

Spring 5-10-2013

Using the Stroop Test to Indicate Levels of Muscle Dysmorphia in Men

Molly White

Western Kentucky University, Molly.White944@topper.wku.edu

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USING THE STROOP TEST TO INDICATE LEVELS OF MUSCLE DYSMORPHIA IN MEN

A Capstone Experience/Thesis Project

Presented in Partial Fulfillment of the Requirements for

The Psychology Degree Bachelor of Arts with

Honors College Graduate Distinction at Western Kentucky University

By

Molly White

Western Kentucky University
2013

CE/T Committee

Dr. Frederick Grieve, Advisor

Dr. Andrew Mienaltowski

Ms. Caelin Smith

Approved by

Advisor
Department of Psychology

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2013

ABSTRACT

Muscle dysmorphia a disorder in which a person obsesses over not being muscular enough. The purpose of the current study is to discover whether the Stroop Test can be used to find symptoms of muscle dysmorphia. Participants first fill out a demographics questionnaire. Then they completed a task using E-Prime computer software. Participants are presented with a group of neutral and body-related words in blue, green, yellow, or orange. They indicated the color of the word by pressing the first letter of the color on the keyboard. The reaction time, as well as the number of errors, is measured. Muscle dysmorphia symptoms were also analyzed by having participants complete a short muscle dysmorphia questionnaire. It was hypothesized that participants with higher levels of muscle dysmorphia would have slower reaction times and commit more errors than participants with low levels of muscle dysmorphia. Results revealed that all of the participants responded quickest to body words, followed by neutral words, and lastly, color words. This may have been due to flaws in the methodology of the study, specifically the use of a nonclinical sample.

Keywords: Muscle Dysmorphia, Stroop Test, Body Disorder, Body Image, Body Dissatisfaction, Eating Disorders

Dedicated to my mother and father who have always
encouraged me to go beyond the expectations

ACKNOWLEDGEMENTS

I am so thankful for the help and support of so many people. My thesis project would not have been possible without the knowledge and skills of all of those who helped me. I am very appreciative for the help of Dr. Rick Grieve, my faculty advisor for this project. I am grateful for the time he spent developing my project and critiquing my work. The constant support from Dr. Grieve encouraged me to become passionate about this project. I would like to thank the other members of my committee, Dr. Andrew Mienaltowski and Caelin Smith and my clinical applied research group for their help and support.

I am also grateful for the Honors College at WKU for providing me with a community of learned people who have inspired me every day to reach my highest intellectual abilities. I am also thankful for WKU for providing me with funds to complete this research through the FUSE grant. Without such funds, I would not be able to present my research at the Association for Psychological Science in Washington DC.

Lastly, thank you to my family, friends, and God whom have provided me with comfort and reassurance when I have felt overwhelmed. They provided me with confidence when I needed it most.

VITA

February 25, 1992.....Born- Louisville, KY

2010.....Assumption High School,
Louisville, KY

2012.....Junior Academic Achievement
Award, Psychology Department,
Western Kentucky University

2013.....Association for Psychological
Science

2013.....Kentucky Honors Roundtable
Conference, University of
Kentucky

2013.....REACH Week, Western Kentucky
University

2013.....Western Kentucky University,
Bowling Green, KY

FIELD OF STUDY

Major Field: Extended Psychology

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CHAPTER 1

INTRODUCTION

In American culture, it has long been an accepted notion that women more commonly suffer from body image disorders as compared to men. Eating disorders such as anorexia nervosa and bulimia nervosa are most frequently seen in women. Contrary to popular opinion, men actually suffer from body disorders of their own. In fact, over the past decade, more and more men are experiencing feelings of dissatisfaction with their bodies (Olivardia, 2001). Research has been done on muscle dysmorphia, a type of body dysmorphic disorder, which was once referred to as reverse anorexia (Pope, Gruber, Choi, Olivardia, & Phillips, 1997). Muscle dysmorphia is a body disorder seen in men that is characterized by feelings of anxiety over one's level of muscularity.

Muscle dysmorphia is characterized as feelings of intense anxiety concerning one's levels of muscularity (Pope et al., 1997). Researchers have developed specific criteria for men with muscle dysmorphia (Olivardia, Pope, & Hudson, 2000). The first is that they have a fixation with the idea that their body is not muscular enough. Second, this fixation causes anxiety and problems with their social and professional performance. This involves giving up social functions in order to keep up with a rigorous work out and diet routine. The individual may also avoid situations that

involve revealing his body in public. Men with this disorder also continue to follow their routine even if they are experiencing psychological or physiological problems. Third, the main concern is about being too small or not muscular enough and not about being fat, which is the main concern in other body disorders such as anorexia (Olivardia, 2001).

The thought processes for individuals with this disorder are very similar to those who suffer from anorexia, except in the opposite way. Men with muscle dysmorphia are usually very muscular, lean, and have low body fat percentages. They are able to see that other men are muscular, but do not see themselves in the same light. These men report having thoughts about their body about five hours a day, which is about six times as often as the average weightlifter (Olivardia, 2001).

Many people assume that this disorder is only found in weightlifters and body builders. In fact, the disorder is seen in a small amount of weightlifters (Pope, et al., 1997). It not known how prevalent muscle dysmorphia is, but there are some studies that have been conducted that may give us some information into how common it is. In a study of 156 weightlifters, 16 men thought of themselves as less muscular than they actually were (Pope & Katz, 1994). Another study of 193 men and women with body dysmorphic disorder, 18 of them had muscle dysmorphia as well (Pope et al., 1997). However, selection bias may have altered the results, and embarrassment may have inhibited some individuals with the disorder from participating. We do not know that exact number of individuals with muscle dysmorphia because of these issues with research. However, if 10% of weightlifters and 9% of people with body dysmorphic disorder have muscle dysmorphia as well,

then there are thousands of men who suffer from muscle dysmorphia, making it an important topic for research (Pope, Gruber, Choi, Olivardia, & Phillips, 1997).

