

MUSCLE DYSMORPHIA, BODY DISATISFACTION,  
AND EATING ATTITUDES IN COLLEGIATE-AGED  
MALE AMATEUR WEIGHTLIFTERS

By

JAMISON WILLIAMS

Bachelor of Science in Nutritional Science

Oklahoma State University

Stillwater, Oklahoma

2011

Submitted to the Faculty of the  
Graduate College of the  
Oklahoma State University  
in partial fulfillment of  
the requirements for  
the Degree of  
MASTER OF SCIENCE  
December, 2013

MUSCLE DYSMORPHIA, BODY DISSATISFACTION, AND EATING  
BEHAVIORS IN COLLEGIATE-AGED AMATEUR MALE WEIGHTLIFTERS

Thesis Approved:

Dr. Lenka Shriver

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Thesis Adviser

Dr. Nancy Betts

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Dr. Doug Smith

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## ACKNOWLEDGEMENTS

Thanks to Jesus Christ, who allows all things to be possible through him. Thank you to my parents for their continued support of my education. A special thanks to all of my committee members (Dr. Shriver, Dr. Betts, and Dr. Smith) for all of their input and patience on this project. Also, thank you to my wife for her continued support of my education and the handsome new addition to our family, Bennett.

Acknowledgements reflect the views of the author and are not endorsed by committee members of Oklahoma State University.

Name: JAMISON WILLIAMS

Date of Degree: DECEMBER, 2013

Title of Study: MUSCLE DYSMORPHIA, BODY DISSATISFACTION, AND EATING BEHAVIORS OF COLLEGIATE-AGED MALE AMATEUR WEIGHTLIFTERS

Major Field: NUTRITIONAL SCIENCE

Abstract: Muscle Dysmorphia (MD) is a growing problem in men in western society. Although the causes of MD remain unknown, this condition is most prevalent among men engaging in competitive bodybuilding and weightlifting. However, there is a lack of studies with younger recreational male weightlifters and bodybuilders. The purpose of this study was to examine prevalence of signs and symptoms of MD and disordered eating among young college-aged males. A convenience sample (n=38) of male members of the university weightlifting club agreed to participate in this study. Height, weight, and body fat were measured and used to calculate Body Mass Index and Fat-Free Mass Index. Participants also completed a survey packet that included the Muscle Dysmorphia Disorder Inventory (MDDI), Eating Attitudes Test (EAT), and Bodybuilder Image Grid (BIG). A cutoff score of 39 on the MDDI was used to classify study participants as dysmorphic or non-dysmorphic. A score of 11 on the EAT was used to classify study participants as 1) having signs of disordered eating and 2) no signs of disordered eating. The BIG, which is a grid of males varying in muscularity and body fat levels, was scored on both desired changes in muscularity and body fat. MDDI and EAT scores had a positive significant association ( $r=.50$ ,  $p<0.01$ ). Driver for Size, Appearance Intolerance, and Functional Impairment subscales of the MDDI and Dieting, Bulimia and Food Preoccupation, and Oral Control Subscales of the EAT had positive significant associations. Subjects classified as “dysmorphic” based on the MDDI scores had significantly higher scores on the EAT than “non-dysmorphic” subjects. Regression analysis revealed that two MDDI items 12 “I feel depressed when I miss one or more workouts days” and 1 “I think my body is too small” accounted for 80.1% of the variance of MDDI scores. This study suggests that collegiate-aged males involved in recreational weightlifting may be at higher risk for developing MD and patterns of disordered eating than previously believed.

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## CHAPTER I

### INTRODUCTION

Muscle Dysmorphia (MD) is a body image disturbance in which individuals with above average muscle mass perceive themselves as lacking significant muscle mass (Pope et al., 1993). The presence of muscle dysmorphia (MD) has been an increasing problem for males engaging in resistance training (Pope et al. 1993). There are many potential reasons for this rise in body image disturbance, but perhaps none as prominent and impactful as the images depicted of males in popular Western culture (Pope, 1999). Due to the lack of proper diagnostic criteria, there is currently a push in the field of psychology for the classification of MD as an eating disorder along with anorexia nervosa and bulimia nervosa (Nieuwoudt et al., 2012).

Due to the nature of sport and competition, the most heavily researched population for MD has been middle aged (25-40 years old) male bodybuilders (Nieuwoudt et al., 2012). The onset of MD symptomology has been shown to occur during collegiate years (Olivardia et al., 2000). While certain aspects of MD can be seen in a variety of leanness or weight-based sports, the prevalence of MD remains highest in bodybuilders (Ravaldi et al., 2003). However, due to sufferers of MD being disgusted with their own body image, the desire to compete may not be present. This has given rise

to the possibility MD being present in amateur weightlifters in rates similar to competitive bodybuilders.

There has been a variety of assessment tools used to screen for the presence of MD (Nieuwoudt et al., 2012). One common tool of assessment is the Muscle Dysmorphic Disorder Inventory (MDDI) (Hildebrandt et al., 2004). The MDDI is a 13-item questionnaire that contains three subscales that directly relate to MD: “drive for size,” “appearance intolerance”, and “functional impairment” (Hildebrandt et al., 2004). The drive for size subscale is used to measure the desire to increase muscle mass (Hildebrandt et al., 2004). The appearance intolerance subscale is used to measure the desire to lose fat mass (Hildebrandt et al., 2004). The functional impairment subscale is used to measure avoidance of social situations (Hildebrandt et al., 2004).

Because MD is a body image disorder, body dissatisfaction generally presents itself. In order to gauge the level of body dissatisfaction, the Bodybuilder Image Grid (BIG) was created (Hildebrandt et al., 2004). The BIG contains 30 images of varying muscle and fat mass (Hildebrandt et al., 2004). Body images increasing in fat mass make up the horizontal grid (Hildebrandt et al., 2004). The vertical grid shows body images increasing in muscle mass and called the Fat Free Mass Index (FFMI) (Hildebrandt et al., 2004). The FFMI was created to assess levels of musculature based on height, weight, and body fat percentage (Kouri et al., 1995).

In order to improve perceived body image, individuals with MD may try to alter their diet in a drastic manner. This could potentially lead to the development of disordered eating, as disordered eating is more prevalent in athletes who focus on leanness or weight (Rosendahl et al., 2009). In order to assess eating behaviors in MD sufferers, an eating behaviors survey such as the Eating Attitude Test (EAT) with three



subscales of “dieting,” “bulimia” and “food preoccupation” may be administered (Garner et al., 1982).

Given the general lack of research related to MD in male populations and the timing of MD onset in early adulthood, the purpose of this study was to determine the prevalence of MD in a sample of college-aged amateur weightlifters and to examine their eating attitudes and body image perceptions related to body fat and lean body mass.

## CHAPTER II

### REVIEW OF LITERATURE

Muscle dysmorphia (MD) is a form of mental body distortion in which an individual becomes obsessed with increasing lean body mass (Pope et al., 1997). Although MD is not directly classified as an eating disorder, symptoms of disordered eating are often seen in afflicted individuals (Murray et al., 2012). Unlike other eating disorders, such as anorexia nervosa and bulimia nervosa, the preoccupation with food seen in MD is geared towards weight gain to increase muscle size rather than weight loss (Pope et al., 1997). MD was first characterized as a “reverse anorexia”, as the individual’s distorted mental image was that of being too small or lacking enough musculature (Pope et al., 1993). While eating disorders, such as anorexia and bulimia, affect mostly women, most individuals characterized with MD are males. The primary symptom of MD is excessive exercise with disordered eating being a secondary symptom (Pope et al., 1997). In this manner, MD could not be solely classified as an eating disorder. Individuals with MD believe they have inadequate lean body mass and they typically engage in resistance training multiple times every week, some even multiple times per day.

