ABSTRACT

RADTKE, C. J. The relationship between perceived body image and actual body composition among male college students. MS in Adult Fitness/Cardiac Rehabilitation, December 1996, 57pp. (N. K. Butts)

This study investigated the relationship between perceived body image and percent body fat among 39 male college students. Ss were randomly selected from 332 males enrolled in the HPR 105, Health and Physical Well Being, course during the Spring semester of 1996. Perceived body image was determined from the Body Cathexis Scale (Secord & Jourard, 1953) and the Body Silhouette Scale (Stunkard, Sorenson, & Schulsinger, 1983), and hydrostatic weighing was used to determine body composition. A Pearson product moment correlation revealed a significant ($p < .001$) relationship and a moderate ($r = .52$) correlation between perceived body image and percent body fat. A one-way ANOVA with repeated measures showed no significant ($p > .05$) differences between current and ideal, current and attractive, and ideal and attractive body figures. Body cathexis scores revealed that the males were satisfied with their body image and a Pearson product moment correlation showed no significant ($p > .05$) relationship between the body cathexis score and the current body figure. However, results showed that body cathexis scores increased systematically as self-perception moved toward the skinnier or fatter body silhouette. A dependent t-test showed a significant ($p < .05$) difference between self-reported and actual height measurements and no significant ($p > .05$) differences between self-reported and actual weight and BMI measurements. Perceptions of the males revealed satisfaction with their body image, however a slightly slimmer body physique was desired.

THE RELATIONSHIP BETWEEN PERCEIVED BODY
IMAGE AND ACTUAL BODY COMPOSITION
AMONG MALE COLLEGE STUDENTS

A THESIS PRESENTED
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CHAPTER I

INTRODUCTION

Background

Today's society attaches expectations, values, and the ideal body image to both men and women through television, magazines, and sports. "As society becomes more fitness conscious there may be a shift in the cultural definition of an ideal male physique, with greater emphasis placed on adolescent males attaining large and muscular figures" (Cohn & Adler, 1992, p. 77). Television ads are taking advantage of America's current infatuation with fitness by using both men and women that reflect the ideal body image associated with physically fit individuals. Muscularity and fitness have been highly regarded as the acceptable means for male attractiveness, while femininity and fitness have been highly regarded as the acceptable means for female attractiveness (Brodie, Slade, & Riley, 1991; Guy, Rankin, & Norvell, 1980).

Satisfaction or dissatisfaction with self-appearance plays an integral role with an individual's self-concept and self-esteem. We learn and observe during childhood what is socially attractive and unattractive to the human culture. Children grow up in a society that perceives good looks as the acceptable norm (Dion, Berscheid, & Walster, 1972; Urbanska, 1994). As we grow, our perceptions of ourselves affect the way we carry ourselves and interact with others. Strong implications for body image may result from the label a person assigns to him or herself.

Recently, researchers have found that 3 and 6 month old babies stared convincingly longer at attractive rather than unattractive faces of white and black females, white males, and babies. This suggests that babies make observations similar to what is

attractive and unattractive to adults. This may also imply that people are born with an innate sense of what is attractive and unattractive (Cowley, 1996).

Nonetheless, people try almost anything and everything, from diet pills to surgery, in order to improve their body image. Studies have found that body weight plays a significant role in body image (Huddy, Nieman, & Johnson, 1993; Stewart & Brook, 1983). In between taking diet pills to having surgery may possibly lie the answer to improving body satisfaction. Recently, researchers have investigated how exercise may contribute to improved body image (Adame, Johnson, Cole, Matthiasson, & Abbas, 1990; Deonier & Schwarzkopf, 1991; Hallinan, Pierce, Evans, DeGrenier, & Andres, 1991). Results from these studies suggest that involvement in exercise may contribute to an improved body image. Studies also have demonstrated that exercise improves people's sense of physical competence (Sonstroem & Morgan, 1989), contributes to a more positive evaluation of one's body (Collinwood & Willett, 1971), and increases the likelihood to "feel good" (Huddy et al., 1993).

Purpose of the Study

The purpose of this study was to investigate the relationship between perceived body image and actual body composition among male college students.

Null Hypothesis

There is no significant relationship between perceived body image and actual body composition among male college students.

Assumptions

The following assumptions were made:

1. The subjects understood the questionnaires, directions, and procedures that were asked and given.

2. The subjects answered the questions as honestly as possible.
3. The subjects refrained from any food, beverages, and physical activity 2 to 4 hours prior to testing.
4. The subjects were randomly obtained, thus a representative sample of all UW-La Crosse students was obtained.
5. The Body Cathexis Scale (Secord & Jourard, 1953) and the Body Silhouette Scale (Stunkard, Sorensen, & Schulsinger, 1983) are interval measurement scales.

Delimitations

1. The number of subjects were restricted to 50 male students randomly selected from the course HPR 105, Health and Physical Well Being, Spring semester of 1996.
2. Only male students attending UW-La Crosse were used in this study.
3. The Body Cathexis Scale (Secord & Jourard, 1953) and the Body Silhouette Scale (Stunkard et al., 1983) were used to evaluate perceived body image.

Limitation

1. Individuals may have been intimidated by the hydrostatic weighing device which could negatively affect the outcome.

Definition of Terms

Body Cathexis Scale - questionnaire developed by Secord and Jourard (1953) used to measure body image. Forty different body parts and processes are presented and a person subjectively evaluates his/her feelings toward each body part using a 5-point Likert scale.

Body Composition - made up of various components determined through hydrostatic weighing: fat mass, fat-free mass, body density, and percent body fat.

Body Density (BD) - mass of the subject while totally immersed in water, determined through hydrostatic weighing. Body mass divided by body volume expressed in gm/cc^1 .

Body-Image - how an individual perceives his/her own physical characteristics measured by the Body-Cathexis Scale (Secord & Jourard, 1953).

Body Mass Index (BMI) - weight in kilograms divided by height in meters squared (W/H^2) and expressed as kg/m^2 which may reflect adiposity.

Body Silhouette Scale - nine figure silhouette developed by Stunkard et al. (1983). It is used to determine how individuals interpret their current body image, ideal body image, and attractive body image.

Fat Free Weight (FFW) - all materials in the body excluding fat (muscles, bones, water, tissues, and organs). FFW is calculated as body weight minus fat weight as determined through hydrostatic weighing.

Fat Weight (FW) - the weight of fat tissue within the body. FW is calculated as body weight times percent body fat as determined through hydrostatic weighing.

HPR 105 - College of Health, Physical Education, and Recreation General Education course, Health and Physical Well Being, that is required of all undergraduate students who attend the University of Wisconsin-La Crosse. This course emphasizes the importance of health and physical activity as a means to a healthier lifestyle.

Hydrostatic Weighing (HW) - method used to determine the subject's body weight in water that is then converted to body density.

Ideal Body Image - a subjective evaluation of the ideal body image with reference to the Body Silhouette (Stunkard et al. 1983).

Percent Body Fat - is the percent of the total body weight which is fat weight as determined through hydrostatic weighing.

Physical Activity - any exercise that persists longer than 12 minutes at 50 - 85% of maximum heart rate (American College of Sports Medicine, 1995).

Residual Volume (RV) - the amount of air left in the lungs after a maximal expiration as measured by the closed circuit oxygen dilution method (Wilmore, 1969).

CHAPTER II

REVIEW OF RELATED LITERATURE

Introduction

This chapter reviews pertinent literature on perceived body image and body composition among men and women. The Body Cathexis Scale and Body Silhouette Scale are reviewed as questionnaires for the determination of perceived body images among male college students. Also, the various methods for measuring body physique are reviewed and include hydrostatic weighing, skinfold measurements, and body mass index (BMI). In addition, overweight, obesity, and self-reported weight and height are reviewed.

Perceived Body Image

Rozin and Fallon (1988) studied two generations of men and women to determine their body image and weight perceptions. They determined that mothers, daughters, and fathers had similar dissatisfactions with their body image and weight. However, fathers did not show as much concern about weight and weight-loss issues as did mothers and daughters, even though the fathers were more concerned than their sons. Rozin and Fallon concluded that men show less concern with their body image than women.