Men with muscle dysmorphia exhibit behaviors that include extensive hours of weight lifting, obsession with diet, and looking in the mirror (Olivardia, 2001). Men with Muscle Dysmorphia also report feelings of depression (Olivardia, 2001). They regret spending so much time in the gym and less time doing other things, but the fear of being small overwhelms them. These men also spend much of their time analyzing others' bodies and comparing those bodies to their own. This often makes the disorder worse because they see themselves as smaller than they actually are, but they see others as they truly are (Olivardia, 2001). Unlike muscular men, who like to show off their bodies, these men do not. They avoid taking off clothes and wear many layers of clothing. It is important to note that self-esteem, depression, and anxiety can be correlated with body image (Olivardia, 2001). Feelings about body image can affect psychological and emotional stability. Also, people who have perfectionist tendencies also tend to strive for a perfect body. This causes them to care more about health and fitness which increases the risk for unhealthy levels of muscularity (Olivardia, 2001).

Another aspect of this disorder is creatine use. Creatine is taken to increase muscle without increasing fat (Davey & Bishop, 2006). Many college-age men are using muscle-enhancing substances (creatine) to achieve their desired level of muscularity. More severe methods include steroid use and less severe methods include muscle gaining powders or protein bars. While creatine use is legal, it is speculated that illegal steroid use may occur if results are not obtained (Kanayama,

Gruber, Pop, Borowjecki, & Hudson, 2001). More college age men are beginning to turn to drugs and self-medication than before (Morgan, 2002), so steroid use may be viewed as a common resource for men who want to bulk up. This may be attributed to the fact that drugs are more easily accessible on college campuses today (Grieve, Wann, Henson, Ford, 2006).

Muscle dysmorphia is sometimes accompanied by eating disorders such as bulimia nervosa. The behaviors and diagnostic criteria for muscle dysmorphia, anorexia nervosa, and bulimia nervosa are quite similar. Muscle dysmorphia is known as reverse anorexia; both disorders involve low self-esteem and negative thoughts regarding body and weight (Grieve, 2007). Men who have muscle dysmorphia have also reported having an eating disorder in the past, or have an eating disorder simultaneously with muscle dysmorphia (Olivardia, Pope, Borowiecki, & Cohane, 2004). The primary force of both muscle dysmorphia and eating disorders is judgment of self. If the person is close to the socially accepted ideal body, his opinions of self will be higher and vice versa. They normally consume high calorie foods to increase muscle mass, similar to binge eating in women with bulimia. Because of the similarities, it is believed that the factors leading to eating disorders in women may also explain factors leading to muscle dysmorphia in men (Grieve, 2007). Research on eating disorders in women is important to muscle dysmorphia because it may explain certain behaviors and how best to treat the disorder.

Mood and anxiety disorders are common with muscle dysmorphia. Research showed that 58% of men with muscle dysmorphia also had a history of a mood

disorder, and 20% of men with muscle dysmorphia had a history of an anxiety disorder (Maida & Armstrong, 2005). Personality disorders of the cluster B type are seen as well. These disorders and muscle dysmorphia share feelings of aloneness, instability, and identity problems. Men with muscle dysmorphia also share symptoms with men who suffer from eating disorders such as perfectionism (Maida & Armstrong, 2005). Obsessive compulsive disorder, muscle dysmorphia, bulimia nervosa, anorexia nervosa, and some anxiety disorders may be grouped as disorders that share similar defects

Research on the nature of the disorder has been done, but there is still little evidence to account for the causes of muscle dysmorphia. It is believed that the desire for muscularity due to social and health benefits (Davey & Bishop, 2006). The most popular theory to explain male body disorders is a sociocultural (Davey & Bishop, 2006) that poses the idea that in recent years men have begun to experience a pressure to have a certain body type similar to the pressure women have experienced to be thin. This pressure caused many women to develop anorexia nervosa and bulimia nervosa. Due to media and society, men are becoming obsessed with obtaining the perfect body. Thanks to modern technology and photo editing programs, many bodies in magazines are created to be perfect and are therefore, unattainable to the average man (Davey & Bishop, 2006). This is why muscle dysmorphia is becoming more common. However, there are many other factors that contribute to the development of muscle dysmorphia, such as body awareness. Body awareness is only problematic when it is interfering with health. It is very normal to be consciousness about one's body, especially in teenage years (Rosenblum & Lewis,

1999). There are differences between normal body concerns and unhealthy concerns. First, in patients with muscle dysmorphia, their sense of muscularity is highly underestimated. Second, a sense of self worth and confidence are dependent solely on appearance. Third, preoccupation with diet and exercise interferes with normal daily functioning and wellness. Lastly, unhealthy behaviors such as steroid use and strict dieting are more common in individuals with muscle dysmorphia.

The cause of muscle dysmorphia is attributed to a biopsychosocial model. Muscle dysmorphia is a subtype of body dysmorphic disorder, so it would be considered a type of somatoform disorder (Maida & Armstrong, 2005). However, because individuals experience obsessive thoughts and compulsive behaviors, it is similar to obsessive-compulsive disorder. Both body dysmorphic disorders and obsessive-compulsive disorder are very similar, but there are significant differences. Some differences include social isolation, delusions, and decreased insight in body dysmorphic disorder relative to obsessive compulsive disorder (Madaia & Armstrong, 2005). Research suggests that muscle dysmorphia is more likely to be a member of the obsessive compulsive disorder family than a type of somatoform disorder (Madaia & Armstrong, 2005). Therefore, these disorders may contain a genetic predisposition and run in family history. Men with these disorders have problems with self-esteem and masculinity. Studies have shown that men with traditional views on masculinity and femininity have higher incidences of muscle dysmorphia. Perhaps spending so much time focusing on working out is a way to deal with their issues of masculinity.