The proposed diagnostic criteria for MD include at least two of the following items: skipping social events or other activities in order to maintain diet and workout schedule; anxiousness or complete avoidance of instances where the body is exposed, such as swimming pools, lakes, or beaches; impaired ability to function at work or social events due to the constant thoughts of inadequate body size; the use of performance-enhancing drugs and extreme diets are used even though potential dangers are known to the individual (Pope et al., 1997). Many activities, such as relationships with friends and sexual partners also suffer because of the self-conscious aspect associated with MD (Mosley, 2000).

### **Prevalence of MD**

In terms of the presence of MD in sports, there is perhaps no greater prevalence than in the sport of bodybuilding. Although there are other sports that would place athletes at risk, none require as much enhanced muscularity and leanness to be competitive as does bodybuilding. Due to the nature of competition, it is not uncommon for a bodybuilder with MD to diet to extremely low body fat levels, similar to an individual with anorexia, while still engaging in vigorous resistance training sessions in an effort to increase muscle mass (Parkinson et al., 2006). Many bodybuilders find themselves trying to obtain physiques that are not genetically possible for them to obtain. This is one reason for the increase in anabolic steroids among this athletic population (Dawes et al).

Research has shown the average age of onset for MD to be between 19 and 20 years of age (Olivardia et al., 2000). However, most research involving MD has been conducted with middle age males (Nieuwoudt et al., 2012). Many men who have MD also have a history of eating disorders ranging from anorexia to binge-eating (Olivardia et

al., 2000). Nearly half of all weightlifting men reported using anabolic steroids compared to less than 10% of a control population (Olivardia et al., 2000). The average onset for the use of anabolic steroids in this population was 20 years of age (Olivardia et al., 2000). Nearly half of the weightlifting group reported not liking their body image, compared to only 20% of the control population (Olivardia et al., 2000). Males with MD reported that they had worse relationships with their mothers and that mother-father violence occurred more frequently than did their control counterparts (Olivardia et al., 2000). There are also other potential factors for the development of MD that include sport participation, perfectionism, internalization of ideal body image, low self esteem, body dissatisfaction, and body distortion (Grieve, 2007).

### **Assessment of MD**

The Muscle Dysmorphia Disorder Inventory (MDDI) is a 13 question self-administered survey used to assess the presence of MD (Hildebrandt et al., 2004). The MDDI is divided into three subscales: drive for size, appearance intolerance, and functional impairment (Hildebrandt et al., 2004). The drive for size subscale encompasses questions concerning a perceived lack of strength or musculature and the desire to increase muscular appearance (Hildebrandt et al., 2004). The appearance intolerance subscale includes questions about negative body ideals, anxiety caused by a perceived lack of musculature, and avoidance of exposing the body (Hildebrandt et al., 2004). The functional impairment subscale consists of questions related to exercise behaviors and avoidance of social interactions or gatherings (Hildebrandt et al., 2004). The MDDI has been shown to correlate with many other tests that correspond to individuals with MD, such as body dissatisfaction,

presence of eating disorders and patterns of disordered eating, and other questionnaires (Hildebrandt et al., 2006).

The majority of individuals surveyed for the presence of MD are either middle-aged weightlifters or competitive bodybuilders (Nieuwoudt et al., 2012). The MDDI has been also used in studies that included anabolic steroids users and non-users (Hildebrandt et al., 2006).

Many men with MD have an altered mental body image. This altered mental body image can result in extreme body dissatisfaction in individuals who present with MD. Previous research on recreational weightlifters has shown higher levels of body dissatisfaction than control groups of similar age ( $27.7 \pm 7.53$  and  $27.8 \pm 7.45$  respectively) (Babusa et al., 2012). Male weightlifters were recruited from local fitness centers and an age-matched group of undergraduate students were recruited as a control group (Babusa et al., 2012). When compared to the undergraduate student control group, male recreational weightlifters had significantly higher levels of MD, significantly higher ideal body weights, significantly higher Body Mass Indices, and significantly higher levels of body dissatisfaction (Babusa et al., 2012). Male bodybuilders have also shown levels of body dissatisfaction more comparable to the general female population than the general male population (Ravaldi et al., 2003).

The Bodybuilder Image Grid (BIG) is an assessment tool used to measure body dissatisfaction in males (Hildebrandt et al., 2004). The BIG was designed to assess perceived disturbances in body image in males (Hildebrandt et al., 2004). It also measures the perceived attractiveness to both males and females (Hildebrandt et al., 2004). The BIG contains 30 images that vary in muscularity and body fat (Hildebrandt et al., 2004). Test subjects answer four questions: their current image,

their ideal body image, the body image most attractive to males, and the body image most attractive to females (Hildebrandt et al., 2004). Ideal body image from the BIG has been significantly related to the drive for size subscales of the MDDI (Hildebrandt et al., 2006).

In order to help gauge MD from a more scientific standpoint, the Fat-Free Mass Index (FFMI) was created to gauge muscularity (Kouri et al., 1995). This equation involves the subject's height, weight, and approximate body fat percentage (Kouri et al., 1995). The equation yields a number that correlates to the muscularity of the individual: a score of 16 corresponds to a lack of muscle or a large amount of fat, a score of 20 corresponds to an average build, and a score of 23 corresponds to a noticeable high level of muscularity (Kouri et al., 1995). It is believed by researchers to be impossible to have a FFMI score of greater than 26 without the use of anabolic steroids (Kouri et al., 1995). One limitation of this tool is that it was only developed for use in males (Pope et al., 1997).

### **Development of MD**

There are currently many ideas about the etiology of MD. There are many potential influences, but three main hypotheses prevail (Pope et al., 1997). The first is the presence of psychological disorders, such as obsessive-compulsive disorder, eating disorders, and mood disorders that somehow predispose individuals to developing MD (Pope et al., 1997). This is due to the nature of such disorders, which present a distortion of an individual's body perception, thus making weight training a tool for reaching an unattainable physique.

The second hypothesis deals with changing cultural values. In a similar manner to the depiction of thin females in media and print, there has been an increase in

males with enhanced muscularity (Pope et al., 1997). Along with the media, toy companies have continually increased the muscularity of popular male action figures, such as GI Joe and Star Wars characters, from the 1970s to the present (Pope et al., 1999). In cinema, old Hollywood stars, such as James Dean and Steve McQueen, lack the muscularity of today's action stars. Thus, there is cultural pressure on boys and men to be bigger and more muscular than in the past decades (Pope et al., 1999). This has led to an increase in the frequency in which males engage in resistance training and an increased risk for MD.

The third proposed hypothesis is centered on the greater availability of anabolic steroids; however, it has met with some criticism (Pope et al., 1997). There are many men who exhibit symptoms of MD and have never used anabolic steroids. One important question to ask is if an increase in the availability of anabolic steroids is causing an increase in MD or if individuals with body dysmorphic disorders are turning to steroids more frequently. In more simple terms, it is difficult to determine the direction of the relationship between anabolic steroids and symptoms of MD.