Adame et al. (1990) investigated the relationship between exercise and body image among male and female college students. Their results indicated that the individuals who were more fit felt good about their body image, whereas the individuals who were less fit had poor perceived body images. In general, physically fit subjects were more satisfied with their body image than were less physically fit subjects, which suggested exercise may play a vital role in improving one's perceived body image.

Distorting mirrors were used by Brodie et al. (1991) to measure body image perceptions of 30 healthy men and 30 healthy women. Brodie et al. concluded that both sexes perceived themselves fatter than their actual body image. However, males perceived their ideal body image broader than their actual body image, whereas females perceived their ideal body image slimmer than their actual body image. Similarly, healthy slim women prefer to be slimmer, whereas healthy men did not share the same desire but preferred a broader appearance.

Huddy et al. (1993) designed a study to assess the relationship between percent body fat and body image among male college varsity athletes (i.e., football players and swimmers) and nonathletes. A 20-item questionnaire was used to determine body image and skinfold measurements to determine percent body fat. They hypothesized that a relationship existed between body image and percent body fat. Results showed a linear relationship between body image and percent fat for the nonathletes and no relationship for the athletes. Moreover, a significant inverse relationship was found when the three groups were combined. In other words, athletes with a low percent body fat scored higher on the perceived body image, whereas nonathletes with a high percent body fat tended to score lower on the perceived body image. These authors suggested that percent body fat may play a vital role in body image.

In 1993, Butler and Ryckman also attempted to examine male and female college students' perceived and ideal physiques. Students were asked to rate their perceived and ideal body image on an endomorph, mesomorph, and ectomorph scale. The findings suggested that mesomorphy (i.e., predominantly muscle and bone) was the most important factor associated with the college students' ideal physiques. Moreover, females

desired greater muscle tone along with a thinner figure, whereas men desired a more muscular physique.

Body Silhouette Scale

Stunkard et al. (1983) developed a method of determining body weight status through the use of nine figure silhouettes (see Appendix A) ranging from very thin to very heavy. The scale was originally used to study the weight status of adoptive and biological parents of adoptees. First, children were asked to select a silhouette that most closely depicts their parents' body figures. Parents were then asked to select the body figure that best represents their figure and that of their spouse. The results were then compared to that of the adoptive parents and biological parents. In order to determine the validity of the silhouette, a sample of men and women of Tecumseh, Michigan were used to test the validity of the silhouettes. For more than two decades the Tecumseh population has been measured every three years with the use of surveys. A sample of 1,000 men and women aged roughly the same as the adoptees (34 to 57 years old) were asked to select silhouettes that closely resemble that of their parents. They identified 350 parents of the men and women in the sample group, and height and weight measurements of the parents were determined. Examination of the data reveals the silhouette is an accurate method of determining body weight status. The nine figure silhouette represented a monotonic increase in percentage overweight (Stunkard et al., 1983).

Fallon and Rozin (1985) presented 227 female and 248 male students with the nine-figure drawings designed by Stunkard et al. (1983) which ranged from very thin to very heavy in order to compare their current, ideal, and most attractive (to the opposite sex) body figure. Approximately 32.5% of the men and 69.7% of the women rated their current figure heavier than their ideal and 38.1% of men and 62.4% of women perceived

their current figure heavier than the most attractive to the opposite sex while 11.8% of the men and 21.7% of the women rated their ideal thinner than the most attractive to the opposite sex. Men indicated minimal differences between current, ideal, and most attractive figures. Women on the other hand, indicated that their current figure was heavier than their ideal or than their most attractive to the males. Fallon and Rozin concluded that men tended to be satisfied with their figures, whereas women felt they needed to lose weight.

In a similar study, Hallinan et al. (1991) administered a nine-figure Body Silhouette Scale (Stunkard et al., 1983) to college men and women athletes and nonathletes. The purpose was to determine the subject's current and desired body image and demonstrate that both male athletes and nonathletes were satisfied with their body image. A significant ($p < .001$) difference was shown for both female athletes and nonathletes, indicating females overestimated their body shapes and desired a thinner image. However, no significant ($p > .05$) difference was shown for both male athletes and nonathletes, indicating males were satisfied with their body image. Approximately 47.4% of women athletes and 38.1% of women nonathletes perceived themselves heavier than their perceived ideal to be, whereas 52.7% of male athletes and nonathletes perceived themselves thinner than they perceived their ideal to be.

In 1992, Cohn and Adler presented college men and women with a nine-figure body silhouette by Stunkard et al. (1983) ranging from very thin to very heavy. The participants responded to four questions: which drawing looks most like your own figure? (CURRENT); which figure do you most want to look like? (OWN IDEAL); which figure do you think most women (men) want to look like or find most attractive? (PEER IDEAL); and which figure do you think men (women) find most attractive?

(ATTRACTIVE). Results indicated that women desired a slimmer figure. In contrast, the men were divided in their desire for a slimmer (34%) or heavier (36%) body figure, suggesting men convey significantly less body dissatisfaction than women. Cohn and Adler concluded males display a desire for a larger physique (more muscularity) and suggested that future research concentrate on male's perception of muscularity.

Body Cathexis Scale

An investigation by Secord and Jourard (1953) found that the Body Cathexis Scale (see Appendix B) is a reliable ($r = .81$) tool when determining an individual's satisfaction or dissatisfaction with various body parts and processes. The body cathexis scores based on a 5-point Likert scale (1 = strong negative feelings to 5 = strong positive feelings) supported the hypothesis that feelings toward the body are equivalent with feelings toward the self. In addition, a low body cathexis score was associated with anxiety, insecurity, and feelings toward the self.

In 1954, Jourard and Secord distributed a Body Cathexis Scale to 62 male undergraduates. This scale was revised from the original version (Secord & Jourard, 1953) with a 5-point Likert scale ranging from 1 = strong positive feelings to 5 = strong negative feelings. After completion of the body cathexis, measurements (i.e., height, weight, shoulder width, chest circumference, expanded chest circumference, biceps circumference hanging loosely, and biceps flexed) were taken of each subject. Correlations between the measurements and the body cathexis ratings on height, weight, shoulders, chest, and muscular strength were calculated. Significant correlations were shown between all variables except weight, suggesting that larger characteristics coincide with muscularity (positive attitude) and smaller body characteristics with weakness (negative attitude).

Lerner, Karabenick, and Stuart (1973) administered four scales to undergraduate students attending Eastern Michigan University in the Spring of 1972. The students were asked to rate a list of 24 body characteristics on a 5-point Likert scale. The authors concluded that females considered the "shape of legs," "hips," and "thighs" more important in judging their own physical attractiveness. Males rated "height" and "width of shoulders" more important. In addition, males and females that exhibit a positive self-image tend to be more satisfied with their body characteristics.

Tucker (1981) administered the Body Cathexis Scale to male college students ($n = 83$) in order to determine the test-retest reliability and to examine the internal structure and dimensionality of the scale. It was found that male body attitude was determined by four orthogonal factors obtained from the 40 body characteristics of the Body Cathexis Scale. These factors include: Health and Physical Fitness (primary items: health, resistance to illness, physical skills, energy, and legs), Face and Over-all Appearance (primary items: face, facial complexion, and over-all appearance), Subordinate and Independent Body Features (primary items: chin, ears, and hands), and Physique and Muscular Strength (primary items: muscular strength, body build, chest, arms and width of shoulders). Scores indicated men were more satisfied with their Health and Physical Fitness and Face and Over-all Appearance and fairly dissatisfied with their Subordinate and Independent Body Features and Physique and Muscular Strength. Tucker suggested that by improving male's strength a significant improvement in the male's self-concept may be noticed. The test-retest reliability coefficient of .87 demonstrates the Body Cathexis Scale is a good measure of the self over time.

In 1982, Tucker also assessed 88 male undergraduate student's self-perceived body build through the use of a seven male figure scale ranging from very thin to very muscular

to very heavy, and the use of the 40-item Body Cathexis Scale. Results indicated a 70% difference between the male's current body figure and ideal body figure which indicated college males tended to be dissatisfied with their body figure and desired a more muscular build. The body cathexis results indicated that males who were dissatisfied with their body parts and processes perceived their body build as skinny or fat (outer extremes of the seven male figures), thus suggesting muscular build as the desired physique.