Surely, men who have large muscles are viewed as more manly than those men without. On the other hand, some men aspire to be big and strong to convey power and dominance. Men who have had adverse childhood experiences also develop muscle dysmorphia. For example, boys that are told they are underweight or ridiculed for being puny are at a higher risk for developing muscle dysmorphia than boys who are not (Olivardia, 2001).

Grieve (2007) developed a four factor biopsychosocial theory for the development of muscle dysmorphia. The categories include social factors, emotional factors, psychological factors, and physiological factors. The factors in the model include body distortion, negative affect, low self esteem, body dissatisfaction, perfectionism, ideal body internalization, media pressure, sport participation, and body mass. The model is simple, but it is important to realize that many of the factors are complex and interact with one another in the development of muscle dysmorphia (Grieve, 2007). There are many models that have been developed to explain muscle dysmorphia, some being biological, psychological, social, and behavioral, etc. in nature. Grieve's model is a combination of many models and is more etiological in nature. The model also shows that the three most important components to the development of muscle dysmorphia: ideal body internalization, body dissatisfaction, and body distortion. Other factors such as self-esteem, media influences, negative affect, and sport participation are less important. These variables may influence the development of the disorder, but are not likely to be responsible for the origination of muscle dysmorphia (Grieve, 2007). It is also important to note that the strength of the factors is affected by age. For instance, the

desire to reach a muscular ideal was very important for teenagers but not older adults. Other factors that could be affected by age may be sport participation and media influence (Grieve, 2007).

Since muscle dysmorphia is a relatively new disorder, little research has been conducted on the topic. However, there have been several efforts to develop techniques to measure it. The somatomorphic matrix presents men with computerized images of male bodies, and participants must either add or subtract fat to present the current body, ideal body, and body that women want (Davey & Bishop, 2006). This was found to be a good tool for measuring muscle dysmorphia. Mayville, Williamson, White, Netemeyer, and Drab (2002) developed the Muscle Appearance Satisfaction Scale, which is a questionnaire that measures cognitive, affective, and behavioral dimensions of muscle dysmorphia. This was found to be a good tool for men but not women with muscle dysmorphia. The Drive for Muscularity Scale (DMS; McCreary & Sasse, 2000) was found to be a good measurement tool for both genders. It was concluded that the DMS and the Somatomorphic Matrix were the optimal forms of measurement for muscle dysmorphia.

The current study focuses on muscle dysmorphia symptoms in college age males. Research reveals that more college age men are seeking counseling help on college campuses for problems with self-esteem, body concerns, and exercising and diet behaviors than any other issues (Davey & Bishop, 2006). It was reported that 95% of college men experienced feelings of unhappiness with some part of their body. Because of this, problems with muscle dysmorphia in college age men are

increasing and college counselors are forced to become more familiar with the disorder. Muscle dysmorphia can affect women, but in much lower incidences than with men (Davey & Bishop, 2006). College age men are at risk for developing muscle dysmorphia and other body issues compared to older aged men. A desire for a muscular body normally begins around the young age of sex or seven years old, continues through adolescence, and heightens around adulthood (Davey & Bishop, 2006). The average age of onset for muscle dysmorphia is around 19.4 years (Davey & Bishop, 2006). A muscle dysmorphia study was done on weightlifters and college students. The results showed that both groups had similar behaviors regarding body satisfaction, muscularity, and eating habits (Olivardia, 2001). A second study was conducted on college men in the United States, Australia, and France. In all three nations, college men viewed their bodies as less than ideal and over guessed the amount of muscle that women desired in a man (Pope, Gruber et al., 2000).

While the Stroop Test (Stroop, 1935) has been used in research with eating disorders in women, it has never been used to identify symptoms of muscle dysmorphia in men. The current study uses the Stroop Test to identify levels of muscle dysmorphia in college age men. The Stroop Test is a task in which participants are presented with color words such as red, blue, green, and yellow. However, the color words are presented in opposing colors. So “red” is presented in green ink, “blue” is presented in yellow ink, and so on. Participants are instructed to say the color of the word aloud, and reaction time and number of errors are recorded (Stroop, 1935). It is a natural reaction to read the word first, rather than recognize the color of the word. The participants are forced to ignore their first

reaction and say aloud the color of the word. This is why the Stroop test is such a difficult cognitive task. Although participants generally have difficulty naming the font color of a color word that is incongruent with the color word, they also have difficulty naming the font color of a word that grabs their attention. In the current study, body related words are likely to capture the attention of those with a body disorder, interfering with their ability to name the font color in which the body word is printed. When participants have difficulty identifying the color of the word because the content of the words grabs their attention, interference occurs.

Ruiz, Diaz, and Mancilla (2008) performed a study to evaluate the affects of eating disorders using the Stroop Task and other cognitive tests. The researchers studied attention using the Stroop Test with body and food related terms. It was hypothesized that participants with an eating disorder would have abnormalities in selective attention, perseverative thinking, working memory, and executive planning compared to participants without an eating disorder. The Stroop Test was one of four psychological tests administered to participants with anorexia nervosa, bulimia nervosa, as well as a control group without eating disorders. The anorexia nervosa group performed the worst in memory, followed by the bulimia nervosa group. Both the anorexia nervosa and bulimia nervosa groups took longer in executive planning and showed more perseverative answers than the control. Both eating disorder groups committed more errors, and the bulimic group required more time to complete the negative body shape words. This shows abnormalities in cognitive processing in both the anorexia nervosa and bulimia nervosa group. Both groups showed attention deficits for the negative body words. The anorexia nervosa

group had a slower response time for food related words. The bulimia nervosa group made more errors with the positive body words. It was hypothesized that participants created schemas, or conceptual frameworks, that told them what information was most important, and what information needed to be remembered. The patients experienced information processing biases in terms of the body and food related terms because there was distortion in the way the participants with anorexia nervosa and bulimia nervosa perceived their experiences (Ruiz, Diaz, & Mancilla, 2008)

In a study by Long, Hinton, and Gillespie (1993), the Stroop Test was administered to anorexia nervosa, obese restrained, and normal control groups. Results showed that the anorexia nervosa group was slower at identifying the colors of the food and body related words compared to the control group. There were not differences between the overweight restrained eaters and the control group. Therefore, the Stroop Test was successful at differentiating between the anorexia nervosa group and the control group, but not between the overweight restrained group and the control group. The Stroop Test can be used to differentiate between some groups of individuals, but the test does have its limits.

