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FEMALE ATHLETES' PERCEPTIONS OF THE BODY COMPOSITION TESTING PROCEDURE

By

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ABSTRACT

FEMALE ATHLETES' PERCEPTION OF THE BODY COMPOSITION TESTING PROCEDURE

By

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The purpose of this investigation was to determine if female collegiate athletes acquire negative or positive perceptions of their body from the body composition testing procedure. The study was performed on 102 female college athletes (M age =19.8$\pm$1.4 years). A survey was used to determine if these perceptions were different within and between sports. A one-way analysis of variance examined if sport and/or age would have a relationship with the survey results. The results indicated that differences were evident between sports in the athlete's satisfaction level of her body from the body composition testing procedure, $t(101) = 3.18$, $p = .002$. Differences in individual and team sports were examined and the participants of individual sports significantly indicated that they were less comfortable with the procedure and body composition results, $F(1,101) = 7.19$, $p < .009$, and were more adamantly against any disclosure of their results, $F(1,101) = 7.33$, $p < .008$. Age had no significant effect on the survey's outcome.

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LIST OF ABBREVIATIONS

A - 18 years old
B - 21 years old and older
BIA - bioelectric impedance analysis
DXA - dual energy x-ray absorptiometry
I - individual sports
NIR - near infrared interactance
NOS - eating disorder not otherwise specified
SD - standard deviation
T - team sports
UWW - hydrodensitometry
* - significant statistic

CHAPTER 1

INTRODUCTION

Body weight and fat can greatly influence how a person feels. Body weight and body fat are related terms, but cannot be used interchangeably. Body fat can be determined by body composition testing. Body composition testing is conducted for health and performance purposes. According to Hergenroeder and Klish (1990), each individual has an optimal range for body weight and an optimal range for body fat for best performance. In sports, an athlete's performance level is important and body composition testing is commonly utilized for measurement.

In today's society, the media tends to portray women as individuals with thin and flawless figures. Athletes, often seen as high profile role models, are evaluated in terms of how they perform and, to a large extent, how they look (Thein & Thein, 1996). Additional pressures that are placed on female athletes are a combination of sociocultural demands including a need for increases in performance and a conformation to the specific aesthetic requirements of a sport (Beals & Manore, 1994). The media can produce a positive or negative message with regard to how a woman should look. A positive message by Nike

Incorporated implies that a person should be measured by the inside, not the outside (Thompson & Sherman, 1993).

> "A WOMAN IS OFTEN MEASURED BY THE THINGS SHE CANNOT CONTROL. SHE IS MEASURED BY THE WAY HER BODY CURVES OR DOESN'T CURVE, BY WHERE SHE IS FLAT OR STRAIGHT OR ROUND. SHE IS MEASURED BY 36-24-36 AND INCHES AND AGES AND NUMBERS, BY ALL THE OUTSIDE THINGS THAT DON'T EVER ADD UP TO WHO SHE IS ON THE INSIDE. AND SO IF A WOMAN IS TO BE MEASURED BY THE THINGS SHE CAN CONTROL, BY WHO KNOWS, MEASUREMENTS ARE ONLY STATISTICS. AND STATISTICS **LIE**."

Although NIKE tries to diminish the importance of looks, most of the media places pressures on women to attain a unrealistic weight and shape. These pressures, provided by the media, that athletes encounter can alter their emotional and mental state and may lead to several psychological issues.

In athletics the body composition testing procedure is utilized to measure lean body mass and body fat. A female athlete may be adversely affected by the results of her body composition testing and the testing process itself. Each individual is different and a person can be affected in various ways by the body composition testing process. Some individuals feel awkward and uncomfortable with some procedures performed during the testing process. During skinfold testing, for example, some people feel uncomfortable when the examiner pinches their skin. The body composition testing process may affect how the athlete

feels about herself, as well as her athletic performance. For instance, if an athlete believes she is the right size and shape for her sport but the results of the body composition test reveal that she has a higher than average body fat percentage, she may begin to believe that she is fat and unhealthy even though she may be performing optimally for her sport.

The focus of this investigation is to determine if female collegiate athletes acquire negative or positive perceptions of their body as a result of undergoing the body composition testing procedure.

Perceptions of the body composition testing procedure by female collegiate athletes

Many articles have described the concerns and emotional impact that weight and shape can elicit in female athletes. On the other hand, there have been no direct observations regarding the psychological impact that the process of determining body composition has upon women athletes undergoing such an evaluation. Many studies focus on eating disorders and the female athlete, but not on the impact of the body composition evaluation process (Beals & Manore, 1994; Beim & Stone, 1995; Fleck, 1983; Garner & Rosen, 1997).

Body composition testing takes place in many venues in today's society, especially in athletics. Body composition testing is used in athletics to measure body fat, to assess health status and performance ability. Body composition is important in athletic events that require horizontal or vertical transmission of body weight (Hergenroeder & Klish, 1990). Hergenroeder and Klish (1990, p. 1057) stated, "These tasks are generally performed more poorly by overweight or overfat individuals." Each athlete has his/her optimal range for body weight and range for percent body fat, not one specific number. According to Hergenroeder and Klish(1990), being out of this range can decrease performance.

When body composition is commonly tested, it is broken down into fat mass and fat-free mass (Hergenroeder & Klish, 1990). The individual's fat-free mass includes muscles, bones, tendons, and ligaments. There are many methods to determine fat mass. The most precise methods have measured body composition on cadavers (Hergenroeder & Klish, 1990). The testing procedures are commonly done without any thought of the effect of the test on the participant. The need for an evaluation of the participant's perception of this process is important to determine if completing this type of testing could be beneficial or detrimental to the

participant. Currently no research has been reported on the emotional impact on individuals undergoing the body composition testing procedure.

