

**Relationship of Body Attitude and Personality Characteristics to Dietary Intake in
Female Collegiate Athletes**

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Abstract

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The purpose of this study was to compare the relationship of body attitude to both dietary intake and selected personality characteristics. The study focused on the relationship between dietary intake and both body attitude and personality characteristics as well as differences in body attitude and personality characteristics between female college age lacrosse athletes, dance team members and controls. The subjects were 27 lacrosse players (mean age = 19.4 ± 1.1 y), 20 dance team members (mean age = 19.5 ± 1.4 y) and 64 non- athlete controls (mean age = 20.6 ± 1.5 y).

Participants were administered the Eating Disorder Inventory-2 (EDI-2), the Ben-Tovim Walker Body Attitude Questionnaire, the Cognitive Behavioral Dieting Scale and a Silhouette Scale to assess body attitude and selected personality traits. Participants completed a 5-day diet record including 3 consecutive weekdays and 2 weekend days

Group mean differences on body attitude and personality traits were analyzed using one-way analysis of variance. Post-hoc analyses were performed using the Tukey procedure and the Kruskal-Wallis Test. Relationships were determined between dietary intake, body attitude and personality traits utilizing the Pearson Product Moment Correlation procedures. Stepwise multiple regression techniques were utilized in the attempt to develop a valid and reliable prediction equation for dietary intake using body attitude and selected personality characteristics.

Significant differences did exist between the athletic groups and the control group on interoceptive awareness, maturity fears, social insecurity, feelings of attractiveness, body dissatisfaction, perfectionism, bulimia, interpersonal distrust, dietary protein (g) intake, dietary fat (g) intake, dietary fiber (g) intake, and vitamin C (mg) intake. No significant differences were found between the lacrosse and dance team on dietary intake, body attitude or personality traits. Significant relationships did exist between dietary intake and body attitude measures in all three groups. In addition, significant relationships were also found to exist between body attitude measures and personality traits in all three groups. Five different prediction equations were generated using relationships from each individual group and then combined groups. The

results of this study indicate that female athletes involved in both aesthetic and non-aesthetic sports, may be purposefully restricting total caloric intake as well as fat intake due to body image dissatisfaction during the competitive season.

DEDICATION

This dissertation is dedicated to my family and partner who have collectively provided a support network and have been both a source of strength and a source of insight throughout this arduous process. Their attempt to understand and accept my idealism and eccentricities have been pivotal in the success of all my life endeavors. Their continuous love and support have been the foundation of all my energy.

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TABLE OF CONTENTS

	<u>Page</u>
List of Tables	ix
List of Figures	xi
Chapter 1 Introduction	1
Statement of Problem	5
Research Hypothesis	6
Significance to the Field	6
Basic Assumptions	6
Delimitations	7
Limitations	7
Operational Definitions	7
Chapter 2 Review of the Literature	8
Body Image in Female Athletes	8
Body Image and Eating Disorders in Athletes	10
Eating Disorders and Female Athletes	12
Nutrient Intake in Athletes	13
Health Implications of Inadequate Dietary Intake	14
Personality Characteristics in Female Athletes	15
Summary	16
Chapter 3 Methods	18
Introduction	18
Subjects	18
Data Collection	19
Instrumentation	20
Dietary Records	20
Eating Disorder Inventory-2	20
Ben-Tovim Walker Body Attitude Questionnaire	21
Cognitive Behavior Dieting Scale	22

	<u>Page</u>
Silhouette Scale	22
Statistical Analysis	23
Chapter 4 Results	24
Eating Disorder Inventory-2	25
Ben-Tovim Walker Body Attitude Questionnaire	25
Cognitive Behavioral Dieting Scale	26
Silhouette Scale	26
Dietary Intake	26
Differences in Dietary Intake, Selected Body Attitude Scores, and Selected Personality Traits Between Groups	28
Relationship of Dietary Intake to Body Attitude and Personality Characteristics	43
Lacrosse	43
Dance Group	45
Comparison Group	47
Prediction Equation Using Stepwise Multiple Regression Lacrosse	49
Dance Group	50
Comparison Group	50
Combined Groups	51
Dummy Variable Combined Groups	51
Chapter 5 Discussion	53
Body Attitude, Personality Traits and Aesthetic and Non-Aesthetic Sports	56
Silhouette Scale Body Attitude	57
Body Attitude and Dietary Intake	58
Body Attitude and Personality Traits	60
Dietary Intake Prediction Equations	62
Conclusions	63
Recommendations	64