Due to the nature of this disorder, male weightlifters are a high-risk population. This includes both competitive and noncompetitive bodybuilding populations. Estimates from previous research have shown that at least 10% of male weightlifters have shown symptoms of MD (Pope et al., 2000). However, there are more than 2 million men in the United States that have claimed steroid use, which is one of the hallmark signs of MD (Pope et al., 2000). It is difficult to gauge the actual prevalence of the disorder because many individuals who suffer from MD do not view it as a problem or are hesitant to disclose this issue.

## **Muscle Dysmorphia and Eating Disorders**

When compared to individuals with anorexia, individuals with MD have a significantly greater body mass index (BMI) (Murray et al., 2012). This is not surprising as the view of food between the two groups is in stark contrast. Individuals with anorexia view food as harmful and causing them to gain weight, whereas individuals with MD view food as a necessary tool to increase muscle size. Men with MD and anorexia both score higher than control groups in response to weight concerns (Murray et al., 2012). This is also not surprising, although the thoughts of individuals with MD are on gaining weight while the individuals with anorexia are concerned with weight loss. One major difference between individuals with anorexia and those with MD is the use of ergogenic aids for the purpose of increasing physical appearance. Research has shown that up to 90% of men with MD have used some form of appearance enhancing substance, including steroids (Murray et al., 2012). Since there are so many common characteristics between MD and anorexia, the research does support the call for MD to be classified as an eating disorder. The major hurdle for classifying MD as an eating disorder is that the primary issue deals with excessive exercise with a secondary emphasis on food. Current eating disorders, such as anorexia and bulimia, have a primary issue with food.

However, there are similarities between MD and currently classified eating disorders. Both MD and anorexia begin with distorted body image. Both of these self-assessments are usually incorrect in their respective disorders. MD would seem to be the most similar to anorexia athletica. In these two disorders, there is a difference between primary and secondary symptoms. In anorexia athletica, the primary symptom is disordered eating while the secondary symptom is excessive exercise. In MD, it is the opposite (Mosley, 2009). Another similarity between anorexia and MD is the desire for leanness and the hatred of excess adiposity. At its more extreme, individuals with MD



will not eat at restaurants, due to the desire to have complete control of what is being consumed (Mosley, 2009).

### **Assessment of Disordered Eating in Males**

Since MD is not classified as a clinical eating disorder and most eating disorder research has been focused on anorexia nervosa (AN) and bulimia nervosa (BN), traditional assessment tools for AN and BN may not be appropriate for MD. However, there are other assessment tools that measure broader food- and weigh-related behaviors and can be utilized to detect signs and symptoms of eating disorders in MD. One such screening tool is the Eating Attitudes Test (EAT). The EAT was originally designed as a 40-question (EAT-40) survey to screen for the prevalence of AN (Garner et al., 1979). Questions were based on a 6-point Likert scale and responses were weighted as 1, 2, or 3, with a higher score being more indicative of an anorexia-like behavior (Garner et al., 1979). In the EAT-40, questions could be grouped into 7 different categories: 1) food preoccupation, 2) body image for thinness, 3) omitting and laxative abuse, 4) dieting, 5) slow eating, 6) clandestine eating, and 7) perceived social pressure to gain weight (Garner et al., 1979). An EAT-40 score greater than 30 was to be indicative of anorexia nervosa (Garner et al., 1979). Through careful analysis, the total numbers of survey questions on EAT-40 were reduced.

Similar to EAT-40, a modified version of EAT has been developed with 26 items and three subscales (Garner et al., 1982). The subscales reveal more about eating disorders and patterns of disordered eating than simply a focus on anorexia. The subscales are dieting, bulimia and food preoccupation, and oral control (Garner et al., 1982). Scores on the EAT-26 of individuals suffering from a diagnosed eating disorder

were highly correlated with scores on EAT-40 (Garner et al., 1982). An EAT-26 score of 11 has been suggested as a newly designated cutoff (Orbitello et al., 2006).

Previous research has indicated that certain athletes may be at a higher risk of suffering from eating disorders and patterns of disordered eating. In a study of German high school aged athletes, participants competing in weight class or aesthetic based sports had significantly higher scores on the EAT when compared to athletes competing in endurance based sports (Rosendahl et al., 2009). There seems to be a higher risk for the development of eating disorders and patterns of disordered eating in athletes competing in sports that involve leanness as a portion of the competition compared to when it does not (Rosendahl et al., 2009). In a study of high school wrestlers, participants' lowest average scores on the EAT was during in-season ( $7.3 \pm 1.4$ ) and the highest average scores were during the off-season ( $8.9 \pm 1.9$ ) (Shriver et al., 2009). Similarly, in a study of female collegiate athletes, participants involved in aesthetic based sports scored significantly higher on the EAT ( $13.5 \pm 10.9$ ) than participants involved in endurance ( $10.0 \pm 9.3$ ) or anaerobic ( $9.9 \pm 9.0$ ) based sports (Beals et al., 2002). In this sense, athletes competing in sports such as bodybuilding, powerlifting, and Olympic lifting could potentially have a higher risk of disordered eating due to restrictions in weight classes.

It would seem that non-competitive bodybuilders have a lower prevalence of eating disorders than their competitive counterparts. In a study involving recreational weight lifters and ballet dancers, recreational weightlifters (age  $28.3 \pm 7.3$  years) eating disorder assessment did not differ from that of an age adjusted control male group ( $28.3 \pm 6.8$  years) (Ravaldi et al., 2003). However, none of the participants from the recreational weight lifting group satisfied requirements for MD (Ravaldi et al., 2003).

Although these recreational weightlifters do not suffer from a specific eating disorder, there is evidence that they suffer from higher levels of body dissatisfaction than their age-adjusted male counterparts (Ravaldi et al., 2003).

In athletes competing in weight class sports, the EAT has been shown to significantly positively correlate with body dissatisfaction (Filaire et al., 2011). In a study of judoists, participants with disordered eating patterns had significantly higher levels of body dissatisfaction than their non-disordered counterparts (Filaire et al., 2011). This is an important indicator as athletes competing in leanness or weight based sports tend to have higher levels of body dissatisfaction compared to athletes in non-weight class or leanness based sports. In a sample of natural competitive bodybuilders, 39% of study participants reported being preoccupied with food often or always (Andersen et al., 1995). This data was collected at a natural bodybuilding competition from subjects in their mid-twenties ( $26.4 \pm 0.92$  years) using a questionnaire designed to view challenges faced by wrestlers (Andersen et al., 1995). This form of resistance training based competition requires competitors to diet very rigorously in order to present a nearly flawless physique for judging. The results of food preoccupation are not surprising, as the sport of natural bodybuilding does not allow the use of certain ergogenic aids such as anabolic steroids, growth hormone, or prohormones. Thus study subjects main tool for contest preparation is strict adherence to diet.

Given that most current literature on MD is very limited and most existing studies come from samples of middle-aged, competitive bodybuilders, the purpose of this study was to examine the prevalence of MD and assess body dissatisfaction and eating attitudes in a sample of male college students involved in a recreational-level weight lifting.

## CHAPTER III

### METHODOLOGY

A convenience sample of males from undergraduate and graduate student populations who were members of the Oklahoma State University Weightlifting Club were recruited for the study. The club was comprised of amateur weightlifters, and most members had been engaged in some type of resistance training before beginning college. Potential volunteers were informed about the study during one of the regular club meetings. The Principal Investigator (PI) explained the study to potential subjects, along with the potential risks and benefits of participation and answered any questions subjects had about the study. The written informed consent form served as a recruitment script for the subjects during the meeting. Written informed consent forms were provided to the potential subjects during the meeting and interested subjects were asked to sign the form before the end of the meeting. The study was conducted between March and May 2013. All the study procedures were reviewed and approved by the Institutional Review Board of Oklahoma State University prior to any data collection.