Methods of Body Composition Testing

Anthropometry is a form of body composition testing which is easy, accessible, but unfortunately often is misused. Skinfold testing is a common form of anthropometry. Measurements are taken three times at predetermined sites and the results are averaged providing that all measurements are within 2 mm of each other. The averages are entered into a standard equation that is controlled for bone density approximations for each gender. After computing this equation, a value in percentages is obtained (Lukaski, 1987). Caliper measurements can vary in location, number of sites taken, and the equation used (Fornetti, 1998; Lukaski, 1987). A problem with this procedure is that the tester must obtain considerable experience using the appropriate techniques to be considered accurate (Hergenroeder & Klish, 1990).

Hydrodensitometry or under water weighing (UWW) has been considered the "gold standard" for body composition analysis (Bergsma-Kadijk, Baumeister, & Beurenberg, 1996; Fornetti, 1998; Friedl, DeLuca, Marchitelli, & Vogel, 1992). This method indirectly estimates the body fat

percentage from the ratio of body mass to body volume. UWW is based on Archimedes' principle that body weight in water is equal to the weight of the water displaced during submersion (Friedl et al., 1992). The subject is placed into a tank of water, with a previously measured volume. The subject is then submersed completely and instructed to expire all air from her lungs. The volume of the displaced water is again measured (Friedl et al., 1992). According to Bergsma-Kadijk et al.(1996), this measurement procedure has good reliability. Sources of error using UWW include variance in the amount of fat free mass (e.g., amount of bone, muscle, skin, organs) and differences in bone mineral content per individual. Additional sources of error may include variation in the subject's hydration status, tester error of measurement of residual volume, inaccurate intestinal gas content estimates, variation in consecutive testing methods, and the learning error of the participant in cooperation and understanding of the procedure (Bergsma-Kadijk et al., 1996; Fornetti, 1998; Friedl et al., 1992).

Dual Energy X-ray Absorptiometry, also referred to as DXA, is a new testing procedure that was based on characteristic attenuation of x-rays. The x-rays undergo varying degrees of attenuation by human tissue such as bone and soft tissue. Attenuation is defined as the reduction in

intensity of the x-ray source after it interacts with a chemical compound, such as human bone or soft tissue (Pietrobelli, Fromica, Wang, & Hymsfield, 1996). The participant lies on a table and above them is a mechanical arm. This arm moves horizontally across their body from left to right and the table moves vertically from head to toe. X-rays pass from the arm to the table and the attenuation changes as it passes through the participant's body (Fornetti, 1998; Pietrobelli et al., 1996). This testing procedure is considered to be reliable and takes bone mineral content into account when measuring total body composition. Problems with this procedure are that it is very expensive, the machine was constructed with length and weight limitations, and it assumes constant levels of hydration (Fuller, Laskey, & Elia, 1992; Haarbo, Gotfredsen, Hassager, & Christiansen, 1991).

Bioelectrical Impedance Analysis or BIA uses an electrical current to estimate total body water by measuring the resistance and reactance of the tissue. This method uses a low-level current that is sent through the body via surface electrodes. Resistance is a measure of impedance of the current flow through the body. Impedance is a function of the resistance. Reactance is the opposition to current flow caused by the capacitance

produced by the cell membrane. Reactance and resistance are placed in an equation to yield the impedance value. Tissues within the body either act as conductors or insulators of the current. This procedure is comfortable to the subject, safe, inexpensive, portable, and may be used on obese individuals and requires little training to use. Problems with this method include variance in subject tissue composition, hydration levels and electrolyte concentration, which can influence the standard equation. This procedure is considered a reliable and valid technique for the estimation of body composition (Fornetti, 1998; Jackson, Pollock, Graves, & Mahar, 1988).

Near Infrared Interactance or NIR is relatively new and was originally used to measure the protein, fat, and water content of agricultural products. NIR involves a wand that emits infrared light, which is placed over an individual's bicep brachii muscle and optical densities of remitted light from various tissues are measured. The remitted energy is represented by optical density values. Body fat percentage is determined by equations that contain these optical density measurements (Hortobagyi et al., 1992). This technique is safe, quick and easy to use on all individuals. A problem with this method is that it depends upon regional adipose tissue distribution; as adiposity

increases underestimation of body fat percent increases. Also, errors can occur if the wand is inappropriately placed or poorly shielded from the outside light. Subject factors like skin color and hydration may also introduce errors (Fornetti, 1998; Israel et al., 1989).

Body Image and the Female Collegiate Athlete

Body image is considered multi-dimensional including the emotional and perceptual spectra (Goldberg, Lenhart, Bailey, & Koff, 1996; Thompson & Sherman, 1993). There is a strongly held belief that females in the western world should be thin and fit. Across cultures the pressure to be thin may vary. According to contemporary United States' values, a woman's appearance is often thought to be of more importance than her accomplishments (Grubb, Sellers, & Waligroski, 1993). The unattainable "perfect" body image is the goal (Grubb et al., 1993).

In the 1990s thinness was the epitome of feminine beauty according to McAlister and Caltabiano (1994). This belief has become internalized and causes females to be hypercritical of their own body image, which may negatively impact their self-esteem (Hart, Leary, & Rejeski, 1989). Women have become excessively concerned with weight and shape. They tend to see themselves as overweight even when they are not. In addition, they tend to judge others more

on appearance and are more likely to diet and exercise than men (McAllister & Caltabiano, 1994). Women show less variation in their view of ideal size and weight compared to men (McAllister & Caltabiano, 1994).

A study by McAllister and Caltabiano (1994) examined whether self-esteem or the personal judgement of one's own worth for women was contingent on body weight or subjective views of appearance. This study determined that dieting was an attempt to meet an internalized standard. McAllister and Caltabiano (1994) indicated that self-perception has a large impact on a person's view of weight. If a woman, in this study, had low self-esteem they were more likely to diet on a more regular basis and exhibit more body dissatisfaction.