In a similar study by Johansson, Carlbring, Ghaderi, and Andersson (2008), the Stroop Test was administered to an anorexia nervosa group, bulimia nervosa group, and a control group that did not have an eating disorder. Food and body related words were used in this test as well. Women with bulimia nervosa revealed interference with body related words while anorexia nervosa women showed interference with food related words. Participants directed their attention towards

emotional stimuli that were personally relevant to them. This type of selective attention caused delays in color naming, which is known as emotional Stroop Interference (Williams, Watts, Macleod, & Matthews, 1996). There are theories as to which cognitive processes can explain the Stroop Test (Faunce, 2002). The parallel distributed processing model (Cohen, Dunbar & McClelland, 1990) states that there are two different pathways attributed to processing words and colors that work together. Attention is distributed among the pathways, but interference of color naming occurs when emotionally relevant material attracts more of our attention (Williams et al., 1997). Research has also suggested that anorexia nervosa patients may experience neurocognitive functioning difficulties such as spatial recognition memory, planning, visual information processing, and attention (Fowler et al., 2006) that could cause delays in reaction time for the Stroop Task. The current study aims to test the ability of the Stroop Test at recognizing symptoms of muscle dysmorphia in men.

The current study uses the Stroop Task to identify symptoms of muscle dysmorphia. Similar to the original Stroop, participants are presented with words in different color. Unlike the original task, this study uses body related words and neutral words (Appendix A). All of the words are presented in green, red, blue, yellow, or orange. Reaction time and number of errors are also recorded. The purpose of the Stroop Test in this study is not to test cognitive abilities, but rather to determine muscle related words could trigger a response in individuals with symptoms of muscle dysmorphia. It is hypothesized that participants with high levels of muscle dysmorphia will have a higher reaction time to body related words

compared to neutral words. Participants with low levels of muscle dysmorphia will show no difference in reaction time. This is hypothesized because the body related words would act as a trigger for participants with high levels of muscle dysmorphia, which may distract them from the task and increase their reaction time.

CHAPTER 2

METHODOLOGY

Participants

This study was conducted at Western Kentucky University through the Department of Psychology Study Board. There were 80 undergraduate students who participated in the study, but 12 of them were eliminated from the data because they failed the color blind test. One participant did not fully complete the Muscle Dysmorphia Questionnaire, and two participants did not fully complete the Stroop Test. This left us with 65 participants. All of the participants were male with an age range between 18 to 38 ($M = 20.12$, $SD = 3.34$). Ethnic composition included 35 (53%) Caucasians, 1 African American (1.5%), 1 Hispanic (1.5%), 1 Phillipino (1.5%), 4 Asians (6.2%), and 23 (35.4%) of the participants who did not identify their ethnicity.

Materials

Demographics Questionnaire. The Demographics Questionnaire is a four-item questionnaire regarding participants' age, weight, height, ethnicity, education, and health history (See Appendix B).

Muscle Dysmorphia Questionnaire. The Muscle Dysmorphia Questionnaire (MDQ, Grieve, et al., 2012) is comprised of 34 items that measure the individual's body anxiety, muscle anxiety, self worth, diligence, eating and exercising habits, and

irrational thinking. The questions are answered on a six-point Likert-type scale, ranging from 1 (*Strongly Disagree*) to 6 (*Strongly Agree*). “Working out causes problems in my job” and “I eat by myself” are examples of items found on the inventory. The scores will be summed together. A higher score means higher levels of muscle dysmorphia symptoms. The internal consistency of the MDQ is .87, which was found with Cronbach’s alpha (Short, 2005). This indicates good internal consistency and is consistent with past research. The MDQ also has sufficient test-retest reliability ($r = .59$ Cubberley, 2009) (See Appendix C).

Stroop Test. The Stroop Test (Stroop, 1935) is a cognition test in which the participant reads a word that is written in colored ink. Normally, the participant will be asked to read the word “green” even though it is displayed in blue ink. The Stroop effect occurs when the colored ink interferes with the participants’ ability to vocalize the word (Stroop, 1935). The Stroop Test used in this study will include 15 everyday words as well as 15 words relating to body image, food, exercise, and health (See Appendix A).

Equipment

E-Prime is computer software that was used to administer the Stroop Test to participants and record their results. E-Prime is a simple and efficient way to collect and analyze data. Researchers can create experimental designs and accurately test data.

Procedure

Participants were recruited from the undergraduate Psychology courses at Western Kentucky University. They were given the informed consent document at

the beginning of the study (See Appendix D). They were given the demographics questionnaire and the MDQ before completing the Stroop Test. In this Stroop Test, participants were shown a list of words on a computer screen. The words were written in red, green, blue, and orange ink. The words included everyday words as well as words related to health and fitness. Participants were instructed to hit a specific key to indicate the color of the word. They were debriefed. Some of participants received extra credit in their Psychology classes for their participation.

CHAPTER 3

RESULTS

Preliminary Analysis

The items from the Muscle Dysmorphia Questionnaire were summed to make a total score. The total points possible was 204. A score of 204 would indicate high levels of muscle dysmorphia. The scores ranged from 45- 143 ($M = 85.9, SD = 20.9$). The median split for the data was 85.0. The high group ($M = 102, SD = 15.1$) had significantly higher scores on the MDQ than the low group ($M = 70.5, SD = 10.5$), $t(1,63) = -10.00, p < .001$.