	<u>Page</u>
References	66
Appendices	72
Appendix A	73
Appendix B	77
Appendix C	79
Appendix D	83
Appendix E	87
Appendix F	89
Vita	91

List of Tables

	<u>Page</u>
Table 1. Internal Consistency Reliability Estimates	21
Table 2. Three Week Test-Retest Reliability	21
Table 3. Intercorrelations of BAQ Subscales and EDI Body Dissatisfaction	22
Table 4. Descriptive Lacrosse Group Data	24
Table 5. Descriptive Dance Group Data	24
Table 6. Descriptive Comparison Group Data	24
Table 7. Eating Disorder Inventory-2 Group Data	25
Table 8. Ben-Tovim Walker Body Attitude Questionnaire	26
Table 9. Cognitive Behavioral Dieting Scale	26
Table 10. Silhouette Scale	26
Table 11. Five Day Average Group Dietary Intake	27
Table 12. Correlational Values for Dietary Intake and Body Attitude Scores	44
Table 13. Correlational Values for the CBDS and Body Attitude Scores	44
Table 14. Correlational Values for Body Attitude Scores and Personality Traits Within Lacrosse Group	45
Table 15. Correlational Values for Dietary Intake and Body Attitude Scores	46
Table 16. Correlational Values for the CBDS and Body Attitude Scores	46
Table 17. Correlational Values for Body Attitude Scores and Personality Traits Within Dance Group	47
Table 18. Correlational Values for Dietary Intake and Body Attitude Scores	48
Table 19. Correlational Values for the CBDS and Body Attitude Scores	48
Table 20. Correlational Values for Body Attitude Scores and Personality Traits Within Comparison Group	49
Table 21. Stepwise Selection Within Lacrosse Group	49
Table 22. Stepwise Selection Within Dance Group	50

	<u>Page</u>
Table 23. Stepwise Selection Within Comparison Group	50
Table 24. Stepwise Selection Using All Groups	51
Table 25. Stepwise Selection Using All Groups and Combined Scores	51
Table 26. Stepwise Selection Using Combined Scores and Dummy Variables	52

List of Figures

	<u>Page</u>
Figure 1. Group Mean Interoceptive Awareness Differences	28
Figure 2. Group Mean Maturity Fears Differences	29
Figure 3. Group Mean Social Insecurity Differences	30
Figure 4. Group Mean Dietary Protein Intake Differences	31
Figure 5. Group Mean Dietary Fat Intake Differences	32
Figure 6. Group Mean Dietary Fiber Intake Differences	33
Figure 7. Group Mean Feelings of Attractiveness Differences	34
Figure 8. Group Mean Body Dissatisfaction Differences	35
Figure 9. Group Mean Perfectionism Differences	36
Figure 10. Group Mean Body Weight Differences	37
Figure 11. Group Mean Bulimia Differences	38
Figure 12. Group Mean Interpersonal Distrust Differences	39
Figure 13. Group Mean Vitamin C Differences	40
Figure 14. Mean Lacrosse Silhouette Score Differences	41
Figure 15. Mean Dance Silhouette Score Differences	42
Figure 16. Mean Control Silhouette Score Differences	43

Chapter 1

Introduction

Body image or body attitude is a psychological construct which refers to self perception including self image and feelings an individual perceives about his or her body (Davies & Furnham, 1986). Body image can significantly effect the way an individual perceives and interacts with the surrounding environment. An individual with a distorted body image for instance may also suffer from low self-esteem or lack feelings of self worth based on perceived physical appearance. The construct of body image can be broken down into two and often three dimensions. The first dimension is cognitive, how an individual “thinks” he or she looks. The second is emotional, how an individual “feels” he or she looks. Last is idealistic, how an individual “wants” to look (Probst, Vandereycken, & Coppinolle, 1998). All three dimensions can be different at any given point in time.

The term body image or body attitude has numerous connotations associated with it particularly for females. Psychologically, formation of body attitude is complex and can be influenced beginning in infancy and continuing throughout adulthood (Fontaine, 1991). Various social influences have been documented which not only impact, but can significantly alter an individuals’ body attitude at any point during the life cycle. Influences such as parents and media have been largely documented in the literature (Fontaine, 1991; Hill & Franklin, 1998; King, Touyz, & Charles, 2000; Ogden & Steward, 2000; Tigemann & Pickering, 1996). A study by King, Touyz, & Charles (2000) suggested that women are significantly effected by media celebrities appearance in the judgement of their own appearance and that women with a higher degree of body dissatisfaction are more strongly effected by media exposure. This type of media representation can induce long standing ramifications on the body images and attitudes of both adolescent females and women living in today’s society.