Within sport, pressures in the form of performance and also physical appearance confront females. Many coaches and athletes believe that if an athlete loses weight they will perform better (Fleck, 1983; Hallinan, Pierce, Evans, Degrenier, & Andres, 1991). These same individuals believe that lower body fat percentages could increase performance. To be successful in sport there are many physiological, emotional and external factors that contribute. Some individuals tend to focus only on an ideal percentage of body fat for a given sport instead of all the factors

combined (Hergenroeder & Klish, 1990). In current literature on body fat measures, there is a belief in the concept that there is an ideal body composition percentage for each sport (Rossi & Zoccolotti, 1979).

It is believed that a female athlete may need to attain her optimal weight and body composition range to compete and train most successfully. This is a range and not a single number or percentage. The difference between actual and ideal weight is referred to as the index of body dissatisfaction (McAllister & Caltabiano, 1994; Thompson & Sherman, 1993). Females that are of average weight or heavy were most dissatisfied with themselves by this index according to Hallinan et al. (1991). Based on documented objective standards by Gray (1977), women tend to overestimate their weight (by 25%) and express dissatisfaction with their physical size and image. Such dissatisfaction does not exist across gender.

Fallon and Rozin (1985) documented that men's perceptions of desirable body shape served to keep them satisfied with their figures, whereas women's perceptions placed pressure on them to lose weight. According to Hallinan et al. (1991) female athletes decide to lose weight for appearance while male athletes lose weight for performance. A large number of American women, athletes

included, are trying to lose weight. This is fueled by an intemperate value that society places on physical perfection. A thin physique is an archetype of perfection, which places subsequent unrelenting pressures on many women (Beals & Manore, 1994).

Male and female athletes have physical attributes that must be considered for performance such as body size, skeletal structure, muscle mass, strength, skill, and, especially, overall body composition. In a study by Thein and Thein (1996), both sexes were similar in strength per unit size and muscle fiber type. There were no differences in metabolic rate or skin temperature when matched for percent body fat and absolute workload. In comparison, males and females are more alike than most people think. Any perception differences may be related to a specific sport, not the athlete's gender (Beim & Stone, 1995).

Although men and women are comparable physiologically, their body fat percentages should not be synonymous. The universal goal of a low body fat percentage can be problematic. Thein and Thein (1996) stated that body fat percentages for elite female athletes should be 6-8%, for endurance athletes 12-18% and that team athletes should be 18-24%. On the other hand, a woman needs a body fat percentage of 12% to physiologically function normally

(Thein & Thein, 1996). Physiologically, men do not have stringent limitations related to their body fat percentage. Therefore, men and women should have separate body composition goals in sport. Some female athletes focus their training solely toward an ideal percent of body fat, which is misguided (Hergenroeder & Klish, 1990). A percentage range may be a more attainable goal. In a study by Hergenroeder and Klish (1990), it was noted that most national and international female runners had a body fat measurement below 12%. However, one runner, who held most American middle distance records, had a body fat measurement of 17% and changing that percentage could have impaired her performance. It appears that this individual was at her optimal body composition amount for performance. Another woman, with body fat of 36%, had established the world record for the 50-mile run. Within sports there is considerable variability, even among the highest level athletes (Hergenroeder & Klish, 1990).

Williamson, Netemeyer, Jackman, Anderson, Funsch, & Rabalais (1995) completed a study involving the overconcern with body size in female athletes and determined three risk factors. The results indicated 1) social pressure for thinness by coaches and peers, 2) anxiety about athletic performance, and 3) negative self-appraisal of athletic

achievement were associated with increased concern about body size and shape. Other identified psychosocial variables included social pressure, teasing about appearance, low self-esteem, and negative affect or stress (Williamson et al., 1995). Overall, athletes tend to be more independent, aggressive, achievement-oriented and dominant then the non-athlete (Kukla & Pargman, 1976). Although these characteristics in female athletes are important, they can have a negative effect on their body image views. If a female athlete feels she has a high body fat percentage she will strive and usually succeed in lowering her percentage even if it could be unhealthy for her. Adverse issues associated with negative body image perceptions can range from eating disorders to psychological issues.

Related Problems with Testing Process

Problems that have been identified in relation to the body composition testing procedure are the development of eating disorders and the effect on the level of self-esteem. There are three main eating disorders identified and they will be defined and discussed. These disorders have often been related to levels of self-esteem and will also be examined.

Anorexia Nervosa is often considered the " Self Starvation Syndrome" (Thompson & Sherman, 1993). This problem can develop in any period of growth, but most commonly begins at puberty. The most agreed upon theory of food restriction is the individual's means to avoid dealing with difficult maturation and emotional issues. The person involved develops a distortion of body image, low self-esteem and unhappiness (Sundgot-Borgen, 1994). Those affected by the disease have an increased need for approval, excessive conformity and conscientiousness (Thompson & Sherman, 1993). Thompson and Sherman (1993) stated that anorexia nervosa is a combination of cultural, familial and individual factors that predispose an individual to the disorder. The Diagnostic and Statistical Manual of Mental Disorders (DSM IV) (American Psychiatric Association, 1994) requires that for the diagnosis of anorexia nervosa to be made, an individual must refuse to maintain body weight over a minimal normal weight for height and age, have an intense fear of gaining weight or becoming fat even though he or she is underweight, have a distorted body image, and be amenorrheic if female. Anorexia Nervosa has associated medical problems in addition to psychological characteristics in most individuals (Thompson & Sherman, 1993).

Bulimia Nervosa, also referred to as the "Binge-Purge Syndrome", relates to an interaction of several predisposing factors including dieting, binge eating and purging (Thompson & Sherman, 1993). Sociocultural pressures to be thin convince the individual that her weight or body shape is a problem (Thompson & Sherman, 1993). Individuals with this problem try to diet and use restraint. As weight loss decreases, they continue to limit intake of food. They tend to lose control and binge, which in turn causes the person to purge to regain control. Binge eating is described as the rapid consumption of a large amount of food in a discrete period of time, this can be variable. Purging is typically done by induced vomiting but can also involve laxative or diuretic use or excessive exercise (Thompson & Sherman, 1993). Rosen, McKeag, Hough, & Curley (1986) studied 182 female athletes in different sports and found that 14% used self-induced vomiting and 16% used laxatives as purging methods to control weight. Seventy percent of these participants believed the behavior was harmless.