Hypothesis Testing

A 2 (Muscle Dysmorphia symptoms: high vs. low) by 3 (word type: body words vs. neural words vs. color words) repeated measures ANOVA test with a mixed design was used for this study. Reaction time on the Stroop Test was recorded with E-Prime software. It was hypothesized that participants who scored high on the muscle dysmorphia questionnaire would exhibit slower reaction times on the Stroop Test compared to participants who scored low on the muscle dysmorphia questionnaire. Results show that people who scored high on the MDQ responded the quickest on body words ($M = 1080.22, SD = 273.06$), followed by everyday words ($M = 1100.32, SD = 246.44$), and finally color words ($M = 1796.80, SD = 780.29$). People who scored low on the MDQ also responded the quickest on

body words ($M = 1042.93$, $SD = 194.16$), followed by everyday words ($M = 1052.08$, $SD = 192.21$), and finally color words ($M = 1937.8074$, $SD = 1194.74$). A repeated measures ANOVA shows a main effect of word type $F(1, 63) = 47.682$, $p < .001$, $\eta^2 = .431$.

CHAPTER 4

DISCUSSION

The present study examined whether the Stroop Test could be used to identify symptoms of muscle dysmorphia in men. It was hypothesized that men with high levels of muscle dysmorphia would have a longer reaction time compared to men with low levels of muscle dysmorphia. It was also expected that men with high levels of Muscle Dysmorphia would incorrectly identify colors more often than those with low levels of Muscle Dysmorphia. The original Stroop Task is so difficult because participants must ignore their desire to simply read the word, and instead identify the color (Stroop, 1935). The Stroop Test for the current study is similar in that participants are instructed to ignore the word and process the color. The task should not have been difficult for participants with low levels of muscle dysmorphia. There are no color words that are interrupting their ability to recognize the colors. However, for participants with high levels of muscle dysmorphia, the words can be very distracting. Muscle dysmorphia is a body disorder in which people feel intense anxiety over their muscularity. They spend hours planning meals and workout routines. It was hypothesized that words such as “exercise” “muscle” and “arm” (Appendix A) act as a trigger for them, and cause a flow of added thoughts regarding their muscularity to occur. This is why it was hypothesized that individuals with high levels of muscle dysmorphia would exhibit a longer reaction time with the body

related words. It was expected that the body words would elicit a preoccupation with other thoughts and exhibit a slower reaction time.

The brain processes colors and words via two different pathways that work together. The pathways are usually in balance with one another, unless one pathway attracts more attention than the other (Williams et. al, 1997). When completing the Stroop Task, it was believed that the body words would demand attention from the muscle dysmorphia participants and less focus would be given to identifying the color of the word. This would result in longer reaction times and errors in correctly identifying colors. Klein (1964) conducted one of the first experiments using words besides color words in the Stroop Test. His results revealed that color naming was slower with “attention getting” words compared to neutral words. Other studies such as Ray (1979) and Watts, McKenna, Sharrock, and Trezise (1986) used exam words with nervous students and spider words with phobics. Both of the studies revealed slower reaction time with the meaningful terms. Because of results from such experiments, it was hypothesized that participants with high levels of muscle dysmorphia would respond slower to body words.

The results of this study contradicted the original hypothesis. Participants with high levels of muscle dysmorphia actually responded quickest to body related words, followed by neutral words, and then color words. The colors words (original Stroop Test) were used as a control and practice tool to help participants get acquainted with the E Prime program and Stroop Test. The results for participants with low levels of muscle dysmorphia were the same. They responded quickest to body related words, followed by neutral words, and lastly color words. While the

hypothesis was not supported, it is interesting that both groups responded quickest to body related words. The current study indicates that the Stroop Test cannot be used to identify levels of muscle dysmorphia in college age men. However, it does reveal that participants react quickest to body words. This could be because of familiarity, anxiety, faults in the study, etc. It is understandable why the color words required the most time to react. As previously discussed, it is difficult for participants to identify a color when a different color word is presented simultaneously (Stroop, 1935). For individuals with high levels of muscle dysmorphia, anxiety or nervousness may have caused them to react more quickly. These may have been reasons why there was a faster reaction time for the body words.

Another theory as to why participants react quickly is to avoid the unwanted stimuli. Restrained eaters tend to have increased attention for food stimuli (Overduin, Jansen, Louwense, 1995). Because participants with eating disorders are preoccupied with food and eating, they showed delayed reaction times (Overduin, et al., 1995). The delay may mean that the participant is focusing on the meaning of the word rather than the color, or it could mean that the participant is looking away or closing his or her eyes to avoid the word (Macleod, Matthews, & Tata, 1986). Herman and Polivy (1993) proposed that people who diet lose more weight and stick to the diet if they try to avoid thinking about food. Therefore, participants with anorexia nervosa attempt to avoid focusing on food stimuli. While women in past studies may look away from stimuli that made them feel uneasy, men in the current study may have pressed the correct key more quickly to move to the next stimuli.

This could explain why participants with high levels of muscle dysmorphia react so quickly to body terms, so they can avoid focusing on the stimuli for long periods of time. Muscle dysmorphia can be conceptualized as the reverse of anorexia nervosa (Pope et al., 1997), so perhaps individuals with muscle dysmorphia react to stimuli in reverse to individuals with anorexia nervosa. Women with anorexia nervosa who complete the Stroop Task tend to have delays in reaction time. Since little research has been done on muscle dysmorphia and the Stroop Task, perhaps men tend to have faster reactions to body stimuli. The differences in reaction time could be due to gender or disorders differences.