Markee, Carey, and Pedersen (1990) administered the Body Cathexis Scale to 29 women to determine nude body and clothed body perceptions. The Body Cathexis Scale was modified to 24 body parts on a 5-point Likert scale (very satisfied to very dissatisfied). The clothed body cathexis was used to determine body cathexis changes with clothing. Using a pre-posttest design, pretest scores indicated clothed body cathexis values were greater than body cathexis values for facial complexion, profile, weight distribution, eyes, waist, arms, shape of legs, general appearance, face, hips, body build, thighs, chest, and total score. Posttest scores indicated clothed body cathexis values were greater than body cathexis values for facial complexion, profile, weight distribution, waist, arms, shape of legs, general appearance, face, body build, thighs, and total score. These results imply that clothing improves body characteristics by covering up dissatisfied areas, momentarily enhancing body cathexis.

The effect exercise involvement has on the body cathexis was investigated by Deonier and Schwarzkopf (1991). Subjects included women and men enrolled in a university physical fitness class. Four variables dependent on exercise involvement in which the females seemed to be preoccupied with included waist, hips, thigh, and weight; whereas, the males tended to be preoccupied with shoulders, chest, and fitness. Results show males tended to be satisfied with their body characteristics more so than women. In

addition, exercise involvement significantly improved male and female body cathexis despite initial body cathexis score.

Body Composition

When assessing body composition (i.e., body density, total body fat, and lean body weight) the two most prominent methods used are hydrostatic weighing and skinfold measurements (Barr, McCargar, & Crawford, 1994; Pollock, Garzarella, & Graves, 1995; Wilmore & Costill, 1994).

Hydrostatic Weighing

Hydrostatic weighing (HW) is one of the most reliable, accurate, and vastly used procedures for determining body density (Behnke & Wilmore, 1974; Pollock & Wilmore, 1990; Wilmore & Costill, 1994). The HW method utilizes Archimedes' principle that a body immersed in a fluid is acted on by a buoyancy force which is evidenced by a loss of weight equal to the weight of the displaced fluid (Behnke & Wilmore, 1974). The density of fat (0.90 gm/cc^3) is lower than that of water, whereas density of bone and muscle tissue (1.2 to 3.0 gm/cc^3) is higher than water. An individual with a greater proportion of bone and muscle mass over fat will weigh more submerged in water resulting in a higher body density (i.e., lower percent body fat).

Proper instruction and preparation prior to HW are essential for obtaining the best results. Pollock and Wilmore (1990) recommend a normal diet, fluid intake, and exercise pattern prior to testing day. Foods which may cause excessive amounts of gas in the gastrointestinal tract should be avoided. In addition, subjects should avoid circumstances when hydration or dehydration may occur, because severe hydration prior to HW increases weight while decreasing density thus increasing body fat. Severe dehydration decreases weight while increasing density thus decreasing body fat (Girandola, Wiswell, &

Romero, 1977; Martin & Drinkwater, 1991). Other guidelines include voiding bladder and bowel if necessary and abstaining from eating, drinking, or smoking 2 to 3 hours prior to testing (Pollock et al., 1995; Pollock & Wilmore, 1990). Pollock et al. (1995) recommends testing subjects in the morning prior to breakfast. Men should wear a swimming brief and women a two-piece swimsuit in order to avoid trapping air which may cause a significant error in the measurements.

Despite the fact HW is considered the "gold standard" when formulating prediction equations, a variance of approximately $\pm 3.8\%$ (Siri, 1961) derived from four major sources may be seen. These four factors include: variance in the water content of the body independent of body fatness, variance in the protein to bone mineral ratio, variance in the density of obesity tissue, and variance in fat content (Katch & Katch, 1980). Other errors associated with HW occur with improper measurement in RV, body weight out of the water, and body weight in the water. Errors in RV may occur when age and height or vital capacity are estimated, thus any estimations associated with RV are not recommended. Time of day, dietary pattern, hydration status, and illness may cause variation in body weight (Lohman, 1981; Pollock et al., 1995). As mentioned earlier, density can be altered by excessive dehydration or hydration brought on by exercise, sauna, diarrhea, medications, or menstruation cycle. A 1% change in percent body fat may result from a 1 to 3 kg weight change (Girandola et al., 1977; Pollock & Wilmore, 1990).

The equations are based on the assumption that muscle, bone, and fat constitute a constant density and that water is of a constant temperature. A high correlation ($r = .995$ to $.999$) exists between the two equations suggesting either one is useful for calculating body density (Behnke & Wilmore, 1974). Lohman (1981) determined the two equations

correspond within 1% fat of each other. Percent fat can be predicted from either of the following two equations:

Brozek, Grande, Anderson, and Keys (1963):

$$\text{Percent body fat} = \frac{4.570}{BD} - 4.142 \times 100$$

Siri (1961):

$$\text{Percent body fat} = \frac{4.590}{BD} - 4.500 \times 100$$

The density of fat free weight (FFW) and fat are irregular in humans, which may cause an error in determining percent body fat from density by 2.5 or 3.8% (Lohman, 1981). Nevertheless, a reliability with Pearson product moment correlation coefficients greater than .95 have been associated with the hydrostatic weighing method (Oppliger, Looney, & Tipton, 1987).

Skinfold Measurements

Skinfold measuring is also a common method used for measuring body density. Hydrostatic weighing is the basis for which skinfold equations are based. The reliability and validity in predicting percent body fat have been studied, comparing skinfold and hydrostatic weighing results. Jackson and Pollock (1985;1980;1978) developed equations based on skinfolds and age. Correlation values for three separate equations included .90, .91, .89 and .85, .84, .83 for men and women, respectively.

Body Mass Index

Body mass indices (BMIs) are commonly used in large epidemiologic studies of obesity. Body mass indices derived from height and weight measurements include the weight-height ratio (W/H), Quetelet index (W/H²), Kahosla-Lowe index (W/H³), and Benn index (W/H⁴) and the Quetelet index is regarded as the most accepted BMI. A BMI that

Table 1. Zero-order correlations between four body mass indices, weight, and height

Body Mass Indices	Body Mass Indices			
	W/H	W/H ²	W/H ³	W/H ^P
W/H ²	.97			
W/H ³	.91	.98		
W/H ^P	.98	.99	.97	
Weight (lbs)	.98	.91	.81	.92
Height (inches)	.19	-.03	-.24	-.01

Revicki, D. A., & Israel, R. G. (1986). Relationship between body mass indices and measures of body adiposity. American Journal of Public Health, 76, p. 993.

correlates minimally with height and maximally with weight is desired. All BMIs show a high correlation with weight (see Table 1), whereas W/H² and W/H^P are not significantly correlated with height (Revicki & Israel, 1986).

Skinfold measurements and hydrostatic weighing methods tend to show a high relationship to body fat measurements (see Table 2). The W/H² and W/H^P had the highest correlation with hydrostatic measures of percent body fat. The Quetelet index (W/H²) and the Kahosla-Lowe index (W/H³) show the highest correlation, after age-adjustment, between the BMIs and hydrostatic measurements.

A major limitation of the BMI is that it is hard for patients to comprehend. Nevertheless, a panel at the 1985 National Institute of Health Conference recommended the use of BMI for the evaluation of desirable and obese weight ranges and that nomograms be used to simplify calculations of BMI (Burton, Foster, Hirsch, & Van Itallie, 1985).

Table 2. Correlations, partial correlations adjusting for age, and 95% confidence intervals among four body mass indices, skinfold fat percent, and hydrostatic fat percent

Body Fat Measures	Body Mass Indices			
	W/H	W/H ²	W/H ³	W/H ^P
Correlations (Confidence intervals)				
Skinfold Fat %	.75 (.71, .79)	.76 (.72, .80)	.73 (.68, .77)	.76 (.72, .80)
Hydrostatic Fat %	.70 (.65, .75)	.71 (.66, .75)	.69 (.64, .74)	.71 (.66, .75)
Partial Correlations (Confidence intervals)				
Skinfold Fat %	.70 (.65, .74)	.74 (.70, .78)	.72 (.67, .76)	.72 (.67, .76)
Hydrostatic Fat %	.52 (.45, .59)	.58 (.51, .64)	.58 (.51, .64)	.54 (.47, .60)

Revicki, D. A., & Israel, R. G. (1986). Relationship between body mass indices and measures of body adiposity. *American Journal of Public Health*, 76, p. 993.