A biopsychosocial perspective suggests an individual at risk for bulimia nervosa may have a biological vulnerability or predisposition to depression, which can be exacerbated by sociocultural and family expectations

(Thompson & Sherman, 1993). These factors together lead to low self-esteem and problems with self-regulation. The DSM-IV (American Psychiatric Association, 1994) criteria for bulimia nervosa include recurrent episodes of binge eating, a feeling of a lack of control, overeating behavior during binges, purging that might include self-induced vomiting, laxative or diuretic use, strict dieting or fasting, vigorous exercise to prevent weight gain and persistent over-concern with body shape and weight. This disorder can have many medical and psychological consequences (Thompson & Sherman, 1993).

Eating Disorder Not Otherwise Specified (NOS) is a condition in which an individual meets neither the specific criteria for anorexia nervosa or bulimia nervosa. Eating disorders tend to occur on a continuum. The diagnostic category of NOS is used to include individuals who do not meet all the criteria for either anorexia nervosa or bulimia nervosa, but a combination of both disorders. NOS acknowledges the existence and importance of a variety of eating disturbances. More individuals meet the diagnostic criteria for NOS than the other two eating disorders. DSM-IV (American Psychiatric Association, 1994) goes more in depth about the diagnostic criteria for Eating Disorder Not Otherwise Specified.

Many athletes, especially females, are asked to lose weight to perform and compete better. Athletes tend to have a high need for achievement or superior performance that in theory could make them susceptible to eating disorders (Hewitt, Flett, & Ediger, 1995). Much research has been done on the prevalence of eating disorders and on the behavioral and attitudinal characteristics that may predispose certain women athletes to develop an eating disorder. It has been reported that many athletes utilize pathogenic weight-control behaviors that may result in the development of an eating disorder (Rosen et al., 1986). This occurs in relationship to "thinness-demand", which includes a small body size, thin shape, and low weight. This "thinness-demand" is greatest in sports that are judged in terms of how athletes appear to be performing various skills, such as gymnastics, diving, and figure skating. The relationship between sports and eating disorders is believed to occur through one of two philosophies: 1) that specific sports attract individuals who are either eating disordered or who are at risk for the development of an eating disorder or 2) participation in certain sports can encourage the development of an eating disorder.

Researchers have tried to determine if high levels of physical activity may play a role in the development of an eating disorder or if the pressures and demands for thinness precipitate eating disorders. If physical activity is the precept, the cycle could begin with activity that may suppress the athlete's appetite, which could in turn, decrease the value of food. Therefore, food intake and body weight may decrease and exercise motivation may increase. Pressures to decrease weight begin with dieting. Coaches' pressures then become additive. Coaches, teammates and peers in sport can either precipitate or help maintain an existing disorder (Garner & Rosen, 1997; Garner, Rosen, & Barry, 1998; Johnson, Nebelsick-Gullett, Thorland, & Housh, 1989).

To increase performance many athletes focus on weight. An athlete's concept of an ideal body weight is, in most cases, not related to one single perfect weight. Ideal weight refers to a recommended weight based on height, body frame, and gender, and is typically represented by a weight range. An ideal competitive weight may imply that a lower weight is needed for success. If an athlete is unable to reach this weight, it may lead to frustration, depression and poor health (Thompson & Sherman, 1993).

Studies on the relationship of body fat and sport

performance are at best equivocal and inconclusive. Body weight and body fat differ in their perceived impact upon performance. In fact, performance is not always enhanced as a result of weight loss. Each athlete has her own optimal level of performance that varies from other individuals.

Early education in the areas of nutrition and its relationship with performance may prevent the development of eating disorders in female athletes. Prevention of eating disorders is clearly needed. Health care professionals with expertise in nutrition, weight control, and eating disorder treatments must be available to athletes early in their athletic experiences (Mayhew, Piper, Koss, & Montaldi, 1983). A multidisciplinary approach should utilize dieticians, athletic trainers, physicians and coaches (Beim & Stone, 1995). These professionals must be aware of, and be experienced in regards to the needs, expectations and demands of the athlete's world. Athletes may be more prone than non-athletes to develop eating disorders as a result of early dieting, complying with coach's demands for weight loss, extreme exercise, and the influence of traumatic events, e.g., injury and illness (Sundgot-Borgen, 1994). Education should focus on nutrition, fitness and sport performance,

while minimizing detractors such as appearance and unnecessary preoccupation with weight.

An athlete's self-esteem can be negatively affected by the influence of body composition testing and athletics. Self-esteem is the sense of contentment and self-acceptance that stems from a person's appraisal of their own worth, significance, attractiveness, competence and ability to satisfy aspirations (Silverstone, 1992). Another definition of self-esteem is the extent to which a person feels positive about him or herself (Goldberg et al., 1996). Self-esteem is made up of social identity, personal disposition and physical characteristics. Self-esteem develops in childhood and increases during adolescence to stabilize in the mid-twenties.

High self-esteem is dependent upon unconditional acceptance by parents, clear limits for behavior, respect for an individual's actions, and good parental self-esteem (Silverstone, 1992). If an individual has confidence or high self-esteem relating to his or her body, it can be reflected to others (Darden, 1972). Women tend to perceive high self-esteem as a result of approval of others while males tend to develop high self-esteem from self-approval (Silverstone, 1992).

