is critical to gaining muscle mass.	1	2	3	4	5
I spend over $100 a month on muscle building supplements.	1	2	3	4	5
I try to stay updated on the new supplement trends.	1	2	3	4	5
I discuss supplement use with my peers.	1	2	3	4	5
Over-the-counter supplementation is a must when building muscle mass.	1	2	3	4	5

PLEASE READ THE STATEMENT AND DECIDE WHETHER OR NOT YOU AGREE WITH IT. THERE ARE NO CORRECT ANSWERS.

I prefer to wear loose fitting clothes when working out.	1	2	3	4	5
I will not take off my shirt unless I have recently worked out.	1	2	3	4	5
I workout before going to the beach or pool.	1	2	3	4	5
I sometimes feel people are checking out my muscle size in public.	1	2	3	4	5
I wish gyms had more mirrors.	1	2	3	4	5
Occasionally I will flex in front of the mirrors on the gym floor.	1	2	3	4	5
I wear bulky clothes when going to and from the gym.	1	2	3	4	5
I will do an extra set of pushups right before going out to the beach or pool.	1	2	3	4	5
I flex in front of the mirror at home.	1	2	3	4	5
I enjoy wearing tight fitting shirts.	1	2	3	4	5
Most days I exercise my upper body.	1	2	3	4	5
I prefer to wear sleeveless shirts when lifting my upper body.	1	2	3	4	5
If I have not worked out recently, I will wear baggy clothes.	1	2	3	4	5
I have used a tanning bed to enhance my appearance.	1	2	3	4	5
I frequently shave my arms.	1	2	3	4	5
I frequently shave my legs.	1	2	3	4	5
I frequently shave my chest.	1	2	3	4	5
I frequently shave my abdomen.	1	2	3	4	5
I will avoid certain social situations if I feel "out of shape".	1	2	3	4	5
I feel depressed on days which I am bloated.	1	2	3	4	5
I exercise more than 5 days per week.	1	2	3	4	5

PLEASE READ THE STATEMENT AND DECIDE WHETHER OR NOT YOU AGREE WITH IT. THERE ARE NO CORRECT ANSWERS.

There is no off-season for working out.	1	2	3	4	5
I will exercise even if my body is sore.	1	2	3	4	5
I have trained through injury.	1	2	3	4	5
My workout is a high priority.	1	2	3	4	5
I only take a recovery day if I am really sick.	1	2	3	4	5
I schedule my workouts days in advance.	1	2	3	4	5
I will do whatever it takes to get my workout in.	1	2	3	4	5
If traveling, I will find a gym close by.	1	2	3	4	5
My ideal job would be a personal trainer.	1	2	3	4	5
I will lift weights no matter what happens in my day.	1	2	3	4	5
Lifting weights is a very important part of my life.	1	2	3	4	5
Pretty much nothing will get in the way of my workout.	1	2	3	4	5
I would feel lost without exercise.	1	2	3	4	5
My recovery/off days seem to last forever.	1	2	3	4	5
I use pain relievers to speed recovery.	1	2	3	4	5
I use pain relievers to mask muscle soreness.	1	2	3	4	5
I want to lift weights my entire life.	1	2	3	4	5

Please circle or fill in the blank with the appropriate response.

Gender: **Age**: _____

1. Male
2. Female

Student Classification:

1. Freshman
2. Sophomore
3. Junior
4. Senior
5. Graduate

Ethnicity: African American Asian Caucasian Hispanic

Native American Pacific Islander Other_____

How often do you exercise per week?

Less than 3 hours 3 to 6 hours 6 to 10 hours 10 or more hours

THANK YOU!

Appendix 5

Hale's Scale (HAS)

85 items
Cronbach's Alpha = .912

Factor One- MD Internalization

1. I feel pressure to be muscular.
2. If I have a bad workout, I feel bad the rest of the day.
3. My muscle size determines how I feel about myself.
4. The more muscle mass I have, the better I feel about myself.
5. Less muscle mass equals poor self-esteem.
6. My self-esteem is influenced by my muscle mass.
7. The more muscular I am, the better I feel about myself.
8. I am a foul mood if I miss a training session.
9. My mood is determined by the amount of muscle I have.
10. My mood is bad if I feel small.
11. I become angry if I feel bad about my body.
12. I think about my musculature many times throughout the day.
13. I become angry if I miss a workout.