Lavy and Van den Hout (1993) also proposed a theory on increased attention during the Stroop Test. They proposed that the need to avoid threatening stimuli or attract desired stimuli motivated increased attention. Participants that responded quickly to food words could be motivated by the threat of food or a desire for food. Restrained eaters showed increased attention to food words because of their desire to eat or the fear and anxiety they felt when presented with the stimuli (Lavy & Van den Hout, 1993). Therefore, participants with high levels of Muscle Dysmorphia may have responded quickest to body words because of their desire to maintain the perfect physique or perhaps feelings of concern and preoccupation over their physique (Lavy & Van den Hout, 1993).

In a study by Boon, Vogelzang, and Jansen (2000), the researchers hypothesized that participants with anorexia nervosa would have delayed reaction times to food words. Just like my study, their results contradicted the hypothesis, and the participants actually responded more quickly to body words than neutral

words. This is so interesting, because in past studies, participants with body disorders tend to have delayed reaction times. The researchers' explanation for their results was because they used non-clinical participants (Boon et al., 2000). I probably did not have clinical participants either since the average score on the muscle dysmorphia questionnaire was an 85.9 out of 204. There was only 3.8% variance in reaction time to body words between those who scored high on the muscle dysmorphia questionnaire and those who scored low on the muscle dysmorphia questionnaire. If there is a non-linear relationship, it is very small. This may explain why my hypothesis was not supported.

They also found that anorexic participants required less time to identify the food stimuli compared to the neutral stimuli. The Ironic Process Theory states that, when people try to avoid certain thoughts, it causes the individual to have more thoughts (Lavy & Van den Hout, 1994). Therefore, participants with muscle dysmorphia spend much of the day thinking about exercising and muscularity, so they are very familiar with the body terms. This increased familiarity may explain the increased reaction times.

While some of these theories may explain why participants with high levels of muscle dysmorphia reacted more quickly to the body words, it does not explain why participants with low levels of muscle dysmorphia responded more quickly to body words as well. In the current study, an increased response time could indicate that the participant is more concerned about the meaning of the word rather than the word itself, which is indicative of abnormal cognitive processing. However, the results revealed that participants with high and low levels of muscle dysmorphia

responded quickest to body words. Could this mean that nearly all of the participants had symptoms of muscle dysmorphia? Perhaps muscle dysmorphia is extremely common among college campuses. Ben-Tovim, Walker, Fok, and Yap (1989) argue that just because something means one thing, does not indicate that the reverse is true as well.

Ben-Tovim et al. (1989) hypothesized that preference for food related words that originated from anxiety over the meaning of the words was indicative of psychopathology. However, whether or not anxiety had to do with preference was questioned. Green and Rogers (1993) found that slower response time to food related words was present in restrained eaters whether or not they were dieting at the time. Therefore, food restraint may be related to increased attention to food words, but increased attention to food words is not always related to food restraint (Channon & Hayward, 1990). Individuals with high levels of muscle dysmorphia may have reacted quickly to food words because of variables related to anxiety or bias, but quicker reaction times does not necessarily mean the participant has high levels of muscle dysmorphia.

Reaction time is not necessarily indicative of psychopathology, but the fact that all of the participants reacted more quickly to body terms could reveal that more and more people today are concerned with their body shape and/or size. While some participants scored low for symptoms of muscle dysmorphia, all of the participants responded quickest to body words. Most of the college students do not experience preoccupation with their appearance or have intense feelings of anxiety

over their muscularity, but many if not all of them had concerns about their appearance.

Narcissism was commonly believed to be a female disorder. The pressure to have perfect hair, skin, and body was more geared toward women than men (Grieve, Wann, Henson, & Ford, 2006; Ridgeway & Tylka, 2005). In the 1990s, men were often portrayed as the practical man. However, in recent years narcissism and perfectionism have become problems for men as well. Men have started to focus on beauty and will go to whatever means necessary in order to achieve it, including eating disorders and perhaps, muscle dysmorphia (Hoyer & MacInnis, 2004). Therefore, appearance is a priority for most people. There has been an increase in the number of men on college campuses that are dissatisfied with their bodies (Morgan, 2001; Grieve, 2006). Research shows that 95% of college men are unhappy with their bodies (Labre, 2002). This could explain why all of the participants had faster reaction times for the body words. Because the body words were more personal and perhaps induced feelings of concern, they could have led to a faster reaction in all of the participants.

An important factor for the current study was word choice. The body words included terms such as “bicep, arm, muscle, etc” and the neutral words included terms such as “squirrel, window, pain, etc”. However, it is not known whether those words are actually neutral to the participants. For example, the word “squirrel” could have triggered the participants to think about the white squirrels on WKU campus. Some of the neutral words may have actually caused anxiety and preoccupation, which may have affected response time. It may have been beneficial

to use neutral words such as “and, the, same”, etc that do not hold much meaning. It would have also been interesting to use body and food words. In research with anorexic and bulimic patients, some groups responded differently to body and food words. While men with muscle dysmorphia are more concerned with muscularity than food, they maintain a strict diet and take dietary supplements (Olivardia, 2001). Therefore, they may respond differently to food versus body words.

There were some limitations with the research that I would change if I could do it over again. First, I would have liked to have a wider range of participants. Many of the participants agreed to do the study for extra credit in their Introduction to Psychology 100 class. Since freshmen normally take this class, most of the participants were 18 years old. I would have preferred to have males from each grade so that the sample matched the campus more precisely. The majority of the men were Caucasian as well. It would be interesting to conduct this study on men of other ethnicities to discover differences in the racial groups. I also think the presence of the researcher may have affected the participants’ responses. The questions from the muscle dysmorphia questionnaire were rather personal and having college students their own age conducting the questionnaires may have been intimidating for them. The social facilitation effect could have played a role in the participants’ performance. The social facilitation effect is the tendency for people do well on simple tasks when there is an audience, but do poorly on difficult tasks when an audience is present (Zajonc, 1965). Hueget, Glavaing, Monteil, and Dumas (1999) found that, in contrast with this theory, an audience, as well as the presence of another participant in the room, enhanced performance on the Stroop Test.