In much of the research on eating disorders and body composition, the subject's level of self-esteem appears to be the main symptom in development of an eating disorder instead of vice versa (DiNucci, Finkenberg, McCune, McCune, & Mayo, 1994). The dieting process, either successful or unsuccessful, may lead to depression, obsession, feelings of failure and decreased self-esteem (Beals & Manore, 1994). Grubb et al. (1993) showed no relationship between the level of self-esteem and eating disorders while other studies have found a relationship (Beals & Manore, 1994; DiNucci et al., 1994). Rosen and Ross (1968) found that feelings about the body are commensurate with feelings about self.

Esteem can encompass other terms such as social physique anxiety, body esteem, and body cathexis. Social physique anxiety is what a person experiences in response to others' evaluation of their physique and is related to body image. This physique perception can both impede and/or improve performance (Hart et al., 1989). Body esteem or body affect refers to the degree of satisfaction an individual has regarding various aspects of his or her body. Body cathexis is used to separate people's subjective feelings and objective size and shape of one's body.

Self-esteem can be affected by social, emotional, and physical involvement in sport. According to Lindeman (1994), an athlete's self-esteem may be affected by mood, age, life satisfaction and gender. Self-esteem levels have been used to determine prevalence of eating disorders, levels of depression, and anxiety in athletes (Button, Sonuga-Barke, Davies, & Thompson, 1996). Self-esteem may be a reflection of more generalized influences such as genetic endowment, educational achievement, quality of family life, relationships, and social conditions in athletes (Button et al., 1996). Individuals with a higher self-esteem and perceptions of self tend to enter sport (Grubb et al., 1993). Sport can eventually affect each individual in a different way. To correctly identify the effect of sport on the individual, research needs to continue. A study by Lindeman (1994) determined a positive correlation between athletic participation and increased self-esteem. On the other hand, through sport, an athlete may have intensified body awareness that may increase negative thoughts and decrease self-esteem (Beals & Manore, 1994). More research needs to be completed to reconcile contradictory views.

The problem with the studies that measure self-esteem is that the information is too subjective. These studies include questions that are open-ended or that are open to

the participants' interpretation. Presently, this is the primary type of question that is utilized.

Research Questions

Four research questions will be examined within this study. 1) Did the athletes' perceived satisfaction levels significantly change when comparing the body composition results prior to and after receiving the body composition results? 2) Did the athletes' satisfaction level of their body composition vary by sport? 3) Did the type of sport, individual versus team sports, significantly affect satisfaction levels? 4) Did the age of the participant, 18-year-olds versus 21-year-olds and older, affect the survey subset results?

CHAPTER 2

METHODS

Participants

The participants of this study were female collegiate athletes at a Division 1 Institution. A total of 104 female athletes between the ages of 18-27 years (*M* =19.81, *SD* =1.47) were participants in this study. The data from 2 athletes were incomplete and had to be dropped. The final subject total for this study was 102 athletes. Athletes surveyed were members of gymnastics, softball, crew, track and field, soccer, field hockey, volleyball, cross country, and swimming teams.

The total number of athletes studied represented approximately 40% of all members of women's varsity teams. Only two athletes who were asked to complete the survey failed to do so. The main conflict for the non-participants was the timing of the study; the study was conducted during the last week of the spring semester and the participants were leaving for the summer. Athletes were selected from the participants that completed the study, *Body Composition in Female Athletes* by Willa Fornetti in 1998.

The Michigan State University committee on research involving human subjects (UCRIHS) (See Appendix A) approved

the study and a written informed consent (see Appendix B) was obtained from each participant. Care was taken to ensure confidentiality for each participant.

Instrumentation

A survey (see Appendix C) was distributed in a team meeting by the team's athletic trainer with a prepared statement including the purpose of the study and instructions to complete the informed consent statement and survey (see Appendix B and C). The athletes were then asked to sign a consent statement to either agree or decline to participate in this study. If the athlete agreed to participate, they completed and returned the survey instrument indicating they voluntarily gave consent.

The survey was developed to determine the presence of positive and/or negative perceptions that were associated with the experiences of undergoing a body composition testing procedure. The survey instrument included 17 statements that were rated on a 5 point Likert-type scale. For confidentiality, the survey and consent forms displayed matching numbers. The survey assessed demographic information including the athlete's age and sport.

Data Collection Procedures

The principle investigator met with each team's athletic trainer for an informational meeting to explain

the data collection procedure. These athletic trainers then met with the athletes at a designated team meeting. The meeting included an explanation to the participants informing them of the purpose of the study, an overview of the survey instrument and consent statement, and a question/ answer period.

Following the presentation the participants were asked to complete the consent form and survey. The group-administered survey required 10 to 20 minutes. Upon completion of the survey, the athletes placed the instrument into an envelope in order to ensure confidentiality. The surveys were presented to the athletes during the same semester as the Body Composition in Female Athletes study, but after they received their body composition results. The difference in the time elapsed between the body composition testing process and the completion of the perception survey ranged from five days to a maximum of three months.

Data Analysis

The data were analyzed by quantitative methods. Responses to the survey instrument items were tabulated and presented in the form of descriptive statistics. The survey results were analyzed for each team and compared between teams.

The survey was broken down into 5 subsets. The first being labeled "satisfy," which looked at questions 1, 2, and 3 of the survey. "Satisfy" examined if the subjects were comfortable with their body composition results and if the percentage was what they perceived it would be. The second and third subset, "prior" (questions 4-7) and "after" (questions 8-11) represented satisfaction with weight, body image, eating habits and exercise habits before and after receiving their body composition results. The fourth subset, "process 1," looked at how the athletes felt about being informed of their body composition and if they believed the body composition testing should be done (questions 13-14). Finally, the last subset, "process 2," dealt with the disclosure of body composition information (questions 15-17).

Four research questions were examined within this study. 1) Did the athletes' perceived satisfaction levels significantly change when comparing the body composition results prior to and after receiving the body composition results? 2) Did the athletes' satisfaction level of their body composition vary by sport? 3) Did the type of sport, individual versus team sports, significantly affect the results of the survey subsets? 4) Were the survey subsets

significantly affected by the age of the participant, 18-year-olds versus 21-year-olds and older?