Factor Two- Risky Steroid Use

14. I have used steroids not prescribed by a doctor.
15. I cycle steroids more than once a year.
16. I have purchased steroids over the internet.
17. I have purchased steroids from a member of the gym I workout in.
18. I have injected steroids with a needle.
19. I have ingested steroids orally.
20. I prefer to use steroids over other types of supplements.
21. I have bought steroids from a country other than the one in which I live.
22. I use steroids even though I am aware of the side effects.
23. I have used steroids for non-medical purposes.
24. I prefer to stack steroids with other muscle building supplements.
25. I have used over-the-counter steroid precursors to build muscle mass.
26. I currently use "Andro" or a similar steroid precursor.

Factor Three- Desire for Muscle Mass

27. I wish I had more muscle mass.
28. I would like to build muscle.
29. I wish my arms were more muscular.
30. I wish my chest was more muscular.
31. I would like to gain more muscle in my upper body.

32. I am not muscular enough.
33. I am worried about not being muscular enough.

Factor Four- Dietary Supplementation

34. I have used meal replacements to add weight.
35. I supplement protein shakes to add weight.
36. I have tried "weight gainer" products.
37. Most foods I eat are to gain more muscle mass.
38. I restrict my diet to enhance my muscle striations.
39. I restrict my diet to enhance my muscle striations.
40. I eat foods which will enhance muscle recovery.
41. I eat foods which will speed muscle growth.
42. Most foods I eat are to enhance the muscles I have.
43. Most foods I eat are to enhance the muscles I have.
44. I use supplements to add muscle mass.
45. Supplementation is critical to gaining muscle mass.
46. I discuss supplement use with my peers.

Factor Five- Idealization of the Perfect Body

47. I would like to have the perfect body.
48. Obtaining the perfect body is a goal of mine.
49. My workout goal is to obtain the perfect body.
50. I want to close the gap between my body and the perfect body.
51. Other people influence the way I feel about my body.
52. I want to obtain the ideal body.
53. I am constantly thinking about my body type.
54. I feel there are always improvements I can make to my body type.
55. If my body is not perfect, I feel dissatisfied.
56. I compare my body with those of movie stars.
57. I feel pressure to obtain the ideal body.

Factor Six- Body and Sport

58. My body size is determined by the sport which I play or played.
59. I will add muscle mass if playing a sport which requires more size.
60. I will lose weight if playing a sport which requires lean mass.
61. My muscle mass is determined by which sport is in season.
62. My workout program is centered on the sport which I am interested in.

Factor Seven- Workout Priority

63. I exercise more than 5 days per week.
64. I will exercise even if my body is sore.
65. My workout is a high priority.
66. I schedule my workouts days in advance.
67. Lifting weights is a very important part of my life.
68. Pretty much nothing will get in the way of my workout.
69. I would feel lost without exercise.

70. My recovery/off days seem to last forever.
71. I want to lift weights my entire life.
72. I will do whatever it takes to obtain the perfect body.

Factor Eight- Physique Concern

73. I wear bulky clothes when going to and from the gym.
74. I flex in front of the mirror at home.
75. Most days I exercise my upper body.
76. I prefer to wear sleeveless shirts when lifting my upper body.
77. I would like to gain 5-15 pounds of muscle.
78. I sometimes feel people are checking out my muscle size in public.

Factor Nine-Social Constraints

79. I am constantly thinking of new ways to lose weight.
80. I will not take off my shirt unless I have recently worked out.
81. I feel depressed on days which I am bloated.
82. I workout before going to the beach or pool.
83. If I have not worked out recently, I will wear baggy clothes.
84. I will avoid certain social situations if I feel "out of shape".
85. I will try any extreme of dieting to lose weight.

Oklahoma State University Institutional Review Board

Date:	Thursday, August 21, 2008
IRB Application No	ED08124
Proposal Title:	Scale Development in Muscle Dysmorphia
Reviewed and Processed as:	Exempt

Status Recommended by Reviewer(s): Approved Protocol Expires: 8/20/2009

Principal Investigator(s):

William Hale ✓
12500 Barker Cypress #1430
Cypress, TX 77429

Steven Edwards
180 Colvin Center
Stillwater, OK 74078

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

☑ The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval.
2. Submit a request for continuation if the study extends beyond the approval period of one calendar year. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of this research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact Beth McTernan in 219 Cordell North (phone: 405-744-5700, beth.mcternan@okstate.edu).