After signing the written informed consent forms, all study participants completed three self-reported surveys: 1) Muscle Dysmorphic Disorder Inventory (MDDI); 2) Bodybuilding Image Grid (BIG); 3) Eating Attitudes Test (EAT). The total possible score on the MDDI ranges from 13 to 65 (Murray et al., 2012) (Appendix A). Previous

research using the MDDI in a clinically diagnosed sample of men with MD, a mean score of 52 $\pm$ 6.72 was reported (Murray et al, 2012). A cut-off score for the MDDI of 39 was designated for the current study, as 2 standard deviations below the mean score of 52. Thus, participants with a score greater than 39 on the MDDI were classified as subjects with MD symptoms for the purpose of the study. The three MDDI subscales have previously shown good reliability (Cronbach's  $\alpha$ =.77-.85) (Hildebrandt et al., 2004).

The BIG consists of 4 questions about the current body image, ideal body image, body image desired by most men, and body image most desired by females (Hildebrandt et al., 2004) (Appendix C). A discrepancy index was created to score body dissatisfaction measured by BIG. The index accounts for desired body fat by subtracting ideal fat scores from current fat scores (Hildebrandt et al., 2004). The index also accounts for desired muscle mass by subtracting current muscle from ideal muscle (Hildebrandt et al. 2004). Any changes from desired fat or muscle greater than "0" on the BIG resulted in participants being classified as "dysmorphic" or "non-dysmorphic" for either fat or muscle.

In addition to the MDDI and BIG, subjects completed the EAT. The EAT consists of 26 items related to behaviors and aspects of food and weight-related issues (see Appendix B). The EAT has previously been used as a screening tool to assess the presence of eating disorders in various populations (Garner et al., 1982). While a score of 20 has been traditionally used for identifying signs and symptoms of eating disorders (references), more recent research suggests that a score of 11 on the EAT is an appropriate cutoff for identifying individuals with signs and symptoms of eating

disorders in high-risk populations (Orbitello et al., 2006). Therefore, the cut off of 11 was used in the current study.

Study participants were given a packet of containing the MDDI, BIG, and EAT questionnaires. In addition to the MDDI, BIG, and EAT surveys, study participants from the weightlifting club population were measured for height, weight, and body fat using the Jackson-Pollock 3-site skin fold test for males (Jackson et al., 1978). A trained Health and Human Performance (HHP) Lab Assistant measured skinfolds on the chest, abdomen, and thigh of study participants twice. The average of the two measurements were used to calculate body fat percentage and Fat-Free Mass Index (FFMI). The PI measured height using a Detecto model 3P7044 stadiometer in the HHP lab. Study participants were required to remove their shoes for height measurements. Weight was measured using the scale in the HHP lab. Participants removed shoes and excess clothing except t-shirts and shorts. Height, weight, and body fat measurements were used to calculate Body Mass Index (BMI) and FFMI. Participants were also asked to disclose the duration they had been engaging in resistance training at the end of the survey packet.

### **Statistical Analyses**

The primary purpose of this study was to determine the prevalence of MD in a sample of college-aged recreational weightlifters. The secondary purpose of this study was to examine eating attitudes and body perceptions of the subjects and to determine whether significant correlations between MD prevalence, body dissatisfaction, and eating patterns existed in the sample. All statistical analyses were conducted using the Statistical Package for Social Sciences (SPSS; version 19.0, Windows). The sample was described

in terms of demographic, anthropometric, muscle dysmorphic, dietary and exercise characteristics using means and standard deviations, frequencies, and percentages. The proportion of subjects suffering from MD, signs and symptoms of disordered eating, and body dissatisfaction were determined using previously established cutoffs for each research tool used in the study (i.e., MDDI, EAT, and BIG). The cut off of  $\geq 39$  on MDDI was used to categorize subjects as 1=dysmorphic or 2=not dysmorphic (Murray et al., 2012). The cut off of  $\geq 11$  on the EAT was used to categorize subjects as 1=eating disordered or 2= non-eating disordered (Orbitello et al., 2006). The cut off of  $\geq 1$  on the BIG-Fat and BIG-Muscle was used to categorize subjects as 1=dysmorphic or 2=not dysmorphic (Smith et al., 2011). Bivariate correlations were used to determine whether significant associations between MDDI scores, EAT scores and BIG scores existed in the sample of college-aged weight lifters. Independent t-tests were performed to identify potential differences in eating attitudes between dysmorphic and non-dysmorphic subjects. Regression analysis was performed on all items for the MDDI to examine which items explained the greatest variance in the total scores. The p-value for all statistical analyses was set at  $p < 0.05$ .

## CHAPTER IV

### RESULTS

A total of 38 college-aged males agreed to participate in the study and completed all the measurements. The demographic and anthropometric characteristics of the sample are presented in Table 1. The total mean scores of the MDDI and its subscales and the EAT and its subscales are presented in Table 2.

Table 1. Demographic and anthropometric data of the male weightlifters in the sample (n=38)

	<b>Mean</b>	<b>Std. Dev.</b>
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<b>Age (years)</b>	22.6	2.4
<b>Height (m)</b>	1.76	0.06
<b>Weight (kg)</b>	83.2	17.5
<b>Body Fat %</b>	13.4	5.3
<b>Body Mass Index<sup>1</sup></b>	27.5	3.5
<b>Fat-Free Mass Index<sup>2</sup></b>	23.9	2.6
<b>Training Duration (months)</b>	57.3	39.2

<sup>1</sup>Body Mass Index (BMI)=calculated as weight (kg)/height (m)<sup>2</sup>

<sup>2</sup>Fat Free Mass Index (FFMI) = [W(kg)(1-Body Fat/100)/Height<sup>2</sup>(m)] +[6.1(1.8-Height (m))]

Table 2. Total scores for MDDI and EAT including subscales

	<b>Mean</b>	<b>Std. Dev.</b>
<b>MDDI Score<sup>1</sup></b>	35.3	9.2
<b>Drive for Size</b>	15.1	5.8
<b>Appearance Intolerance</b>	8.5	4.2
<b>Functional Impairment</b>	11.6	5.1
<b>Total EAT Score<sup>2</sup></b>	10.8	7.6
<b>Dieting Subscale</b>	6.3	9.6
<b>Bulimia and Food Preoccupation Subscale</b>	2.0	3.7

<b>Oral Control Subscale</b>	2.5	4.5
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<sup>1</sup>MDDI scores can range from 13-65, with scores higher than 39 being indicative of MD symptoms.

<sup>2</sup> EAT scores can range from 0-78; Drive for Size Subscale Scores range from 5-25; Appearance Intolerance Subscale Scores range from 4-20; Functional Impairment Subscale Scores range from 4-20; Dieting Subscale Scores range from 0-39; Bulimia and Food Preoccupation Subscale Scores range from 0-18; Oral Control Subscale Scores range from 0-21

According to scores on the BIG, a total of 24 participants desired an increase in current muscle mass. Similarly, 23 desired a decrease in body fat at the time of the study. Thirteen participants desired a concurrent increase in muscle mass along with a decrease in fat mass.