Konig and Batra (1994) examined 2,152 males aged 18 to 24 years of age in order to determine if an association exists between fat mass (FM) and fat percent (FP) models. Calculations were determined from body mass (BM), body height (BH), and body mass index ($BMI = BM/BH^2$). It was concluded, when estimating body fat, that models based on fat mass are favored over models based on fat percent; thus, recommending the use of the BMI model for fat mass prediction. Because BMI does not differentiate between fat weight (FW) and fat free weight (FFW), it may exaggerate individuals with high FFW, for example athletes with high muscle mass (Garn, Leonhard, & Rosenberg, 1986). On the

other hand, BMI values for individuals who are tall in stature (i.e., long arms and legs) may be underestimated (McArdle, Katch, & Katch, 1986).

The Quetelet's index (W/H^2) is the most widely used and accepted means of measuring body physique (Pollock & Wilmore, 1990). According to Millar and Stephens (1987) a BMI ≤ 20 is considered underweight, a BMI between 20.1 and 25.0 is normal weight, a BMI between 25.1 and 30.0 is overweight, and a BMI ≥ 30.0 is obese.

Overweight and Obesity

Together, overweight and obesity are considered one of the most crucial health care problems in the U.S. (Van Itallie, 1985). The health problems associated with overweight and obesity totaled \$39 billion in 1986 (Colditz, 1992). Overweight is "that condition where an individual's weight exceeds the population norm or average, as determined on the basis of gender, height, and frame size" (Pollock & Wilmore, 1990, p. 48). Obesity is "an excess of body fat frequently resulting in a significant impairment of health" (Burton et al., 1985, p. 157). Standardized height and weight tables (Metropolitan Life Insurance, 1983;1959) have been used to determine desirable weight ranges. However, standard height-weight tables are not accurate means of determining an individual's appropriate weight range because they do not consider the composition of the weight. For example, an individual can be overweight according to height-weight tables, yet have a low level of body fat (Wilmore & Costill, 1994).

The prevalence of overweight among U.S. adults aged 20 years or older from 1988 to 1991 was estimated at 33.4%. Moreover, the U.S. National Health Interview Survey (NHIS) found an increase in weight of 2.4% from 1983 to 1985 and 3.5% from 1985 to 1990. These percentages were based on self-reported heights and weights among adults 18 years of age or older. Overweight was defined as $\geq 20\%$ of desirable weight

(Piani & Schoenborn, 1993). In a similar survey by the Centers of Disease Control and Prevention Behavioral Risk Factor Surveillance System (BRFSS) it was found that the prevalence of overweight increased (based on self-reported weight and height) by roughly 5% from 1989 to 1992 among adults aged 25 years or older.

According to the Minnesota Heart Health Program, adults in the midwestern U.S. showed an increase in the prevalence of obesity ($\text{BMI} \geq 30$) among adults aged 25 to 74 years old. The results, based on height and weight, showed an increase of 4.6% among men and 6.1% among women (Shah, Hannan, & Jeffery, 1991).

The U.S. Department of Health and Human Services authored a report known as Healthy People 2000: National Health Promotion and Disease Prevention Objectives. The objective was to reduce the prevalence of overweight by the year 2000 to no more than 20%. However, according to the 1976 to 1980 National Health and Nutrition Examination Survey (NHANES II) and the 1988 to 1991 NHANES Phase I the prevalence of overweight has increased as demonstrated by a BMI of 25.3 to 26.3. Some of the factors that may be responsible include dietary knowledge, attitudes, practices, physical activity levels, and health behavior factors (Kuczmarski, Flegma, Campbell, & Johnson, 1994).

The prevalence of overweight has reached a point of great concern in the U.S.. Adults with a $\text{BMI} \geq 26$ is considered to be overweight. By this standard, roughly 39% of men and 36% of women have a higher than normal BMI for their size. People have been informed to lose weight and maintain a healthy weight (BMI 20 to 25) in order to decrease any adverse health risk (Millar & Stephens, 1987). It has been documented that body weight increases with age in the majority of people, while body structure (height) decreases slightly with age (Bemben, Massey, Bemben, Boileau, & Misner, 1995; Pollock

& Wilmore, 1990). So, as an individual ages his/her BMI tends to increase (Bouchard, 1991), which may give rise to an increase in morbidity and mortality (Monson et al., 1990).

Height and Weight

Stunkard and Albaum (1981) examined the accuracy of self-reported weight by comparing self-reported and measured weight. Subjects included 550 American men and women in the U.S. and 752 people at a Danish site in Copenhagen. The sites selected met three criteria: a wide range of persons, a wide range of reasons for weighing them, and that the subjects did not know they would be weighed. Stunkard and Albaum noted that a possible source of bias in self-reports may be associated with the subject's knowledge that he/she will be measured shortly after the reports. Results indicated that self-reported and measured weights of the Americans were accurate for all variables (age, sex, height, and weight), even among obese individuals. However, the Danish reports were less accurate possibly due to the differences in nationality or the reasons for reporting weight.

Palta, Prineas, Berman, and Hannan (1982) compared self-reported weight and height to actual weight and height. Home interviews were used to obtain self-reported weight and height. Two questions were asked: How tall are you without shoes? and How much do you weigh without heavy clothes on? Actual weight and height were measured 3 weeks later. All weight was recorded to the nearest pound and height to the nearest inch. The investigation revealed that on the average height was overestimated by 1.3% in men and .6% in women. In addition, as both men and women increased in age their overestimation of height increased. On the average, weight was underestimated by 1.6% in men and 3.1% in women. Palta et al. concluded that misreported weight and height are unlikely to change conclusions.

Stewart (1982) examined the reliability and validity of self-reported weight and height of 3,373 individuals aged 14-61 years. Weight and height were measured by two methods: completion of a medical history questionnaire (MHQ) and by technicians at a medical screening examination (MSE). Results indicated women underestimated their weight by 3.1 lb and men by 1.6 lb. As education level of men increased so did their underestimating of weight. Conversely as the education level of women increased their underestimating of weight decreased. The greatest underestimation (roughly 3 lb) occurred in the 30-39 age group than in any other group (roughly 2 lb). Underestimating increased as body weight increased for both men and women, more so for women than men. Overweight individuals were more likely to underestimate their weight (mean of 3.6 lb) than nonoverweight individuals (mean of 1.5 lb). In addition, people tended to overestimate their height (mean of 0.6 inch taller), men more so than women. As the subject's age increased, the amount of overestimation increased. Overall, the results demonstrated that self-reported weight and height are accurate indicators of actual weight and height. Moreover, the self-reported weight and height were valid (overall, $r = .99$ for weight and $r = .97$ for height) and reliable even in extremely overweight individuals.

Millar (1986) studied the distribution of weight in adults aged 20-69 years in a comparison of estimates from the 1985 Health Promotion Survey and the 1981 Canada Fitness Survey. The Health Promotion Survey acquired information on self-reported weight and height, while the Canada Fitness Survey made use of measured weight and height. Weight classifications of the 1973 Fogarty Conference on Obesity were utilized in the classification of respondents. Respondents ($n = 10,649$) of the Health Promotion Survey included all persons aged 15 years and older living in Canada. The survey, conducted by telephone, asked two questions: How tall are you without shoes? and How

much do you weigh? Respondents answered in feet/inches or centimeters and pounds or kilograms, respectively. The Canada Fitness Survey used trained technicians and calibrated equipment to obtain actual weight and height measurements of 16,000 individuals between the ages of 7 and 69 years. In addition, the Quetelet index (W/H^2) was used with both surveys to observe any differences between self-reported and actual Quetelet index.