Sincerely,

Sheila Kennison, Chair
Institutional Review Board

Cover Sheet/Informed Consent

Project Title: Scale Development in Muscle Dysmorphia

Investigator: William Davis Hale, M.S., Doctoral Candidate

Purpose:	This is a research study. The purpose of this study is to explore the relationship between attitudes, knowledge, and actual behavior related to muscle dysmorphia.
Procedures:	The project will consist of the participant filling out a survey which contains a Likert type scale with questions related to body image. Completing the survey will take 20-30 minutes. This data will be used for an exploratory factor analysis of a muscle dysmorphic inventory.
Risks:	There are no known risks associated with this project which are greater than those ordinarily encountered in daily life.
Benefits:	This study will benefit the research community in this area. This will further knowledge for possible scale validation in muscle dysmorphia. Further validation of this scale will assist researchers with the opportunity for options examining possible correlations within convergent validity.
Confidentiality	Data will be stored electronically in an SPSS data file on the hard drive of the principle investigator's computer. The computer is located in a locked office, and no one will have access to the results obtained. Additionally, no subject identifiers will be present with the data. Descriptive statistics and demographic information will be reported on the overall sample. An electronic copy of the dataset will be kept indefinitely in case future studies wish to attempt the replication of our findings. Paper copies of the surveys will be stored in the principal investigator's office in a locked file cabinet for a one year period.
Compensation:	None

Contact: Should you have any questions regarding this study, please contact:

William Davis Hale
Oklahoma State University
Stillwater, OK 74078
405-744-9334
d.hale@okstate.edu

Dr. Steve Edwards
325U Willard Hall
Oklahoma State University
Stillwater, OK 74078
405-744-7476
steve.edwards@okstate.edu

If you have questions about your rights as a research volunteer, you may contact:

Dr. Shelia Kennison, IRB Chair
219 Cordell North
Oklahoma State University
Stillwater, OK 74078
405-744-1676
irb@okstate.edu

Participant Rights: Participation in this project is voluntary. If, at any time, you wish to discontinue the activity, you may do so without any reprisal.

By participating in this study, I indicate that I accept the aforementioned terms. I also understand that all information I provide is strictly confidential and will be used for study purposes only. I also understand that I will remain anonymous throughout the course of this study. I am free to discontinue participation during data collection at any time. **My agreement to take part in this study is signified by my participation.**

12500 Barker
Cypress
#14306
Cypress, TX 77429
d.hale@okstate.edu

William Davis Hale, M.S.

EDUCATION:

Doctoral Candidate
Health and Human Performance
Oklahoma State University, Stillwater, OK
Expected graduation- Fall 2008

Masters Degree in Health and Human Performance
Emphasis in Applied Exercise Science, May 2006
Oklahoma State University, Stillwater, OK

Bachelor of Science
Kinesiology, May 2001
Angelo State University, San Angelo, TX

TEACHING EXPERIENCE:

Undergraduate Level Courses

Fall 2008: Prairie View A&M University
HLTH 1063 – Environmental Health
HUPF 2063 – Outdoor Performance Activities
HUPF 4063 – Measurement and Evaluation for Physical Educators

Spring 2008: Oklahoma State University
HHP 4902 – Pre-Internship Seminar
HHP 2712 – Psychomotor Development

Fall 2007: Oklahoma State University
HHP 4902 – Pre-Internship Seminar
HHP 3613 – Community Health

Fall 2004 to 2007: Oklahoma State University
HHP 2603 – Total Wellness

Fall 2004 to Spring 2005: Oklahoma State University
HHP 1812 – Pedagogy of Outdoor Activity
HHP 1842 – Pedagogy of Fitness and Wellness
HHP 3010 - Physical Education for Elementary Teachers

High School Level Courses

Fall 2001 to May 2004: New Braunfels ISD, New Braunfels, TX
8th grade Language Arts
8th grade Physical Education

WORK EXPERIENCE:

Prairie View A&M University Department of Health and Human Performance

Assistant Professor August 2008 – Present

- Plan and supervise semester long courses
- Implement syllabus, curriculum, assignments, class activities, and grading associated with courses taught
- Collaborate with other faculty members in research
- Develop materials to assist faculty and staff with evaluation methods and curriculum review for courses.