Using a cut off score of 39 for the total MDDI score, 15 participants were classified as “dysmorphic” and 23 participants were classified as “not dysmorphic”. A comparison of these groups revealed that dysmorphic participants had significantly higher scores on the EAT than non-dysmorphic participants ( $p=0.018$ ). Dysmorphic participants also had significantly higher scores on the Drive for Size ( $p<0.001$ ), Appearance Intolerance ( $p=0.017$ ), and Functional Impairment ( $p<0.001$ ) subscales. Dysmorphic participants had significantly higher scores on the EAT Dieting subscale ( $p=0.011$ ).

Table 3. Pearson Correlations between Variables related to Anthropometric Data

	<b>Weight (kg)</b>	<b>Chest SF (mm)</b>	<b>Abdomen SF (mm)</b>	<b>Thigh SF (mm)</b>	<b>BF%</b>	<b>BMI</b>	<b>FFMI</b>
<b>Weight (kg)</b>	1	.368*	.558*	.387*	.517*	.876**	.661**
<b>Chest SF<sup>1</sup> (mm)</b>	.368*	1	.821**	.670**	.915**	.421**	.016
<b>Abdomen SF (mm)</b>	.558*	.821**	1	.620**	.936**	.572**	.132
<b>Thigh SF (mm)</b>	.387*	.670**	.620**	1	.821**	.428**	.044
<b>BF%</b>	.517*	.915**	.936**	.821**	1	.555*	.090

<b>BMI<sup>2</sup></b>	.876**	.421*	.572**	.428**		1	.864**
<b>FFMI<sup>3</sup></b>	.661**	-.016	.132	.044	.090	.864**	1

\*Correlation is significant at the 0.05 level (2-tailed); \*\*Correlation is significant at the 0.01 level (2-tailed)

<sup>1</sup>SF- Skinfolds

<sup>2</sup>BMI- Body Mass Index

<sup>3</sup>FFMI- Fat-Free Mass Index

Table 4. Pearson Correlations of Anthropometric Measurements, Total MDDI and EAT Scores, and Training Duration

	<b>Total MDDI</b>	<b>Total EAT</b>	<b>Training Duration</b>
<b>Weight (kg)</b>	-.059	.055	.415**
<b>BF %<sup>1</sup></b>	-.223	-.207	.063
<b>BMI<sup>2</sup></b>	-.009	.052	.376*
<b>FFMI<sup>3</sup></b>	.120	.174	.376*
<b>Total MDDI</b>	1	.500**	-.248
<b>Total EAT</b>	.500**	1	.143
<b>Training Duration</b>	-.248	.143	1

\*Correlation is significant at the 0.05 level (2-tailed); \*\*Correlation is significant at the 0.01 level (2-tailed)

<sup>1</sup>BF%- Body Fat Percentage

<sup>2</sup>BMI- Body Mass Index

<sup>3</sup>FFMI- Fat-Free Mass Index

Analysis revealed a significant positive association between the total MDDI and EAT scores, the MDDI Drive for Size and Functional Impairment subscales, MDDI Appearance Intolerance and EAT Dieting subscales, MDDI Impairment and EAT Dieting subscales, and the EAT Bulimia and Food Preoccupation and Oral Control subscales. The results revealed a significant negative association between the MDDI Drive for Size subscale and weight, body fat percentage, and BMI.

Table 5. Pearson Correlations of Anthropometric Measures, MDDI subscales, and EAT subscales

	<b>Weight (kg)</b>	<b>BF %</b>	<b>BMI</b>	<b>FFMI</b>
<b>MDDI DFS<sup>1</sup></b>	-.399*	-.392*	-.348*	-.176
<b>MDDI AI<sup>2</sup></b>	-.079	-.083	-.015	.049
<b>MDDI FI<sup>3</sup></b>	.222	-.166	.208	.320*
<b>EAT Dieting</b>	.206	-.138	.168	.258

<b>EAT Bulimia</b>	-.029	-.195	.017	.142
<b>EAT Oral Control</b>	-.221	-.169	-.206	-.142

\*Correlation is significant at the 0.05 level (2-tailed)

<sup>1</sup>Drive for Size subscale of the MDDI

<sup>2</sup>Appearance Intolerance subscale of the MDDI

<sup>3</sup>Functional Impairment subscale of the MDDI

Table 6. Pearson Correlations between MDDI and EAT subscales

	<b>MDDI DFS</b>	<b>MDDI AI</b>	<b>MDDI FI</b>	<b>EAT Dieting</b>	<b>EAT Bulimia</b>	<b>EAT Oral Control</b>
<b>MDDI DFS<sup>1</sup></b>	1	.373*	.476**	.195	.126	.354*
<b>MDDI AI<sup>2</sup></b>	.373*	1	.218	.462*	.180	.188
<b>MDDI FI<sup>3</sup></b>	.476**	.218	1	.560**	.160	.274
<b>EAT Dieting</b>	.195	.462**	.560**	1	.366*	.290
<b>EAT Bulimia</b>	.126	.180	.160	.366*	1	.526**
<b>EAT Oral Control</b>	.354*	.188	.274	.290	.526**	1

\*Correlation is significant at the 0.05 level (2-tailed)

\*\* Correlation is significant at the 0.01 level (2-tailed)

<sup>1</sup>MDDI DFS- Muscle Dysmorphic Disorder Inventory Drive for Size Subscale

<sup>2</sup>MDDI AI- Muscle Dysmorphic Disorder Inventory Appearance Intolerance Subscale

<sup>3</sup>MDDI FI- Muscle Dysmorphic Disorder Inventory Functional Impairment Subscale

Table 7 . Linear Regression Analysis of the Muscle Dysmorphic Disorder Inventory

<b>Model</b>	<b>Variables Entered</b>	<b>R<sup>2</sup> Change</b>
1	I feel depressed when I miss one or more workout days.	.633
2	I think my body is too small.	.168
3	I feel like I have too much body.	.082
4	I wish I could get bigger.	.045
5	I pass up social activities with friends because of my workout schedule.	.021
6	I wear loose clothing so that people cannot see my body.	.014
7	I think my legs are too thin.	.009
8	I think my chest is too small.	.007
9	I hate my body.	.006
10	I pass up chances to meet new people because of my workout schedule.	.004
11	I wish my arms were bigger.	.004
12	I am very shy about letting people see me with my shirt off.	.002
13	I feel anxious when I miss one or more workout days.	.005

All MDDI items were used in a regression analysis to identify the best predictors of the total MDDI scores (Table 7). The results showed that the strongest predictor of a cutoff score of 39 or greater was item 12 of the MDDI, “I feel depressed when I miss one or more workout days”. This single item accounted for 63.3% of the variance in scores of the MDDI. Item 1 of the MDDI, “I think my body is too small” accounted for 16.8% of the variance in scores of the MDDI. Taken together, these two items account for 80.1% of the variance of the MDDI.

## CHAPTER V

### DISCUSSION

The purpose of this study was to examine the prevalence of MD in a sample of college-aged weight lifters and to explore potential associations between body dissatisfaction, eating attitudes and MD in this population. The results of the study indicate that the prevalence of MD symptoms and signs may be relatively high in our sample of college-aged males (39%). Signs and symptoms of disordered eating as measured by EAT also seem to be relatively prevalent in this sample (50%). Furthermore, body dissatisfaction was present in a large proportion of the participants, with body fat dissatisfaction being present in 61% of the sample, Fat-Free Mass dissatisfaction being present in 63% of the participants, and both Body Fat and Fat-Free Mass dissatisfaction being present in 34% of the participants.