Results indicated comparisons of mean weight estimates among males showed no significant differences with the exception of males 60-69 years old. This age group underestimated their weight by 3.8 kg. Unlike men, all women underestimated their weight by 0.6 kg (20-69, 30-39, and 40-49 age groups), 1.8 kg (50-59 age group), and 1.5 kg (60-69 age group). In addition, mean height estimates among men ranged from 1.8 to 3.2 cm above the observed. The largest differences in height were observed in males below age 50. Mean height estimates among women ranged from 0.8 to 4.4 cm above the observed; moreover, the mean height difference in women increased after age 40. The mean height differences for all age/sex groups between the two surveys were statistically significant. Mean Quetelet index values for observed data were higher than self-reported data except for males aged 20-29. All comparisons showed significant differences.

Summary

Perceived body image is strongly associated with the label that an individual assigns to himself/herself (Huddy et al., 1993). Studies indicated men tend to be satisfied with their body image (Fallon & Rozin, 1985; Hallinan et al., 1991), whereas, other studies indicated muscularity (body build) as the desired body image (physique) (Brodie et al., 1991; Butler & Ryckman, 1993; Tucker, 1982). Moreover, percent body fat was shown to be a factor in body image attitudes among male nonathletes, however not among

athletes. The combination of athletes and nonathletes however showed an inverse relationship between body image and percent body fat (i.e., low percent body fat = high perceived body image and high percent body fat = low perceived body image) (Huddy et al., 1993).

CHAPTER III

METHODS

Introduction

The Body Cathexis Scale (Secord & Jourard, 1953) and the Body Silhouette Scale (Stunkard et al., 1983) were administered to all the male students in HPR 105, Health and Physical Well Being, course in order to compare their perceived ideal body images to their actual body images. The hydrostatic weighing procedure was used to determine the male's percent body fat. Results were then analyzed to determine if a relationship existed between perceived body image and body composition.

Subject Selection

Initially 332 male students enrolled in the HPR 105 at the University of Wisconsin-La Crosse were asked to complete a two-page questionnaire during the first class period in the Spring of 1996. Subjects recorded their age, school year, height, and weight. In addition each student was asked to complete the Body Cathexis Scale and the Body Silhouette Scale. Each student enrolled in the class was assigned a number in which an Epistat program, a menu-driven statistical program, was used to obtain a random sample of 50 potential subjects from the 332 male students. Subjects were asked to complete an informed consent (see Appendix C), approved by the Institutional Review Board, before any data were collected.

Body Silhouette Scale

The subjects were also presented with three male, nine-figure silhouette and one female, nine-figure silhouette (Stunkard et al., 1983, see Appendix A) ranging ordinally from very thin to very heavy. Each figure corresponded to a number from 1 to 9 (1 = very

thin and 9 = very heavy). On four separate scales the subjects were asked to indicate (circle) the figure (a) that is similar to their current figure (CURRENT), (b) they would like to look like (IDEAL), (c) that they thought would be most attractive to females (ATTRACTIVE), and (d) of the female they found most attractive (OTHER ATTRACTIVE).

Body Cathexis Scale

The Body Cathexis Scale was used to measure the subject's perceived body image on specific body parts or processes (Secord & Jourard, 1953) (see Appendix B). This questionnaire contained 40 various body parts and processes in which the males gave a subjective rating based on a 5-point Likert scale ranging from 1 = Have strong positive feelings to 5 = Have strong negative feelings. This questionnaire was distributed to all males in the HPR 105 course on the first day of class during the Spring semester of 1996. A mean score was determined by summing up the responses and dividing by 40.

Preliminary Procedures for Hydrostatic Weighing

The 50 subjects who were randomly selected were contacted by phone from the Human Performance Laboratory in Room 225 Mitchell Hall. After explaining the purpose of this study, subjects were asked to sign up for 30 minute time slots in order to be hydrostatically weighed. Prior to hydrostatic weighing subjects were asked to: (1) fast for 12 hours; (2) avoid liquid 1 hour prior to testing; (3) avoid vigorous exercise for 12 hours; and, (4) attempt to empty bowel and bladder just prior to testing (Thomas, Crough, & Araujo, 1988). Subjects were also asked to bring a light swimsuit, preferably cotton or nylon, and a towel. Subjects reported to the Human Performance Laboratory for a 30 minute testing session. Upon arrival, subjects were required to sign an informed consent (see Appendix C). The subjects' height and weight were measured with dry swim suits on

to the nearest .25 cm and kg, respectively. Each subject was required to take a shower in order to rinse off any oil to improve the accuracy of the testing results.

Residual Volume

The subjects performed two vital lung capacity tests prior to measuring their residual volume. A Collins (Braintree, MA) 9 L vitalometer was used to obtain the vital lung capacity values. Subjects were instructed to take in a maximal breath, seal their lips tightly around the cardboard mouth piece connected to the spirometer tube and forcefully exhale as much as possible. A second test was completed and an average from the two trials was rounded up to the nearest liter. The value determined was then used as the bag volume of oxygen during the residual volume test.

The subject's residual volume was determined in the hydrostatic weighing tank while immersed at about shoulder level through a closed circuit oxygen dilution method (Wilmore, 1969). An electric nitrogen analyzer (Med Science 505 Nitralyzer, Needham Heights, MA) was used to accurately measure gas exchanged while the subject was inspiring and expiring through the bag. The nitrogen content level was recorded on a chart recorder during each testing procedure. Prior to each test, the chart recorder was calibrated and the rebreathing bag was flushed out with oxygen and emptied with a vacuum pump. The oxygen bag volume was obtained from the vital lung capacity test and was filled to the predetermined value. The subject was then instructed to place a nose clip on and to seal his lips tightly around the cardboard mouth piece and breath normal as possible. The subject was then asked to forcefully expire all air possible. When the subject expired all his air he was told to raise a finger which signaled the researcher to open a valve which connected the subject to the rebreathing bag. Once connected, the subject was instructed to deeply breath in followed by deep, rapid breaths in and out until

an equilibrium was displayed by the chart recorder. The residual volume (RV) was calculated using the following modified equation from Wilmore (1969):

$$RV = \frac{(VO_2)(EN - IN)}{[AN - FN - RVDS]} \quad [1.1]$$

VO₂ = initial volume of O₂ in spirometer system including dead space between breathing valve and spirometerbell (.034L)

EN = percent nitrogen at equilibrium

IN = impurity of nitrogen

AN = percent of alveolar nitrogen

FN = percent of final nitrogen

RVDS = mouthpiece dead space (.070L)

Hydrostatic Weighing

Electronic load cells suspend the underwater chair in order to measure the subject's hydrostatic weight. An automated computer program converted the voltage measured at the load cell into the weight in kilograms. The computer used an average of 100 readings per trial to determine a value that represented the subject's weight while submerged in the water.

The hydrostatic weighing chair was calibrated before each subject was tested. Once the residual volume was determined, the subject was asked to step off the chair and bend at the knees with his back against the side of the tank with the water level at his neck. With the subject off of the chair and motionless, the computer zeroed the hydrostatic weighing chair. Next, two 2 kg weights were placed on each side of the chair. The computer then calibrated the load cells to 4 kg. After calibration was completed, the weights were removed and the subject was asked to resume the seated position in the chair.

Each subject was instructed to remove any trapped air within his swim suit or hair to obtain a more accurate reading. The subject was then instructed to grasp the lower sides of the chair with one hand on each side. Next, the subject was instructed to exhale as much air as possible above the water while slowly submerging until his head was totally submerged (2-4 inches below the water level). The subject pointed an index finger outward to indicate that no more air could be expired and to signal the researcher to obtain a reading of the subjects weight while submerged. Once the computer was finished recording the weight, the researcher tapped on the side of the tank for the subject to come up for air. This procedure was repeated six to eight times in order for the subject to become familiarized with the testing procedure and to obtain several similar trials. The average of 2 to 4 trials within .05 kg of each other was used in the body density equation which represented the subject's mass underwater. The following equation was used to calculate body density (BD) and percent fat (Brozek et al., 1963):

$$BD = \frac{MA}{\frac{MA - MW}{DW}} - RV + .1L$$

MA = mass in the air (kg)
 MW = mass under water (kg)
 DW = density of water (kg/L)
 RV = residual volume (L)

$$\text{Percent body fat} = \frac{4.570}{BD} - 4.142 \times 100$$

Statistical Treatment

In addition to standard descriptive statistics, a Pearson product moment correlation was used to determine if there was a significant correlation between perceived body image and actual body composition. A one-way ANOVA with repeated measures

was used to compare current versus ideal body images, current versus the male silhouette that males thought was most attractive to females, and the ideal body image versus the male body silhouette that males thought was most attractive to females. The 40 body cathexis values were added together to determine a total body cathexis score. A Pearson product moment correlation was used to determine if there was a significant correlation between the body cathexis and current body figure. A dependent t-test was also used to determine if there was a significant difference between the self-reported and actual height, weight, and BMI measurements.