Oklahoma State University Department of Health and Human Performance

Graduate Associate September 2004 – May 2008

- Plan and supervise semester long courses
- Implement syllabus, curriculum, assignments, class activities, and grading associated with courses taught
- Collaborate with other graduate students teaching same courses
- Develop materials to assist faculty and staff with evaluation methods and curriculum review for courses.
- Consult with faculty and staff in the selection, design, production, and implementation of material to be covered in courses.

New Braunfels ISD, New Braunfels Middle School and High School

Football and Head Track Coach September 2001 – May 2004

- Supervised and instructed athletes in corresponding sports during their respected seasons
- Initiated off-season conditioning program at Middle School
- Supervised and collaborated with track coaches during track season
- Planned and conducted two track meets at NBISD including the district meet

- Communicated with parents on the athletes' performance
- Obtained Class B driving license to transport athletes on school bus

New Braunfels ISD, New Braunfels Middle School

Language Arts and Physical Education Instructor September 2001 – May 2004

- Planned and supervised year long courses in honors language arts
- Supervised during physical education course
- Planned and implemented year long curriculum based on Texas Essential Knowledge and Skills
- Consulted with faculty and staff in the selection, design, production, and implementation of materials to be covered in courses.
- Initiated and enforced effective discipline policy within classroom
- Conducted parent/teacher meetings to evaluate students' performances

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PUBLICATIONS:

Vassar, M**.** & **Hale, W**. (2006). Reliability reporting in youth life satisfaction research. *Social Indicators Research.*

Vassar, M**.** & **Hale, W**. (In Press). Reliability reporting across studies using the Buss Durkee Hostility Inventory.

CONFERENCE PRESENTATIONS:

National Conferences:

Vassar, M. & **Hale, W**. (2008) Life satisfaction in college students: A Q-study. Presented at the 2008 Annual Conference for the American Psychological Association (APA).

Kensinger, W., Divin, A., & **Hale, W.** (2009). Differences in B.A.C. of college students by campus residence. Accepted for presentation at the Annual Meeting of the American Association of Health Educators (AAHE).

Hale, W. (2006). Regular, moderate exercise lessens frequency of episodes of lone atrial fibrillation in active adult male. Accepted for presentation at the 2006 Annual Meeting of the American College of Sports Medicine (ACSM) National Convention, Denver, CO.

Hale, W. (2006). Affective state response to stretching before an acute bout of exercise. Accepted for presentation at the 2006 Annual Meeting of the American Psychological Association (APA) National Convention, New Orleans, LA.

Hale, W., Vassar, M., Miller, B., Kensinger, W., & Divin, A. (2008). Examining the prevalence of muscle dysmorphia in a physically active college female population. Accepted for presentation at the 2008 Annual Meeting of the American College of Sports Medicine (ACSM) National Convention, Indianapolis, IN.

Hale, W. & Vassar, M. (2007). A psychometric comparison of three muscle dysmorphia inventories. Accepted for presentation at the 115th Annual Convention of the American Psychological Association (APA), San Francisco, CA.

Vassar, M. & **Hale, W.** (2007**)** A psychometric assessment of the Multidimensional Media Influence Scale. Accepted for presentation at the 115th Annual Convention of the American Psychological Association (APA), San Francisco, CA.

Vassar, M. & **Hale, W. (**2007**)** The relationship between gender role and the drive for muscularity. Accepted for presentation at the 115th Annual Convention of the American Psychological Association (APA), San Francisco, CA.

Dodson, K., Vassar, M., **Hale, W**., & Hale, H. (2006) A reliability generalization study of the Impact of Event Scale. Accepted for presentation at the 2007 Annual Meeting of the American Educational Research Association (AERA), Chicago, IL.

Dodson, K., Vassar, M., **Hale, W.**, & Hale, H. (2007). Reliability reporting practices of the Impact of Event Scale. Accepted for presentation at the National Association of School Psychologists (NASP) National Convention, New York City, NY.

Regional Conferences:

Hale, W. & Vassar, M. (2008). Current trends in muscle dysmorphic research. Accepted for presentation at Oklahoma State University Annual Research Symposium, Stillwater, OK.