The MDDI subscale Drive for Size had significant negative correlations with weight of subjects, body fat percentage, BMI, and FFMI. In essence, the smaller an individual subject was in weight and muscle mass, the greater his desire to add more muscle to his physique. This is contradictory to previous research, in which participants with MD had significantly higher BMI and significantly higher scores on the Drive for Size subscale of the MDDI (Hildebrandt et al., 2006). This incongruence could be due to

an athletic sample being compared with a sample of non-weightlifting males (Hildebrandt et al., 2006).

The Drive for Size subscale of the MDDI had a significant positive correlation with the Oral Control subscale of the EAT. While the Drive for Size subscale includes questions such as “I think my body is too small”, the Oral Control Subscale includes questions such as “I cut food into small pieces” and “Other people think that I am too thin.” Thus, the Oral Control subscale of the EAT reflects the opinions of others and/or focuses on the process of eating rather than the amount of food or dieting. It is possible that the smaller males in the study who had significantly higher scores on the Drive for Size subscale of the MDDI also scored higher on the Oral Control subscale of the EAT because they feel evaluated as too thin by others and therefore they “control” their food intake while trying to get bigger to a greater degree. The results of our study also revealed that the Functional Impairment subscale of the MDDI was positively associated with the Dieting subscale of the EAT. Our results are consistent with the belief found in previous research that in order to increase muscle size, eating every two to three hours is essential (Andersen et al., 1995). Thus, the higher the dieting efforts, the greater influence on the daily schedule of the individual and the more the daily schedule revolves around food intake (Andersen et al., 1995).

There was also a significant correlation between the Bulimia and Food Preoccupation and Oral Control subscales of the EAT. However, EAT questions “Vomit after I have eaten” and “Have the impulse to vomit after meals” received a score of “0” for all study subjects. This would indicate that Food Preoccupation, rather than Bulimia, is exhibited by study participants than Oral Control.

Subjects who scored 39 or higher on the MDDI were categorized as dysmorphic in the current study. Subjects labeled as dysmorphic scored significantly higher on all three subscales of the MDDI. This is to be expected as the total MDDI scores for the dysmorphic subjects were significantly higher. However, dysmorphic subjects also had significantly higher total scores on the EAT and the EAT's Dieting subscale. This helps establish a link between MD and potential disordered eating patterns. Men with MD have previously been shown to have significantly higher rates of disordered eating when compared to a control population (Olivardia et al., 2000). Higher scores on the dieting subscale could be due to many subjects preparing for upcoming competitions, as many competitions involving resistance training are based on weight classes. In a variety of resistance training related competitions, such as powerlifting or bodybuilding, competitors often attempt to lose weight in order to be in a lower weight class than their normal body weight. This would allow a distinct advantage over smaller competitors in the same weight class. This practice is similar to that of wrestlers (Shriver et al., 2009). In the current study, the dysmorphic group had not trained for a significantly longer period of time as hypothesized. This finding is consistent with trends of previous research (Hildebrandt et al., 2006).

Individuals with MD manifest signs of body dissatisfaction and often body image disturbances (Hildebrandt et al., 2006). Typically, they tend to desire an increase in muscle mass and a concurrent decrease in body fat (Hildebrandt et al., 2006). In the current study, subjects scoring greater than 0 on the BIG-Muscle scale were considered dysmorphic. For the BIG-Fat scale, the dysmorphic group desired a change from their current to ideal body fat level. Subjects who were dysmorphic had significantly higher



weight, BMI, and FFMI. Participants with significantly higher BMI have been shown to have higher BIG-Fat scores in previous research (Hildebrandt et al., 2006). However, unlike previous research, participants dysmorphic on the BIG-Fat did not have significantly higher scores on the Appearance Intolerance subscale of the MDDI (Hildebrandt et al., 2006). These results would indicate that subjects who desired to lose body fat did not necessarily have more body fat to lose. This finding is consistent with body dissatisfaction trends associated with MD found in previous studies (Hildebrandt et al., 2006).

The dysmorphic group identified by the muscle scale of the BIG indicated a desire to increase their FFMI to an ideal level. Subjects who were dysmorphic had significantly lower weight, abdomen skinfold thickness, BMI, FFMI, and years training. These results follow the findings of previous research, in which study participants with the lowest BMI had the greatest elevation in drive for muscle mass (Hildebrandt et al., 2006). These dysmorphic subjects also had significantly higher total MDDI, Drive for Size, and Appearance Intolerance scores. From a physical standpoint, the dysmorphic subjects lacked the muscularity of their non-dysmorphic counterparts. Significantly higher scores on two of the three subscales of the MDDI could explain the higher scores on the MDDI. However, it is important to note the Drive for Size subscale scores were significantly higher, adding credence to the interpretation that the subjects wanted to add more FFMI to obtain an ideal physique.

Previous research suggests that individuals with MD may be more vulnerable to disordered eating and unhealthy eating behaviors compared to their counterparts (Hildebrandt et al., 2006). The results of our study are consistent with previous research

and indicate that nearly 50% of the subjects in our sample showed signs and symptoms of disordered eating. When compared on MDDI scores, subjects with disordered eating had significantly higher total MDDI scores, as well the Appearance Intolerance and Social Impairment subscales of the MDDI. This provides strong evidence for the correlation between disordered eating patterns and MD in male weight lifting populations (Ravaldi et al., 2003). Given the age of our sample, this finding is important and points to the urgent need to educate young college-aged males on good nutrition, healthy eating and provide them with eating tips for gaining muscle mass and optimizing body fat. Such efforts would help prevent and/or reduce the prevalence of disordered eating behaviors and unhealthy body image in this population (Sundgot-Borgen et al., 2013).

No previous published research has performed regression analysis with the MDDI in order to elucidate the greatest predictors of MD symptomology. In this sample, total MDDI scores were largely predicted by two items. Through regression analysis, it was revealed that MDDI items 1, “I think my body is too small”, and 12, “I feel depressed when I miss one or more workout days”, were responsible for 80 percent of the variance on the MDDI. Subjects labeled as dysmorphic through the MDDI were significantly more likely to have a positive response on MDDI 12. Similarly, dysmorphic subjects were significantly more likely to positively respond to on MDDI 1, while non-dysmorphic subjects were significantly more likely to respond negatively to the same question. These questions, or ones similar to them, could prove beneficial in an abridged version of the MDDI for large-scale populations.

The results of this study indicate that the prevalence of MD is not only limited to bodybuilders (Pope et al., 1993), but also college-aged amateur weightlifters. This

follows the results of previous research, in which 16.9% of a sample of weightlifting males aged 32.64+/- 12.37 years showed symptomology of muscle dysmorphia (Hildebrandt et al., 2006). However, this study revealed an even higher percentage (39%) of male weightlifters presenting with symptomology of MD. The present study also indicates a high prevalence of MD symptomology coupled with signs and symptoms of disordered eating behaviors in college aged amateur male weightlifters. Our findings are of concern because unhealthy eating behaviors and poor body image in young college-aged males can have both short-term and long-term consequences on the health status of this population. There is also potential for poor socialization and low self-esteem due to MD symptomology, which could result in initiating or continuing anabolic steroid use. Prolonged steroid use could result in a variety of health complications involving multiple organ systems. Therefore, prevention efforts are warranted to ensure healthy eating and positive body image development and maintenance in this at-risk population (Sundgot-Borgen et al., 2013).