CHAPTER IV

RESULTS AND DISCUSSION

Introduction

The purpose of this investigation was to examine the relationship between perceived body image and actual body composition among male college students. All males ($n = 332$) in the HPR 105 course completed the Body Silhouette Scale (Stunkard et al., 1983) and the Body Cathexis Scale (Secord & Jourard, 1953) in order to evaluate perceived body images. From the 332 students, a random sample of 50 individuals were asked to have their body composition measured using the hydrostatic weighing (HW) technique. Variables examined included current body figure, ideal body figure, male figure most attractive to females, female figure most attractive to males, body cathexis values, body composition, height, weight, and BMI.

Subjects

Of the 50 potential subjects, 39 volunteered to take part in the study, and their physical characteristics are presented in Table 3. The males' average height and weight measurements coincided with the norms reported in the Metropolitan Life Insurance Company (1983). According to these norms, a 5 foot 11 inch (180.3 cm) tall male should weigh approximately 146-184 pounds (57.5-72.4 kg). Mean scores for the males in the present study were within the normal height and weight ranges, while their mean BMI score was slightly outside of the normal range. According to Millar and Stephens (1987), a BMI between 20.1 and 25.0 is considered normal and a BMI between 25.1 and 30.0 is considered overweight. In addition, the mean percent body fat of the males in the current study was considered acceptable (i.e., 10-22%) according to Lohman (1982). The

Table 3. Means and standard deviations for subjects' physical characteristics

Characteristics	Mean	SD
Age (yrs)	19.5	1.8
Height (cm)	180.3	6.6
Weight (kg)	81.7	14.6
RV (L)	1.182	.286
Density (gm/cc ¹)	1.05920	.01626
Percent Body Fat	17.5	6.6
FFW (kg)	66.9	9.4
FW (kg)	14.8	7.9
BMI (kg/m ²)	25.1	4.0

11 subjects who did not volunteer in the present study said they did not have time or were simply not interested. Other factors that may have prevented these individuals from taking part in the present study might have included body weight, body physique, and fear of water.

Body Silhouette Scale

A Pearson product moment correlation was used to determine if there was a significant correlation between perceived body image and actual body composition among male college students (see Figure 1). An r of .52 indicated that perceived body image and actual body composition were significantly ($p < .001$) related. Although no studies were found either to agree or disagree with the present finding, it was apparent that as the perceived current body figure increased from thin to heavy, the percent body fat increased. This finding suggested that percent body fat plays an important part in determining an individual's perceived body image (i.e., low percent body fat equals most desired body

Figure 1. Linear relationship between perceived body image and percent body fat

image, and they recognized that they were "fatter" with a high percent body fat equals least desired body image).

Huddy et al. (1993) performed a similar study by comparing a 20-item questionnaire on body image (60 points = most preferred body image, and 20 points = least preferred body image) with percent body fat in order to determine if a relationship existed. Huddy et al. determined that a significant ($p < .001$) inverse relationship and an r of $-.52$ existed between specific attitudes about body image and percent body fat among male college students (i.e., combination of athletes and nonathletes). The negative correlation showed that individuals with a lower percent body fat felt better about their

Figure 2. Mean ratings of current, ideal, and attractive body figures

body image and thus scored higher on the body image questionnaire. Huddy et al. concluded that percent body fat was a determining variable in body image.

A one-way ANOVA with repeated measures was used to compare current body image, ideal body image, and the male silhouette that males thought was most attractive to females. No significant ($p > .05$) differences were found between the three comparisons. The data showed that the men were satisfied with their body image (see Figure 2) and are consistent with Fallon and Rozin's (1985) results. They found that current, ideal, and most attractive were almost identical for men, indicating that men were satisfied with their body image.

Although the men in the present study perceived their current figures heavier than their ideal or heavier than what they believed women preferred, these differences were not significant. These results supported Cohn and Adler's (1992) study. They found that the current figure of the males was heavier than their ideal figure. In contrast, these results did not coincide with Hallinan et al. (1991) and Fallon and Rozin (1985) who found that the current figure of the males was slimmer than their ideal figure. This suggests that the

males in the present study preferred a slightly slimmer physique rather than a heavier physique.

Fallon and Rozin (1985) found that males preferred an ideal figure that was slightly heavier than the figure they thought was most attractive to females, thus indicating that the men thought women preferred men with a slimmer physique. In contrast, Cohn and Adler (1992) found that men desired an ideal figure that was slightly thinner than the figure they thought was most attractive to females. The results indicated that the men felt women desired men with a slightly larger physique. In the present study, the males selected an ideal body figure that was identical to the figure they thought was most attractive to females, indicating that the men did not distort women's preferences of the ideal male silhouette. The current study suggested that the slightly thinner ideal body figure of the males was the figure they felt was most preferred by females.

The female figure that men selected as most attractive (3.3) to them in the present study was thinner than the females current figures (3.6 & 4.1) in Fallon and Rozin's (1985) and Cohn and Adler's (1985) study, respectively. The current study suggested that men desired a woman with a thinner figure, which may explain the differences between current and ideal figures for women. These male desires place pressure on women to obtain or maintain a thinner figure. In addition, the female figure that men selected as most attractive (3.3) to them in the present study was heavier than the figure females thought was most attractive (2.9 & 3.1) to males in Fallon and Rozin's (1985) and in Cohn and Adler's (1992) study, respectively. It is apparent that women exaggerated the extent to which men desired women with thinner figures leads to the conclusion that women may be basing their desired body shape and size on their distorted view of what men prefer.

An alternative presentation of the results revealed that approximately 41.0% of the men rated their current figure heavier than their ideal figure, while 48.7% rated their current figure heavier than the most attractive to the opposite sex. In addition, 15.4% rated their ideal figure thinner than the most attractive to the opposite sex. This is somewhat higher than studies conducted by Fallon and Rozin (1985), who found that 32.5% of men rated their current figure heavier than their ideal, 38.7% rated their current heavier than the most attractive to the opposite sex, and 11.8% rated their ideal thinner than the most attractive to the opposite sex. Hallinan et al. (1991) found that 47.3% of college men rated their current figure heavier than their ideal figure. Moreover, Cohn and Adler (1992) determined that men were divided in their desire for a slimmer (34%) or heavier (36%) body figure, while the men in the present study desired a slimmer (41%) over a heavier (15.4%) body figure. The results of the present study coincide with Cohn and Adler, Fallon and Rozin, and Hallinan et al. in that perceptions of the males body figures found them satisfied with their physique. However, it appears that the trend toward a heavier body physique may be leaning toward a slimmer body physique.

Body Cathexis Scale

The Body Cathexis Scale (Secord & Jourard, 1953) based on a 5-point Likert scale (1 = strong positive feelings to 5 = strong negative feelings) was used to measure the subject's feelings toward the body with feelings toward the self. The mean total score was calculated by adding up the 40 responses and dividing by 40. A high body cathexis score was associated with anxiety, insecurity, and feelings toward the self, whereas a low score was associated with security and positive feelings toward the self.