All of the above questions were answered by the analysis of the 5 subsets. Data analysis included descriptives, t-tests, F-tests and one-way ANOVAs. The results of the questions 15, 16, and 17 were reversed scored compared to the other 14 questions on the survey.

CHAPTER 3

RESULTS

Descriptive statistics were run on all the results of the survey instrument. An alpha level of .05 was used for all statistical tests.

A paired T-test was performed to determine if a difference was evident when comparing satisfaction levels of the body composition testing process prior to (M = 2.48, SD = 1.05) and after (M = 2.25, SD = .93) the results were given to the participants (see Table 1). The results indicated that the athletes' satisfaction levels were higher after the body composition measurements were given, $t(101) = 3.18$, $p = .002$.

The second research question examined if the athletes of each sport had apparent differences in body composition satisfaction levels. The means indicated that field hockey, swimming and soccer athletes were most satisfied, while gymnastics, cross-country, and crew athletes were least satisfied (see Table 2). A one-way analysis of variance was run to determine if significance existed and no significant difference was found, $F(1,101) = 1.44$, $p = .191$. Athletes from two of the three more satisfied sports were participants in team sports. Athletes from two of

Table 1: Descriptive Data

Subsets	N	Mean	SD
PRIOR	102	2.4779	1.0460
AFTER	102	2.2475*	.9258
PROCESS 1	102	2.2108	.9503
PROCESS 2	102	3.6242	.9632
SATISFY	102	2.7092	.7774

Table 2: Satisfaction Level Differences Between Sports

Sport	N	Mean	SD
Gymnastics	15	3.0889	.5837
Cross-country	18	2.8704	1.0171
Crew	18	2.7778	.5601
Softball	17	2.7255	.7287
Volleyball	4	2.6667	.9813
Track	8	2.6250	1.1743
Soccer	9	2.3333	.6667
Swimming	5	2.2667	.4944
Field hockey	8	2.2500	.3883
Total	102	2.7092	.7774

the three least satisfied sports were participants in individual sports. The variation of the means of each sport lead to the analysis of the impact the type of sport had on the survey results within each subset.

Table 3 includes data from the third research question, which examined if the type of sport, individual versus team sport, would directly influence the athletes' satisfaction level of their body composition or view of the body composition testing procedure. To compare the influence of sport type, on the athletes' satisfaction levels prior to and after the body composition results were analyzed; a one-way ANOVA was performed. Prior to receiving the results of the body composition testing, no significance was found, $F(1,101) = 3.17$, $p = .078$. Type of sport significantly affected the athletes' satisfaction levels after the results were given, $F(1, 101) = 7.19$, $p = .009$. After the body composition results were given, individual sport participants had a significantly lower satisfaction level when compared to the team sport participants (see Table 3). These results indicate that athletes in individual sports were less satisfied with their body composition following receipt of the composition results.

Another one-way ANOVA was run comparing individual and team sport participant responses to Process 1 and Process 2 (see Table 3). No significant difference was found, when comparing type of sport and the participant's view that the body composition testing procedure was beneficial (Process 1), $F(1,101) = .002$, $p = .967$. Although, type of sport did significantly affect the participants' preference regarding the disclosure of their body composition testing results (Process 2). Athletes in individual sports had a significantly stronger belief, than athletes in team sports, that the disclosure of results should not occur, $F(1,101) = 7.33$, $p = .008$. These results indicate those athletes in individual sports are less likely to want their body composition results disclosed to their coaches, peers, and medical staff than athletes in team sports.

The last research question addressed if age would influence the athlete's survey responses in each subset. Age was separated into 2 categories, individuals who were 18 years old and individuals who were 21 years old and older. This was done to determine if results would vary when comparing an athlete who is first entering collegiate sports to one who is about to finish their collegiate career. Differences in an athlete's attitude about her body composition from the entrance into college to the exit

Table 3: Sport Type Influences on Perceptions

Subset	Sport Type	Mean	SD
Prior	I	2.6793	1.0337
	T	2.3125	1.0360
After	I	2.5109*	1.0206
	T	2.0313	.7849
Process 1	I	2.2065	1.0251
	T	2.2143	.8937
Process 2	I	3.3478*	.9762
	T	3.8512	.8988

I = Individual Sports (N = 46)
T = Team sports (N = 56)
* = Significant differences

Table 4: Age Influences on Perceptions

Subset	Age	Mean	SD
Prior	18	2.6111	1.1733
	21	2.5000	1.1139
After	18	2.5972	.9820
	21	2.1518	.9313
Process 1	18	2.1111	.8498
	21	2.1071	.7860
Process 2	18	3.7222	.9514
	21	3.7609	.9382

18 year olds (N = 18)
21 year olds and older (N = 28)

from college was the objective of this research question. Athletes that were 19 years-old and 20 years-old were not included in the analysis.

Initially, age was analyzed to determine if it would have a direct effect on the satisfaction levels of the athletes prior to and after the body composition results were given. A one-way analysis of variance was run to examine if results were significant. Age had no significant influence on the athletes' satisfaction levels prior to, $F(1,45) = .11$, $p = .748$, or after, $F(1,45) = 2.40$, $p = .128$, the body composition results were given (see Table 4).

Separate one-way analyses of variance were used to determine if age directly influenced the participant's view of the body composition testing procedure (process 1) and how they felt about the disclosure of the body composition results (process 2). No significant difference was found between age and Process 1, $F(1,45) = .00$, $p = .987$, or between age and Process 2, $F(1,45) = .05$, $p = .824$. This indicates that these collegiate athletes, who have recently entered college and those preparing to exit college, do not see the body composition testing process or the disclosure of results differently (see Table 4).

CHAPTER 4

DISCUSSION

Body composition testing is becoming a mainstay in athletics for both males and females. No studies were identified which indicate whether the body composition testing procedure has a positive or negative impact on female athletes. The purpose of this study was to provide information on the impact of the body composition evaluation process on collegiate female athletes. Specifically, the purpose of this investigation was to determine if negative or positive perceptions occurred as a result of the body composition testing procedure.