Although the current study contributes to the limited body of research on MD in male weight lifters, the study has several limitations. First, the Bodybuilder Image Grid (BIG) seemed to lack specificity and sensitivity for the purposes of the study. While the two key components, body fat and FFMI, revealed some insight when viewed alone, there appeared to be no significant association between the BIG and the presence of MD as measured by the MDDI. There is a possibility that too many options of body types were available for selection in the BIG. This could have caused the study subjects to choose improperly. Perhaps in future studies, a different measure of body dissatisfaction can be used. It is also possible that the age of study participants could also be a

limitation. Due to the age of onset for MD, it is possible that being involved in resistance training long-term could lead to MD, disordered eating patterns, or both. The small sample size (n=38) does not allow for generalizations of the amateur college-aged male weightlifting population as a whole. As the MDDI and EAT are both self-reported questionnaires, there is a potential that study participants were not forthcoming with their true responses. There were multiple subtypes of weightlifters present in this sample. Although this would give a greater view of MD prevalence in a broad spectrum of amateur weightlifters, it is possible that one subgroup could have swayed the results of the study. Future research on assessment and diagnosis of MD should focus on studying large and representative samples of males in late adolescence or early adulthood. Given the proposed onset of MD, this could potentially allow for a better understanding of the causes associated with the onset of MD and identification of critical time periods where prevention programs for MD should be implemented (Olivardia et al., 2000). Future studies could also use a different assessment tool for body dissatisfaction that may be more sensitive to an MD population. A control population of males that do not regularly engage in resistance training could be used to compare MD, eating behaviors, and body dissatisfaction in a recreational weightlifting population. Future studies could also focus on determining effective cut-off scores for the evaluation of the MDDI and BIG. An effort could be made to compare current body image from the BIG to actual calculated body types using measured body fat percentage and calculated FFMI. It may also be of interest to look at this sample of individuals at various time periods throughout the year, as preparation for upcoming competitions could alter MD symptomology and results of the EAT.

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## APPENDICES

### Appendix A

#### Muscle Dysmorphic Disorder Inventory

**1. I think my body is too small.**

Strongly Disagree      Disagree      Undecided      Agree      Strongly Agree

**2. I wear loose clothing so that people cannot see my body.**

Strongly Disagree      Disagree      Undecided      Agree      Strongly Agree

**3. I hate my body.**

Strongly Disagree      Disagree      Undecided      Agree      Strongly Agree

**4. I wish I could get bigger.**

Strongly Disagree      Disagree      Undecided      Agree      Strongly Agree

**5. I think my chest is too small.**

Strongly Disagree      Disagree      Undecided      Agree      Strongly Agree

**6. I think my legs are too thin.**

Strongly Disagree      Disagree      Undecided      Agree      Strongly Agree

**7. I feel like I have too much body fat.**

Strongly Disagree      Disagree      Undecided      Agree      Strongly Agree

**8. I wish my arms were bigger.**

Strongly Disagree      Disagree      Undecided      Agree      Strongly Agree

**9. I am very shy about letting people see me with my shirt off.**

Strongly Disagree      Disagree      Undecided      Agree      Strongly Agree



**10. I feel anxious when I miss one or more workout days.**

Strongly Disagree      Disagree      Undecided      Agree      Strongly Agree

**11. I pass up social activities (e.g. watching football games, eating dinner, going to see a movie, etc.) with friends because of my workout schedule.**