The mean body cathexis score ($M = 103.18$; $SD = 15.25$) showed that the males tended to be satisfied with their body parts and processes. Ranking of body characteristics

Table 4. Means, standard deviations, and ranks of body parts and processes associated with the Body Cathexis Scale

Parts & Processes	Mean	SD	Parts & Processes	Mean	SD
Appearance of eyes	2.03	.71	Body build	2.64	.90
Tolerance of pain	2.15	.81	Distribution of hair	2.64	.78
Sex drive	2.18	.91	Hands	2.64	.87
Keenness	2.28	.72	Voice	2.64	.78
Sex activities	2.28	.83	Feet	2.67	.84
Width of shoulders	2.31	.77	Arms	2.67	.93
Sex organs	2.31	1.95	Appearance of teeth	2.72	.99
Health	2.33	.87	Ears	2.72	.89
Age	2.33	.90	Legs	2.74	1.07
Energy level	2.36	.90	Elimination	2.79	.62
Hair	2.36	.78	Digestion	2.82	.76
Height	2.49	1.02	Hips	2.85	.67
Profile	2.49	.82	Back	2.85	.78
Chin	2.54	.68	Appetite	2.85	.88
Face	2.54	.68	Knees	2.90	.85
Muscle strength	2.59	.99	Chest	2.95	.89
Facial complexion	2.59	.79	Resistance of eyes	2.97	.74
Nose	2.62	.85	Posture	3.03	.96
Sleep	2.62	.85	Weight	3.05	1.00
Physical stamina	2.62	.99	Waist	3.05	.95

from least important (i.e., positive feelings) to most important (i.e., negative feelings) are listed in Table 4. The males indicated "waist" and "weight" were more important in judging their own physical attractiveness; whereas, Lerner et al. (1973) found that males rated "height" and "width of shoulders" more important. Thus, like women, men may be centering their attention toward a somewhat slimmer physique.

Figure 3. Mean body cathexis scores of the current body figure

A Pearson product moment correlation was used to determine if there was a significant correlation between the total body cathexis score and current body image. The correlation of $-.04$ was not significant which indicated that the Body Cathexis Scale (i.e., depicts the body in parts and processes) and the current body image (i.e., depicts the body as a whole entity) are separate means of measuring body image. In 1982, Tucker developed a seven male figure silhouette ranging from very thin to very muscular to very fat. Tucker compared the males' body cathexis scores to their current body figure and determined that men who were dissatisfied with their body parts and processes perceived their body build to the outer extremes (i.e., skinny or fat), suggesting that men desired a more muscular build. A similar trend was observed in the present study, as shown in Figure 3. However, the men in this study who were dissatisfied (i.e., outer extremes) with their body parts and processes desired a slimmer body physique.

Tucker (1981) determined that the male body attitude was based on four orthogonal factors. These factors include: Health and Physical Fitness, Face and Over-all Appearance, Subordinate and Independent Body Features, and Physique and Muscular

Strength. As a result, men were satisfied with their Health and Physical Fitness and Face and Over-all Appearance while dissatisfied with their Subordinate and Independent Body Features and Physique and Muscular Strength. These results support the findings of the present study. The results may address the areas that need improvement, as in the males dissatisfaction with their Physique and Muscular Strength. An exercise program may help improve the body attitude of males and females, as suggested by Adame et al. (1990), Deonier and Schwarzkopf (1991), and Hallinan et al. (1991).

Height, Weight, and BMI

A dependent t-test was used to compare males' self-reported and actual height and weight measurements. The results are shown in Table 5. The present study found no significant ($p > .05$) difference between self-reported and actual weight measurements, and a significant ($p < .05$) difference between self-reported and actual height measurements. A range of .6 to 5.0 cm above the males' actual height was observed. In a similar study, Millar (1986) determined no significant ($p > .05$) difference among males' self-reported and actual weight measurements. However, a significant ($p < .05$) difference was observed between their self-reported and actual height measurements. A range of 1.8 to 3.2 cm above the males' actual height was observed.

An investigation by Palta et al. (1982) determined that the men significantly ($p < .001$) overreported their height by 1.3% and significantly ($p < .001$) underreported their weight by 1.6%. The present study revealed that the men overreported height by .93% and weight by .85%, but only height showed a significant difference. Stewart (1982) found that men underreported their weight by an average of .73 kg, and that people overreported their height by an average of 1.52 cm, men more so than women.

Table 5. Means and standard deviations of self-reported and actual height, weight, and BMI measurements

Group	Mean	SD
Height (cm): *		
Self-reported	182.0	6.6
Measured	180.3	6.6
Weight (kg):		
Self-reported	82.4	13.9
Measured	81.7	14.6
BMI (kg/m ²):		
Self-reported	24.8	3.6
Measured	25.1	4.0

* = Significance ($p < .05$)

The present study did not fully coincide with Stewart; the men in the present study overreported their height by an average of 1.7 cm and weight by an average of .70 kg.

The value BMI for each subject was calculated by using the self-reported and actual height and weight measurements (see Table 5). A dependent t-test was used to compare self-reported and actual BMI. No significant ($p > .05$) difference was found between these two variables. These results support Millar (1986) who used self-reported and actual height and weight measurements in order to calculate and compare males' self-reported and actual BMI values. Millar found a significant ($p < .05$) difference between self-reported and actual BMI values except for 20-29 year old males, and that actual BMI values were higher than self-reported BMI values. Although the mean age (see Table 3) of the males in the present study was slightly younger than the 20-29 age group, the subjects still did not show a significant difference between self-reported and

actual BMI values. Which suggests that men in the 20-29 age group are more conscientious about their height and weight measurements.

According to Millar and Stephens (1987), a BMI ≤ 20 is considered underweight, a BMI between 20.1 and 25.0 is normal weight, a BMI between 25.1 and 30.0 is overweight, and a BMI ≥ 30.0 is obese. Based on these standards, approximately 7.7% of the men in this study were underweight, 43.6% were normal weight, 35.9% were overweight, and 12.8% were obese. According to Millar and Stephens, the actual BMI of the men in the current study places them in the overweight category (25.1 to 30.0). Although the BMI of 25.1 is classified as overweight, it is important to stress the slight .1 difference between the normal and overweight standards. The overweight (35.9%) men in this study were slightly higher than the 1988 to 1991 U.S. National Health Interview survey of 33.4% (Piani & Schoenborn, 1993). In the present study, the average overweight BMI of 26.5 was slightly higher than the average overweight BMI from the 1976 to 1980 National Health and Nutrition Examination Survey (NHANES II) and the 1988 to 1991 NHANES Phase I as demonstrated by a BMI of 26.3 (Kuczmarski et al., 1994).

Summary

A Pearson product moment correlation revealed an r of .52 indicating a significant ($p < .001$) relationship between perceived body image and actual body composition among male college students; therefore, the null hypothesis of no significant relationship between perceived body image and actual body composition was rejected. In addition, a one-way ANOVA with repeated measures showed no significant ($p > .05$) differences among the current, ideal, and attractive body figures indicated that the males in the present study were satisfied with their perceived body image. Although the current body figure of the

males was heavier than the ideal body figure and the male body figure which the males thought was most attractive to females, these differences were not statistically significant. It should be noted that the conclusions of this study were somewhat limited due to the narrow range of figures the males selected (i.e., only one subject selected a figure greater than 6). Results may have differed if the full range of the Body Silhouette Scale would have been used.

The body cathexis scores showed that the males were satisfied with their body parts and processes. However, a Pearson product moment correlation showed no significant ($p > .05$) relationship between the body cathexis score and the current body figure; however, as the body cathexis score increased the current body silhouette increased to the outer extremes of the Body Cathexis Scale. Moreover, a dependent t-test showed no significant ($p > .05$) difference between self-reported and actual weight and BMI; however, a significant ($p < .05$) difference was determined between self-reported and actual height.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purpose of this study was to investigate the relationship between perceived body image and actual body composition among male college students enrolled in the HPR 105 course at UW-La Crosse during the 1996 Spring semester. All males ($n = 332$) completed the Body Silhouette Scale and the Body Cathexis Scale in order to determine their perceived body image. Thirty-nine of the 50 male students randomly selected from the initial 332 male students volunteered to take part in the body composition analysis through hydrostatic weighing.

A Pearson product moment correlation was used to determine if a significant correlation existed between perceived body image and actual body composition. An r of .52 indicated that perceived body image and actual body composition were significantly ($p < .001$) related.

A one-way ANOVA with repeated measures was used to compare current body image, ideal body image, and the male silhouette that males thought was most attractive to females. It was determined that there were no significant ($p > .05$) differences among the three comparisons. An alternative description of the results showed that 41% of the men rated their current heavier than their ideal body figure, 48.7% rated their current body figure heavier than the most attractive to the opposite sex, and 15.4% rated their ideal body figure thinner than the most attractive to the opposite sex. Approximately 41% of the men desired a slimmer physique while 15.4% desired a heavier physique.