In general, all participants of this study were moderately satisfied with the view of their bodies. In a study by Lindeman (1994), a positive correlation was identified between athletic participation and increased self-esteem. This satisfaction level could be related to an athlete having a higher self-esteem. Prior to receiving the results of the body composition testing, the participants were somewhat satisfied with their body composition. After they received the results, their satisfaction level significantly increased. This increase in satisfaction level could indicate that body composition testing adds a

positive perspective to an athlete's body image belief. If athletes over-estimate their body composition or body fat and, as a result, have negative perceptions of self, the body composition testing could be viewed positive and possibly change those perceptions.

The athletes' responses were further analyzed to determine if these satisfaction levels varied by sport. Although no significant difference was found, the results tended to suggest that field hockey, swimming and soccer were the sports with more satisfied members. Gymnastics, cross-country, and crew were the sports with the less satisfied members. This indicates that variations can occur. Therefore, more research is warrented.

The above information also led to the next focus of this study. Would type of sport, individual versus team sports, directly influence the body composition satisfaction level, the perception of the body composition testing procedure, and approval of the disclosure of the body composition results? Type of sport significantly affected the satisfaction levels, as stated earlier. This indicated that athletes in individual sports have a lower level of body image satisfaction. This could lead one to believe that athletes in individual sports are possibly more self-conscious about their bodies. According to Beals

and Manore (1994), female athletes in sports that require a thin physique, such as gymnastics and cross-country, tend to be more self-conscious about their body image. Athletes in gymnastics and cross-country were only examples of two individual sports discussed in this study. Athletes, in both individual and team sports, had a favorable perception of the body composition testing procedure. However, participants in individual sports had a significantly stronger belief that body composition results should not be disclosed. This could indicate that these athletes have concerns about how this information would be used by others, such as coaches and peers.

Another factor addressed was whether age would influence the participants' survey responses. Age had no significant influence on the participants' satisfaction levels prior to or after the body composition results were received. Age also did not have any effect on the athletes' belief if the body composition procedure should be done or if the results should be disclosed. This insinuates that age is not a direct factor in influencing body image perceptions of college athletes. This may suggest that if adverse perceptions of body image occur, they may occur earlier in a female's life. Silverstone (1992) stated that if low self-esteem develops it generally begins in

childhood and continues to evolve in adolescence. This suggests that satisfaction level may not specifically follow the development of self-esteem.

This study only investigated a few aspects of the female athlete's perception of the body composition testing process. This topic should be fully explored in the future for the development of health and performance guidelines for the female athlete. Unfortunately, the investigator was unable to reconcile the findings of this study with the results of other literature, due to the absence of any known investigations on this topic.

One of the limitations to the study was the fact that the survey was retrospective. All the subjects were given their body composition results prior to completing the survey. Therefore, the question on the survey inquiring about comfort levels prior to receiving the results was retrospective and the answer was possibly influenced by the results that were previously given. An additional limitation is that the survey was constructed by the researcher and should be utilized and examined in further studies to corroborate results. The questionnaire also did not specify why the athletes were happy or unhappy with their weight and body fat composition.

Recommendations for Future Research

1. Replicate this study at different competitive levels, including different collegiate settings.
2. Replicate this study using male and female participants.
3. Complete a similar study using two surveys, one prior to receiving results and one after receiving the results.
4. Recruit female athletes from other sport teams not included in this study.
5. Measure comfort levels of the body composition testing process using each type of testing procedure separately.
6. Complete a study analyzing if body image satisfaction is correlated with the athlete's actual body fat percentage.
7. Complete a study analyzing how the coaches' feel about body composition testing and results.

APPENDIX

Appendix A
UCHRIS Approval and Renewal

MICHIGAN STATE
UNIVERSITY

April 28, 1998

TO: Sally E. Nogle
Football Building

RE: IRB#: **98-266**
TITLE: DETERMINATION OF BODY IMAGE PERCEPTIONS IN FEMALE COLLEGIATE ATHLETES AFTER RECEIVING BODY COMPOSITION RESULTS
REVISION REQUESTED: N/A
CATEGORY: 1-C,E
APPROVAL DATE: 04/28/98

The University Committee on Research Involving Human Subjects' (UCRIHS) review of this project is complete. I am pleased to advise that the rights and welfare of the human subjects appear to be adequately protected and methods to obtain informed consent are appropriate. Therefore, the UCRIHS approved this project and any revisions listed above.

RENEWAL: UCRIHS approval is valid for one calendar year, beginning with the approval date shown above. Investigators planning to continue a project beyond one year must use the green renewal form (enclosed with the original approval letter or when a project is renewed) to seek updated certification. There is a maximum of four such expedited renewals possible. Investigators wishing to continue a project beyond that time need to submit it again for complete review.

REVISIONS: UCRIHS must review any changes in procedures involving human subjects, prior to initiation of the change. If this is done at the time of renewal, please use the green renewal form. To revise an approved protocol at any other time during the year, send your written request to the UCRIHS Chair, requesting revised approval and referencing the project's IRB # and title. Include in your request a description of the change and any revised instruments, consent forms or advertisements that are applicable.

PROBLEMS/ CHANGES: Should either of the following arise during the course of the work, investigators must notify UCRIHS promptly: (1) problems (unexpected side effects, complaints, etc.) involving human subjects or (2) changes in the research environment or new information indicating greater risk to the human subjects than existed when the protocol was previously reviewed and approved.

If we can be of any future help, please do not hesitate to contact us at (517)355-2180 or FAX (517)432-1171.