Strongly Disagree      Disagree      Undecided      Agree      Strongly Agree

**12. I feel depressed when I miss one or more workout days.**

Strongly Disagree      Disagree      Undecided      Agree      Strongly Agree

**13. I pass up chances to meet new people because of my workout schedule.**

Strongly Disagree      Disagree      Undecided      Agree      Strongly Agree

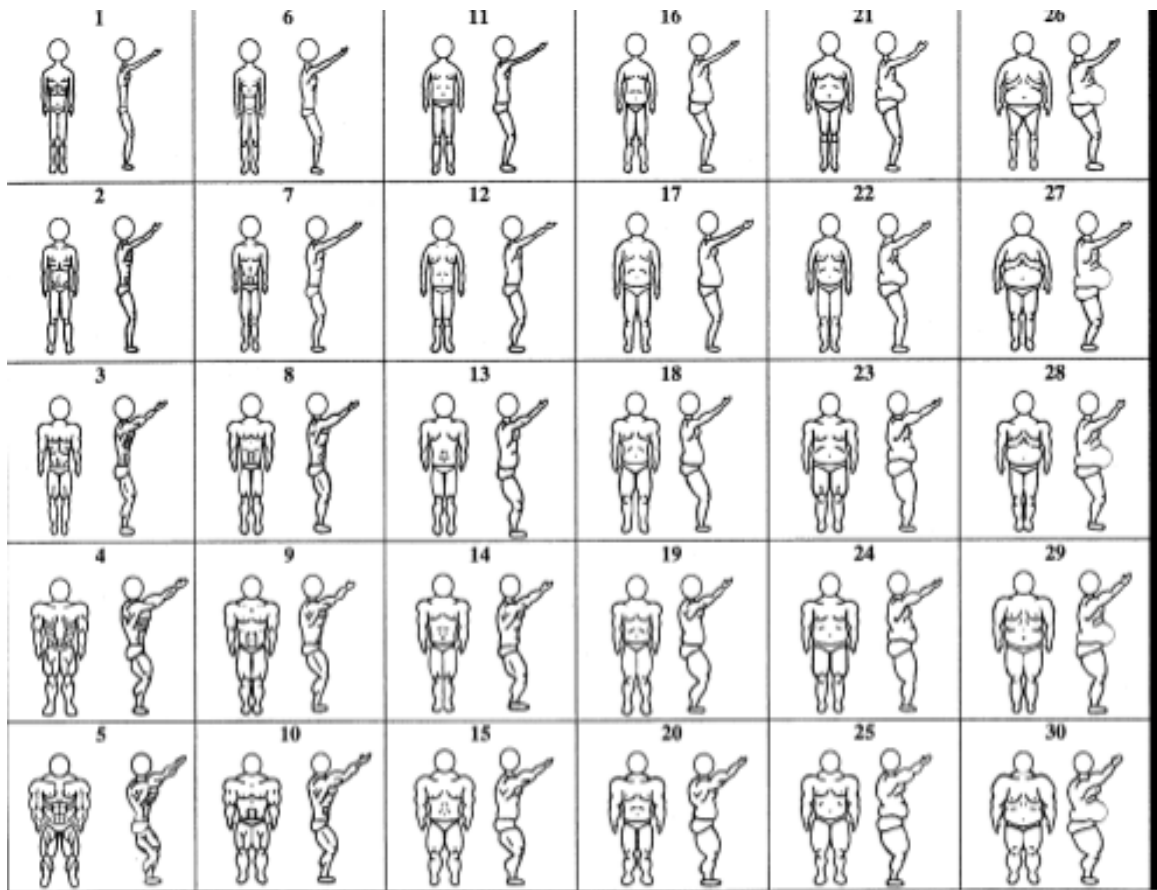
## Appendix B

### Eating Attitudes Test

<b>✓ Please choose one response by marking a check to the right for each of the following statements:</b>	Always	Usually	Often	Some times	Rarely	Never
1. Am terrified about being overweight.	-	-	-	-	-	-
2. Avoid eating when I am hungry.	-	-	-	-	-	-
3. Find myself preoccupied with food.	-	-	-	-	-	-
4. Have gone on eating binges where I feel that I may not be able to stop.	-	-	-	-	-	-
5. Cut my food into small pieces.	-	-	-	-	-	-
6. Aware of the calorie content of foods that I eat.	-	-	-	-	-	-
7. Particularly avoid food with a high carbohydrate content (i.e. bread, rice, potatoes, etc.)	-	-	-	-	-	-
8. Feel that others would prefer if I ate more.	-	-	-	-	-	-
9. Vomit after I have eaten.	-	-	-	-	-	-
10. Feel extremely guilty after eating.	-	-	-	-	-	-
11. Am preoccupied with a desire to be thinner.	-	-	-	-	-	-
12. Think about burning up calories when I exercise.	-	-	-	-	-	-
13. Other people think that I am too thin.	-	-	-	-	-	-
14. Am preoccupied with the thought of having fat on my body.	-	-	-	-	-	-
15. Take longer than others to eat my meals.	-	-	-	-	-	-
16. Avoid foods with sugar in them.	-	-	-	-	-	-
17. Eat diet foods.	-	-	-	-	-	-
18. Feel that food controls my life.	-	-	-	-	-	-
19. Display self-control around food.	-	-	-	-	-	-
20. Feel that others pressure me to eat.	-	-	-	-	-	-
21. Give too much time and thought to food.	-	-	-	-	-	-
22. Feel uncomfortable after eating sweets.	-	-	-	-	-	-
23. Engage in dieting behavior.	-	-	-	-	-	-
24. Like my stomach to be empty.	-	-	-	-	-	-
25. Have the impulse to vomit after meals.	-	-	-	-	-	-
26. Enjoy trying new rich foods.	-	-	-	-	-	-

## Appendix C

### Bodybuilder Image Grid



1. Which numbered image best represents your *current* body?
2. Which numbered image best represent your *ideal* body?
3. Which numbered image best represent the body image most desired by the *average male*?
4. Which numbered image best represents the body image most desired by the *average woman*?

**Oklahoma State University Institutional Review Board**

Date: Tuesday, April 23, 2013  
IRB Application No HE1327  
Proposal Title: Nutrition-related Parameter, Dietary Intakes, and Food and Exercise-Related Attitude among Collegiate Athletes

Reviewed and Processed as: Expedited

**Status Recommended by Reviewer(s): Approved Protocol Expires: 4/22/2014**

Principal Investigator(s):

Jamison L. Williams	Lenka Humenikova Shriver
1118 Main Hall	311 HS
Tulsa, OK 74106	Stillwater, OK 74078

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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.

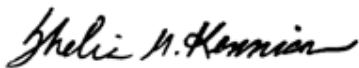
The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

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. Protocol modifications requiring approval may include changes to the title, PI, advisor, funding status or sponsor, subject population composition or size, recruitment, inclusion/exclusion criteria, research site, research procedures and consent/assent process or forms.
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 Dawnett Watkins 219 Cordell North (phone: 405-744-5700, dawnett.watkins@okstate.edu).

Sincerely,



Shelia Kennison, Chair  
Institutional Review Board

**Appendix A**  
**ADULT CONSLNT FORM**  
**OKLAHOMA STATE UNIVERSITY**

**PROJECT TITLE: Muscle Dysmorphia, Body Dissatisfaction, and Eating Behaviors in college-aged, resistance trained males**

**INVESTIGATORS:** Jamison Williams, B.S. Oklahoma State University; Lenka Shriver, Ph.D. Oklahoma State University

**PURPOSE:**

This study will examine ideas and beliefs about body image, body size, exercise, and eating behaviors in college-aged amateur male weight lifters. You are being asked to participate because you are a member of the OSU Weightlifting Club and you represent the target population of this study.

**PROCEDURES**

During this study, you will be asked to complete a survey that includes three questionnaires. One questionnaire is about muscle dysmorphia and includes questions about muscle size, desires to decrease body fat, and behavior in regards to social situations. The second questionnaire includes two questions about your current and desired body image and two questions about the body image desired by the average individual. The third questionnaire will ask about your eating behaviors. If you decide to participate in this study, you will be asked to sign this informed consent form and complete the survey during today's meeting. You will be also asked to report to the Health and Human Performance Laboratory for a short visit on a day we schedule together today. The lab visit is needed in order to have height, weight, and body fat assessed. Your involvement in this study will be approximately 60-90 minutes (1 hour for this meeting and completing the survey and 30 minutes for measuring height, weight, and body fat assessment during the lab visit.

**RISKS OF PARTICIPATION:**

There are no known risks associated with this project which are greater than those ordinarily encountered in daily life.

**BENEFITS OF PARTICIPATION:**

If you are interested in obtaining the results of your body fat assessment, results will be sent to you when all data is gathered.

**CONFIDENTIALITY:**

The records of this study will be kept private. You will be assigned an ID number during this meeting and your completed survey and measurements will not be associated with any personal identifiers. Only your ID will be used during the project. A master list with names and ID numbers will be kept by the researcher in a locked file cabinet and will not be accessible to anyone but the researchers. Any written results will discuss group findings and will not include information that will identify you. Research records will be stored securely and only researchers and individuals responsible for research oversight will have access to the records. It is possible that the consent process and data collection will be observed by research oversight staff responsible for safeguarding the rights and wellbeing of people who participate in research.

**COMPENSATION:**

There is no compensation for this study.

Okla. State Univ.
IRB
Approved 4-23-13
Expires 4-22-14
IRB # 16-13-27

**CONTACTS**

You may contact any of the researchers at the following addresses and phone numbers, should you desire to discuss your participation in the study and/or request information about the results of the study: Jamison Williams, B.S., Human Sciences, Dept. of Nutritional Sciences at Oklahoma State University, Stillwater, OK 74078, (918) 639-1991 or Dr. Shriver, 311 Human Sciences, Depart. Of Nutritional Sciences, Oklahoma State University, (405) 744-5040. If you have questions about your rights as a research volunteer, you may contact Dr. Shelia Kennison, IRB Chair, 219 Cordell North, Stillwater, OK 74078, 405-744-3377 or [irb@okstate.edu](mailto:irb@okstate.edu)

**PARTICIPANT RIGHTS:**

I understand that my participation is voluntary, that there is no penalty for refusal to participate, and that I am free to withdraw my consent and participation in this project at any time, without penalty.

**CONSENT DOCUMENTATION:**

I have been fully informed about the procedures listed here. I am aware of what I will be asked to do and of the benefits of my participation. I also understand the following statements:

I affirm that I am 18 years of age or older.

*Preface the signature lines with the following statement (expand if appropriate):*

I have read and fully understand this consent form. I sign it freely and voluntarily. A copy of this form will be given to me. I hereby give permission for my participation in this study.

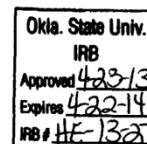
\_\_\_\_\_  
Signature of Participant

\_\_\_\_\_  
Date

I certify that I have personally explained this document before requesting that the participant sign it.

\_\_\_\_\_  
Signature of Researcher

\_\_\_\_\_  
Date



VITA

Jamison Williams

Candidate for the Degree of

Master of Science

Thesis: MUSCLE DYSMORPHIA, BODY DISSATISFACTION, AND EATING  
BEHAVIORS OF COLLEGIATE-AGED MALE AMATEUR  
WEIGHTLIFTERS

Major Field: Nutritional Sciences

Biographical:

Education:

Completed the requirements for the Master of Science in Nutritional Sciences at Oklahoma State University, Stillwater, Oklahoma in December 2013.

Completed the requirements for the Bachelor of Science in Nutritional Sciences at Oklahoma State University, Stillwater, Oklahoma in 2011.

Experience:

Professional Memberships:

Member of the Academy of Nutrition and Dietetics