Divin, A., Kesinger, W., **Hale, W**. (2008) Differences in alcohol consumption between Greek and Non-Greeks. Presented at the Annual Meeting of the Southwest College Health Association (SWCHA).

Kensinger, W., **Hale, W**., Divin, A, & Miller, B. (2008). College students' perceptions of smoking prior to a tobacco-free campus-wide initiative. Presented at the Annual Meeting of the Southwest College Health Association (SWCHA).

CURRENT WORKS IN PROGRESS:

Self esteem, media exposure, and physical appearance comparison as predictors of drive for muscularity among college students (Vassar, M. & **Hale, W.**) [Data collection in progress]

The relationship between structural dimensions of muscularity and sex role (Vassar, M. **Hale, W.,** & Choi, N.)

A psychometric comparison of three muscle dysmorphia inventories. (**Hale, W.** & Vassar, M.) [Data collection in progress]

Muscle dysmorphia in body builders: A qualitative investigation (Vassar, M. & **Hale, W**.) [data collection in progress]

The influence of a behavior change project on life satisfaction, personal growth interest, and locus of control (**Hale, W**. & Vassar, M.) [Data collection in progress]

Subjective constructions of life satisfaction among college students: A Q method study (**Hale, W**. & Vassar, M.) [Data collection in progress]

Ozonide embrocation increases time to exhaustion in a staged cycling protocol. (**Hale, W**., Divin, A., & Smith, D.) [Data collection in progress]

Examining the prevalence of body dysmorphia in active females. (Vassar, M., Hale, W., & Kesinger, W.) [Data collection in progress]

A psychometric evaluation of the SATA-Q: An examination of construct validity. (Vassar, M.., **Hale, W**., & Kensinger, W.) [Data collection in progress]

Prevalence of Meta-Analytical reviews in health promotion journals. (**Hale, W**., Divin, A., & Kensinger, W.) [Data collection in progress]

PROFESSIONAL AFFILIATIONS:

American College of Sports Medicine
American Psychological Association: Division 47 Member
American College Health Association
Association of Texas Professional Educators

SERVICE ACTIVITIES:

Prairie View A&M University
- Supervise research teams
- Mentor students interested in research

Oklahoma State University
- President Graduate Student Organization in Health and Exercise

Oklahoma State University College of Education
- Member Faculty Search Committee in Health Promotions

Oklahoma State University Cycling Club
- Trail Advocacy Volunteer

Tulsa Wheelman Bicycle Race Team
- Community Cycling Project Volunteer
- Monthly Newsletter Contributor

HONORS:

2007 Betty Abercrombie Memorial Scholarship Recipient- Oklahoma State University
2006 A.B. Harrison Scholarship Recipient – Oklahoma State University
2006 Member Phi Kappa Phi National Honor Society
1996-2001 Cauthorn Scholarship Recipient – Angelo State University

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OTHER ACTIVITIES:

United States Cycling Federation
- Professional Cyclist- Road
- Professional Cyclist- Cyclocross

United States Triathlon Association
- Elite Athlete - Duathlon
- World Championship Qualifier- Duathlon

Name: William Davis Hale Date of Degree: December 2008

Institution: Oklahoma State University Location: Stillwater, Oklahoma

Title of Study: SCALE DEVELOPMENT IN MUSCLE DYSMORPHIA

Pages in Study: 123 Candidate for the Degree of Doctorate of Philosophy

Major Field: Health and Human Performance

Scope and Method of Study: The purpose of this study was to develop a scale in muscle dysmorphia (MD) using sound scale developmental techniques as presented in the literature. Eight steps were used in this process. They are as follows, generating an item pool representative of the dimensions from three models of MD, presenting a Likert type set of items to selected Subject Matter Experts (SME), generating a revised set of items following review from SME's, administration to a college population of male and female students ages 18-25 (n = 823), exposing data to an exploratory factor analysis, and finalizing a scale following review of statistical exposure, i.e. factor loadings and reliability.

Findings and Conclusions: An 85-items scale was developed from the eight steps listed above. The name of this new scale is Hale's Scale (HAS). The overall alpha for this new scale is .912. Nine dimensions of muscle dysmorphia were retained for the final instrument. This study is exploratory in nature. Future research is needed to determine convergent validity, sample reliability with various populations, and measurement invariance.

ADVISER'S APPROVAL: Dr. Steve Edwards