Sincerely,

David E. Wright, Ph.D.
UCRIHS Chair

DEW:bed

cc: Jennifer J. Jallo

OFFICE OF
RESEARCH AND GRADUATE STUDIES

University Committee on Research Involving Human Subjects (UCRIHS)

Michigan State University
246 Administration Building
East Lansing, Michigan
48824-1046

517/355-2180
FAX 517/432-1171

MICHIGAN STATE
UNIVERSITY

April 27, 1999

TO: Dr. Sally NOGLE
Duffy Dougherty Building
MSU

RE: **IRB #98266** CATEGORY:1-C,E
RENEWAL APPROVAL DATE: April 22, 1999

TITLE: DETERMINATION OF BODY IMAGE PERCEPTION IN FEMALE COLLEGIATE ATHLETES AFTER BODY COMPOSITION RESULTS WERE GIVEN

The University Committee on Research Involving Human Subjects' (UCRIHS) review of this project is complete and I am pleased to advise that the rights and welfare of the human subjects appear to be adequately protected and methods to obtain informed consent are appropriate. Therefore, the **UCRIHS APPROVED THIS PROJECT'S RENEWAL.**

RENEWALS: UCRIHS approval is valid for one calendar year, beginning with the approval date shown above. Projects continuing beyond one year must be renewed with the green renewal form. A maximum of four such expedited renewal are possible. Investigators wishing to continue a project beyond that time need to submit it again for complete review.
REVISIONS: UCRIHS must review any changes in procedures involving human subjects, prior to initiation of the change. If this is done at the time of renewal, please use the green renewal form. To revise an approved protocol at any other time during the year, send your written request to the UCRIHS Chair, requesting revised approval and referencing the project's IRB# and title. Include in your request a description of the change and any revised instruments, consent forms or advertisements that are applicable.
PROBLEMS/CHANGES: Should either of the following arise during the course of the work, notify UCRIHS promptly: 1) problems (unexpected side effects, complaints, etc.) involving human subjects or 2) changes in the research environment or new information indicating greater risk to the human subjects than existed when the protocol was previously reviewed and approved.

If we can be of further assistance, please contact us at 517 355-2180 or via email: UCRIHS@pilot.msu.edu.

Sincerely,

David E. Wright, Ph. D.
UCRIHS Chair

OFFICE OF
RESEARCH AND GRADUATE STUDIES
University Committee on Research Involving Human Subjects (UCRIHS)
Michigan State University
245 Administration Building
East Lansing, Michigan
48824-1046
517/355-2180
FAX 517/353-2976

DEW: ah
cc: Jennifer Jallo

All UCRIHS forms are located on the web: http://www.msu.edu/unit/vprgs/UCRIHS/

Appendix B
Consent Form

Investigator: Sally Nogle
Jennifer J Jallo

INFORMED CONSENT

The level of training and conditioning of athletes is very extensive especially at the collegiate level. Due to your participation in the Determination of Body Composition of Female Athletes by Willa Fornetti, you were selected for this study. Participation in this study is completely voluntary. You may withdraw at any time. This research project is being done to evaluate collegiate athletes' perception of their own body images. The results of this study could influence later practices and training protocols for other female athletes.

For this study you will be asked to complete this informed consent form and the survey instrument that will be distributed after an instructional session with the investigator. Participation will consist of completing a survey to the best of your ability. The survey consists of questions to be answered by a Likert-type scale. The instructional session and survey will require approximately 10-20 minutes to complete.

A record of your participation in this study will be kept in a confidential file at Michigan State University. The confidentiality of the data will be maintained within legal limits.

_____, the participant, consents to enroll in this study by completing the Body Image Survey. The following ID number is assigned to you and will only be identified with your name by a single investigator to ensure confidentiality and to prevent duplicates of information. Please write this ID number on the top of your survey.

ID# ____

Signature:_____ Date: _____

Investigator: _____ Date: _____

Appendix C

Perceptions Survey

ID NUMBER: _____

By completing this survey instrument, the participant indicates voluntary consent to this study.

Instructions: Please complete the demographic information to the best of your ability. Circle the number that you feel best correlates with the following statements

Demographic Information:

Age: ____ **Sport:** _____

Survey:

1) I am comfortable with my body fat composition results.

Agree				Disagree
1	2	3	4	5

2) The body fat composition result was a percentage that I thought it would be.

Agree				Disagree
1	2	3	4	5

3) I thought my body fat composition would be:

Much Higher	somewhat higher	similar	somewhat lower	much lower
1	2	3	4	5

4) **Prior to** the DXA study I was happy with my weight.

Agree				Disagree
1	2	3	4	5

5) **Prior to** the DXA study I was happy wit my body image.

Agree				Disagree
1	2	3	4	5

6) **Prior to** the DXA study I was satisfied with my eating habits.

Agree				Disagree
1	2	3	4	5

7) **Prior to** the DXA study I was satisfied with my exercise habits.

Agree				Disagree
1	2	3	4	5

8) **Immediately after** receiving my body fat composition results I felt happy with my weight.

Agree				Disagree
1	2	3	4	5

9) **Immediately after** receiving my body fat composition results I felt happy with my body image.

Agree Disagree

1 2 3 4 5

10) As a result of my body fat composition data I changed my eating habits.

Agree Disagree

1 2 3 4 5

11) As a result of my body fat composition data I changed my exercise habits.

Agree Disagree

1 2 3 4 5

12) I am happy with my body fat composition results.

Agree Disagree

1 2 3 4 5

13) I believe it is important to be informed about my body fat composition.

Agree Disagree

1 2 3 4 5

14) I believe that knowing my body fat composition is an asset to competing in my sport or athletic event.

Agree Disagree

1 2 3 4 5

15) I would prefer that my body fat composition would **NOT** be measured.

Agree Disagree

1 2 3 4 5

16) I do not want anyone other than myself to know my body fat composition.

Agree Disagree

1 2 3 4 5

17) Body fat composition, if performed should not be public knowledge (i.e.: Coaches, Athletic Trainers, Physicians or Peers).

Agree Disagree

1 2 3 4 5

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CHAPTER 5

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