The mean body cathexis score indicated that the males in this study were satisfied with their body parts and processes. Examination of the body characteristics revealed that males were dissatisfied with their waist, weight, posture, resistance of eyes, and chest while being most satisfied with their appearance of eyes, tolerance of pain, sex drive, keenness, and sex activities. In addition, four orthogonal factors were determined through the use of the Body Cathexis Scale in which the males were satisfied with their Health and Physical Fitness and Face and Over-all Appearance while dissatisfied with their Subordinate and Independent Body Features and Physique and Muscular Strength.

In addition, a Pearson product moment correlation revealed an r of $-.04$ indicating there was no significant ($p > .05$) relationship between the body cathexis score and the current body figure. However, a trend was observed when each of the male's body cathexis score was assigned to his current body figure. The results showed that the men who were dissatisfied with their body characteristics perceived their body image to the outer extremes (i.e., skinny or fat).

A dependent t-test was used to compare self-reported and actual height, weight, and BMI measurements. The males in this study significantly ($p < .05$) overreported their height, while showing no significant ($p > .05$) differences between self-reported and actual weight and calculated BMI measurements.

Conclusions

The males perceived body image was significantly related to their actual body composition which suggested that percent body fat was an important variable in determining body image. Comparisons between current body figure, ideal body figure, and attractive body figure found the males satisfied with their body image. However, the

current body figure of the males was heavier than their ideal body figure which showed that the males desired a slightly slimmer physique.

The males' satisfaction was further supported by the use of the Body Cathexis Scale which showed that the males were satisfied with their body parts and processes. However, examination of the individual body characteristics showed a negative perception toward their waist and weight which suggested that they may have preferred a slightly slimmer physique. Also, the males reported more satisfaction toward their Health and Physical Fitness and Face and Over-all Appearance than toward their Subordinate and Independent Body Features and Physique and Muscular Strength. These four orthogonal factors may provide some insight into areas of dissatisfaction that need improvement.

The body cathexis scores increased symmetrically, except for the one individual who rated his current as a seven, as self-perception moved toward the outer extremes (i.e., skinnier or fatter). Thus, the skinnier or fatter the males perceived their current body figure, the more negatively they felt about their body characteristics. This trend revealed that the males in the present study, although satisfied with their body image, may have desired a slightly slimmer body physique.

Comparisons between self-reported and actual height, weight, and BMI measurements showed that the male college students significantly overreported their height measurements, while showing no differences between weight and BMI measurements. Therefore, the self-reported height and weight measurements caused little, if any, bias toward the results.

The male college students in the current study were satisfied with their body image; however, they tended to favor a slightly slimmer body physique. The present study administered body silhouettes that only focused on changes in weight status which

suggests that future studies should not only focus on males perceptions of weight but also muscularity. The combination of weight and muscularity preferences may provide further insight into the assessment of a male's perceived body image.

Recommendations for Future Study

Based on the conclusions, the following recommendations for future studies were made:

1. Examine similar variables using a pretest-posttest design, with a control and an experimental group, to determine if an exercise program and/or a strength training program affects male and female college students responses.
2. Examine similar variables among different age groups of males and females.
3. Examine similar variables through a longitudinal study using males and females aged 18 to 23 (i.e., freshmen year through senior year in college).
4. Examine similar variables comparing male and female varsity athletes (i.e., basketball, football, volleyball, and swimming) and nonathletes.
5. Examine similar variables comparing nontraditional male and female college students.
6. Examine a better representation of all examples of the Body Silhouette Scale.
7. Examine similar variables focusing on different nationalities, educational, and ethnic backgrounds.
8. Examine similar variables using married women with children and married women without children.

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APPENDIX A

BODY SILHOUETTE SCALE

(Stunkard et. al., 1983)

Body Silhouette Scale

Which drawing looks most like your own figure?

Which figure do you most want to look like?

Which figure do you feel is most attractive to females?

Which female figure do you find most attractive to you?

APPENDIX B

BODY CATHEXIS SCALE
(Secord & Jourard, 1953)

Body Cathexis Scale

Listed below are a number of things characteristic of yourself or related to you. Consider each item listed and encircle the number of each item which best represents your feelings according to the following scale:

1. Have strong positive feelings.	4. Have moderate negative feelings.
2. Have moderate positive feelings.	5. Have strong negative feelings.
3. Have no feeling one way or the other.	

1. hair.....	1	2	3	4	5
2. facial complexion.....	1	2	3	4	5
3. appetite.....	1	2	3	4	5
4. hands.....	1	2	3	4	5
5. distribution of hair (over body).....	1	2	3	4	5
6. nose.....	1	2	3	4	5
7. physical stamina.....	1	2	3	4	5
8. elimination.....	1	2	3	4	5
9. muscular strength.....	1	2	3	4	5
10. waist.....	1	2	3	4	5
11. energy level.....	1	2	3	4	5
12. back.....	1	2	3	4	5
13. ears.....	1	2	3	4	5
14. chin.....	1	2	3	4	5
15. age.....	1	2	3	4	5
16. body build.....	1	2	3	4	5
17. profile.....	1	2	3	4	5
18. height.....	1	2	3	4	5
19. keenness.....	1	2	3	4	5
20. tolerance for pain.....	1	2	3	4	5
21. width of shoulders.....	1	2	3	4	5
22. arms.....	1	2	3	4	5
23. chest.....	1	2	3	4	5
24. appearance of eyes.....	1	2	3	4	5
25. digestion.....	1	2	3	4	5
26. hips.....	1	2	3	4	5
27. resistance of eyes.....	1	2	3	4	5
28. legs.....	1	2	3	4	5
29. appearance of teeth.....	1	2	3	4	5
30. sex drive.....	1	2	3	4	5
31. feet.....	1	2	3	4	5
32. sleep.....	1	2	3	4	5
33. voice.....	1	2	3	4	5
34. health.....	1	2	3	4	5
35. sex activities.....	1	2	3	4	5
36. knees.....	1	2	3	4	5
37. posture.....	1	2	3	4	5
38. face.....	1	2	3	4	5
39. weight.....	1	2	3	4	5
40. sex organs.....	1	2	3	4	5

APPENDIX C
INFORMED CONSENT

INFORMED CONSENT

RELATIONSHIP BETWEEN PERCEIVED BODY IMAGE AND BODY COMPOSITION IN COLLEGE STUDENTS

Principal Investigators:

Nancy K. Butts, Ph.D.; Christopher J. Radtke; Kimberly L. Weier

I, _____, being of sound mind and _____ years of age volunteer to participate in a study to determine the relationship between body image and body composition in college students. Participation in this study requires me to have my body composition (total weight, fat weight and fat free weight) determined through a procedure known as hydrostatic (underwater) weighing. This procedure involves having my residual lung volume determined while breathing into a spirometer. I also will be required to have my weight determined while I am completely submerged underwater.

I also give permission to the investigators to review the results of my Body Cathexis/Body Silhouette Scale which I completed during HPR 105 class.

All body composition testing will be conducted in the Human Performance Laboratory, 225 Mitchell Hall by Christopher J. Radtke, graduate student in the Adult Fitness/Cardiac Rehabilitation Masters Program under the supervision of Dr. Nancy Kay Butts, Director of the Human Performance Laboratory.

When working in a water environment there is a risk of infection, accident, and possible drowning. However, there has never been a serious accident or report of infection as a result of the hydrostatic weighing procedures in the HPL.

I understand that all my results will be explained to me. I also understand that my results will be strictly confidential and only group data will be used (i.e., no individual's data will be identified) in any final report.

I consider myself to be in good health and to my knowledge I am not infected with a contagious disease or have any limiting physical condition or disability, especially with respect to my lungs and/or heart, that would preclude my participation in the body composition test as described above. I have read the foregoing and I understand what is expected from me. Any questions which may have occurred to me have been answered to my complete satisfaction. I, therefore, voluntarily consent to be a subject in this study. Furthermore I know I may withdraw from this study at any time without any type of penalty.

Signed at _____ this _____ day of _____, 19____, in the presence of the witness whose signature appears below my signature.

Subject: _____

Witnessed by: _____