However, the presence of an audience had an adverse effect on normal cognitive processes. They concluded that social situations might actually influence automatic cognitive processes (Hueget, et al., 1999). This contradicts the original view of the Stroop Test. Since the Stroop Test measures automatic neural processes that occur in the brain, social situations were believed to have little affect on the outcome. However, even the presence of one other person may have greatly affected the participants' ability to identify the colors of the word, as well as their reaction time (Huguet et al., 1999). The fact that a self-report questionnaire was used for the study could also be a limitation. The participants may not have completely understood some of the questions, randomly picked answers, or were dishonest while completing the questionnaire.

Given that the population of WKU undergraduate students is right around 21,000, I would prefer more than 80 participants for the study. The results show that participants with low and high levels of muscle dysmorphia did not respond differently to the Stroop Task. This may have been because the participants did not vary as much as they could have. Muscle dysmorphia is only found in only 9% of people with Body Dysmorphic Disorders and around 5% to 10% of weightlifters (Olivardia, 2001). With 80 participants in my study, at best I would have had maybe five individuals participate that actually had muscle dysmorphia. The participants were identified as either having high or low levels of muscle dysmorphia, but the intensity of the symptoms may not have been large enough among them to show differences in reaction time. The range of scores on the muscle dysmorphia questionnaire was 45-143 ($M=95.9$, $SD= 20.9$). Therefore, participants win my "high

group” actually had moderate to low levels of muscle dysmorphia. The results may have been different if I had used a much larger sample size, or if I had used individuals who were previously diagnosed with a body disorder and compared their results with a control group of normal individuals.

Research on muscle dysmorphia among college age men has many implications for university campuses. It is important for college counselors to be aware of the added pressure that young men have today to reach the ideal body (Ridgeway & Tylka, 2005). Since muscle dysmorphia is such a new disorder and limited research is provided about it, counselors must be aware of its existence. Men who have signs of depression or anxiety should discuss their feelings regarding self-esteem, body image, and masculinity. Men who have issues with these areas may be at risk for developing muscle dysmorphia. A common misconception with this disorder is that men who exercise a lot most likely have high levels of muscle dysmorphia. This is not necessarily the case. What differentiates men with muscle dysmorphia from healthy individuals is how they feel if they miss a work out, their opinion about their body (Morgan, 2002), and cognitive distortions about their bodies (Grieve, 2007). It is important for counselors to ask these questions in account. Counselors need to encourage education about unhealthy media messages, effective means of exercising and eating right, and consequences of taking muscle-enhancing supplements (Grieve, Truba, Bowersox, 2010). Many men may not reach out for help if they think they may have a body disorder. Therefore, it important that positive reinforcement is given to those who do seek help (Olivardia, 2001).

College counseling services should promote information about body dissatisfaction to the entire campus, not just those who seek help for it. There is usually informational material about eating disorders, but not much on male body disorders. Counselors should encourage young men to maintain a healthy fit lifestyle that does not involve the use of supplements (Davey & Bishop, 2006).

More research needs to be done to find out how common the disorder is, its causes, and what techniques are best at fixing the issue. According to Davey and Bishop (2006), some important research questions to pose would be, "Why is the desire for muscularity greatest around the age of emerging adulthood?" "What is the influence of media on body image issues?" and "How can services be developed to effectively address this area of concern?"

The results of this study could possibly imply that the Stroop Test is not reliable for identifying symptoms of muscle dysmorphia. However, past research shows that the Stroop Test is a good measure for symptomatology. Ben-Tovim & Walker (1991) found that the Stroop Test differentiated participants with eating disorders from participants without eating disorders. Further analysis revealed that thought processes concerning body image and food reflected an internal conflict that was not related to weight. Therefore, the Stroop Test is not believed to measure the "core psychopathology of eating disorders", but it could reveal the intensity of the symptoms related to muscle dysmorphia (Ben-Tovim & Walker, 1991). This was evidence that the Stroop Test could measure levels of muscle dysmorphia in eating disorders. While this research is based off of eating disorders and not muscle dysmorphia, patients with the disorders have very similar thought patterns.

In conclusion, the results of the current study did not support the hypothesis that men with higher levels of muscle dysmorphia would have slower reaction times to body related words. All of the participants responded faster to body words. This could have been due to faults in the methodology of the study. Therefore, further research should be done to discover if the Stroop Test could be used to indicate levels of muscle dysmorphia in men.

APPENDIX A

Word List

Everyday Words

Hair
Chair
Shoe
Desk
Thumbtack
Window
Tree
Camera
Squirrel
Cup
Park
Book
Cold
Quiet
Paint

Body image Words

Muscle
Six pack
Strong
Swollen
Obese
Ugly
Sexy
Leg
Arm
Buff
Attractive
Skinny
Thick
Yoked
Weights

APPENDIX B

Demographics Questionnaire

Please circle which of the following pertains to you

Gender:

Male

Female

Race:

Caucasian

African American

Asian

Hispanic

Other

Year:

Freshman

Sophomore

Junior

Senior

Marital Status:

Single

Married

APPENDIX C

Muscle Dysmorphia Questionnaire

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

| | Strongly Disagree | Somewhat Disagree | Slightly Disagree | Slightly Agree | Somewhat Agree | Strongly Agree |
|--|-------------------|-------------------|-------------------|----------------|----------------|----------------|
| When I see my reflection in the mirror or a window, I feel badly about my body size or shape | 1 | 2 | 3 | 4 | 5 | 6 |
| Working out causes problems in my job | 1 | 2 | 3 | 4 | 5 | 6 |
| I eat specific foods at specific times throughout the day in order to gain muscle mass | 1 | 2 | 3 | 4 | 5 | 6 |
| When I see muscular men, it makes me feel badly about my body shape or size | 1 | 2 | 3 | 4 | 5 | 6 |
| I am inclined to continue to work out when I am sick | 1 | 2 | 3 | 4 | 5 | 6 |
| I am ashamed of my body shape or size | 1 | 2 | 3 | 4 | 5 | 6 |
| I have difficulty maintaining relationships because of thoughts about my body | 1 | 2 | 3 | 4 | 5 | 6 |
| I am inclined to continue to work out when I am injured | 1 | 2 | 3 | 4 | 5 | 6 |
| I have difficulty maintaining relationships because of thoughts of working out | 1 | 2 | 3 | 4 | 5 | 6 |
| I believe bad things happen in my life when I do not have a specific level of muscularity | 1 | 2 | 3 | 4 | 5 | 6 |
| Working out causes problems in my romantic relationships | 1 | 2 | 3 | 4 | 5 | 6 |

| | | | | | | |
|---|-------------------|-------------------|-------------------|----------------|----------------|----------------|
| I believe I am more muscular than others | 1 | 2 | 3 | 4 | 5 | 6 |
| I feel badly when I do not get to work out | 1 | 2 | 3 | 4 | 5 | 6 |
| I eat by myself | 1 | 2 | 3 | 4 | 5 | 6 |
| I am inclined to continue to work out against doctor's orders | 1 | 2 | 3 | 4 | 5 | 6 |
| I am inclined to participate in activities that require wearing swimsuits | 1 | 2 | 3 | 4 | 5 | 6 |
| I do not believe I am as muscular as others | 1 | 2 | 3 | 4 | 5 | 6 |
| I want to be more muscular than I currently am | 1 | 2 | 3 | 4 | 5 | 6 |
| | Strongly Disagree | Somewhat Disagree | Slightly Disagree | Slightly Agree | Somewhat Agree | Strongly Agree |
| I think I look better when I have large muscles | 1 | 2 | 3 | 4 | 5 | 6 |
| Working out causes problems in my friendships | 1 | 2 | 3 | 4 | 5 | 6 |
| I am muscular enough | 1 | 2 | 3 | 4 | 5 | 6 |
| If I could increase my muscle mass, I would | 1 | 2 | 3 | 4 | 5 | 6 |
| I have difficulty focusing on schoolwork because of thoughts about my body | 1 | 2 | 3 | 4 | 5 | 6 |
| I am not muscular enough | 1 | 2 | 3 | 4 | 5 | 6 |
| Others feel that I am way too focused on my body shape or size | 1 | 2 | 3 | 4 | 5 | 6 |
| I have difficulty focusing on schoolwork because of thoughts of working out | 1 | 2 | 3 | 4 | 5 | 6 |
| I feel insecure about my | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| body | 1 | 2 | 3 | 4 | 5 | 6 |
| I use legal or illegal supplements (creatine or anabolic steroids) to help develop my muscles | 1 | 2 | 3 | 4 | 5 | 6 |
| I am inclined to participate in activities that require minimal clothing | 1 | 2 | 3 | 4 | 5 | 6 |
| The less clothing I wear, the more anxious I become | 1 | 2 | 3 | 4 | 5 | 6 |
| I eat a large amount of protein in order to increase my muscularity | 1 | 2 | 3 | 4 | 5 | 6 |
| I feel anxious when I deviate from my diet | 1 | 2 | 3 | 4 | 5 | 6 |
| I believe bad things happen to me when I do not keep my workout schedule | 1 | 2 | 3 | 4 | 5 | 6 |
| I feel anxious when I miss a workout | 1 | 2 | 3 | 4 | 5 | 6 |

APPENDIX D

Informed Consent Document

Project Title: Muscle Dysmorphia and The Stroop Test

Investigator: Molly White, Department of Psychology, (502-552-3977)

All information obtained will be treated in the strictest confidentiality. No names or identifying information will be matched to your data. The investigator will explain to you in detail the purpose of the project, the procedures to be used, and the potential benefits and possible risks of participation. You may ask him/her any questions you have to help you understand the project. A basic explanation of the project is written below. Please read this explanation and discuss with the researcher any questions you may have.

1. **Nature and Purpose of the Project:**

As an undergraduate student in the Department of Psychology and under the supervision of Dr. Frederick Grieve in the Department of Psychology at Western Kentucky University, I am conducting research on color recognition. The purpose of this study is to help the researcher discover why color recognition is more difficult with certain words than others. This will be done using the Stroop Test.

2. **Explanation of Procedures:**

I ask that you participate in the Stroop Test using the E-Prime software. You will be asked to view 30 words and then using the keyboard, to indicate a response. Your reaction time will be measured. The study should take no longer than 30 minutes.

3. **Discomfort and Risks:**

There are no foreseeable risks associated with this research project and the probability and magnitude of harm or discomfort anticipated in the research is nonexistent.

4. **Benefits:**

While you may not benefit directly from participation in this study, it is hoped that the knowledge gained through your participation will help others at a later time.

5. **Confidentiality:**

The study does not contain any identifiable information, and anonymity is assured. No one except the researcher and the instructor will have access to the data. Data will be destroyed at the end of the semester.

6. **Refusal/Withdrawal:**

Refusal to participate in this study will have no effect on any future services you may be entitled to from the University. Anyone who agrees to participate in this study is free to withdraw from the study at any time with no penalty.

You understand also that it is not possible to identify all potential risks in an experimental procedure, and you believe that reasonable safeguards have been taken to minimize both the known and potential but unknown risks.

THIS PROJECT HAS BEEN REVIEWED AND APPROVED BY
THE WESTERN KENTUCKY UNIVERSITY INSTITUTIONAL REVIEW BOARD
Paul Mooney, Human Protections Administrator
TELEPHONE: (270) 745-4652

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