Females are more likely than males to struggle with body image distortion mainly due to societal messages which are often conflicting and confusing regarding female roles and expectations (Fontaine, 1991). Women are often encouraged to achieve a lean and almost prepubescent look, which by society’s standards is considered to be “beautiful” or “sexy.” In contrast, women are expected to be career oriented and competitive with men on the basis of mental competence in a male dominated business world; yet women are still largely judged by

their physical characteristics (Fontaine, 1991). These types of messages are not misunderstood by any female who wishes to be successful in today's society forcing many women to harshly misjudge their physical appearance and often take drastic measures to ensure their physical appearance meets society's expectations.

For female athletes, the pressure to be thin may be even greater. Female athletes have exceedingly higher expectations placed on them compared to male counterparts from individuals such as coaches, parents and peers in addition to the media in respect to what is "ideal" for their physical appearance especially in aesthetic or light weight sports such as gymnastics and dance. Factors such as the perception that a lighter body weight or less body fat will equate to better performance can exacerbate an already well established body dissatisfaction problem in adolescent female athletes in general. Young female athletes who struggle with body image distortion or dissatisfaction through adolescence, are more likely to suffer from body image distortion as an adult (Allaz, Bernstein, Rouget, Archinard, & Morabia, 1998; Cullari, Rohrer, & Bahm, 1998); and numerous studies indicate that female athletes in aesthetic sports suffer from body image dissatisfaction (Hallinan, 1991; Huddy, Nieman, & Johnson, 1993; Saint-Phard, Van Dorsten, Marx, & York, 1999). Many studies also indicate that body image dissatisfaction is not limited to aesthetic sports only, but that females involved in non-aesthetic sports are also likely to struggle with body image dissatisfaction as well although the literature is less conclusive on that point.

A relationship between body image dissatisfaction and eating disordered behavior has been well established in the literature in both female athletes and non-athletes (Davis, Durnin, Gurevich, Maire, & Dionne, 1993; Fogelhom & Hillokorpi, 1999; Williamson et al., 1995). However, eating disorders are much more complex than a matter of eating too much or not enough. It involves the interaction of biological, psychological, developmental, familial, and sociocultural factors but is related to the cultural ideal of thinness (Fontaine, 1991). Female athletes in particular are likely to develop eating disordered behavior because they get a series of mixed messages from society. Female athletes are supposed to be strong and graceful, yet are also supposed to meet the ideal of thinness and femininity demanded by society (Johnson, 1994). Female athletes are also under pressure to optimize performance and meet unrealistic weight or

body fat goals in short periods of time which may lead to severe weight loss practices (Agostini, 1994).

The implication that eating disorders are pervasive in athletes, especially female athletes lead the National Collegiate Athletic Association (NCAA) to fund a study researching the prevalence of disordered eating among 1,445 student athletes from 11 Division 1 schools. Each athlete was surveyed utilizing a 133-item questionnaire. Results suggested that 1.1% of the females met DSM-IV criteria for bulimia nervosa; 9.2% were identified as suffering clinically significant problems with bulimia nervosa; 2.85% were identified as suffering clinically significant problems with anorexia nervosa; 10.85% reported binge eating on a weekly or greater basis and 5.52% reported purging behavior on a weekly or greater basis (Johnson, Powers & Dick, 1999). These percentages are statistically low, potentially leading to the belief that eating disorders are not as pervasive as many studies have previously reported. However, this study did not include questions pertaining to chronic dieting behavior or purposeful energy restriction, which are not considered to be clinical eating disorders, but may actually be a more common form of eating disordered behavior in female athletes.

Due to added pressures on female athletes and non-athletes, many individuals suffer from what is defined as a subclinical eating disorder. A true definition of subclinical eating disorders remains vague even though numerous studies have indicated a causal relationship between body image measures and both subclinical and clinical eating disorders particularly in female athletes (Fogelholm & Hilloskorpi, 1999; Parks & Read, 1997; Sundgot-Borgen, 1994; Sykora, Grilo, Wilfley, & Brownell, 1993; Williamson et al., 1995; Ziegler et al., 1998b). Overall, athletes and/or non-athletes suffering from subclinical eating disorders do not meet all the strict criteria for either anorexia or bulimia nervosa defined in DSM-IV. However, these individuals often exhibit serious eating problems such as restricting caloric intake and pervasive body weight concerns (Parks & Read, 1997; Sykora et al., 1993; Ziegler et al., 1998a). A study by Fries (1974) proposed a continuum hypothesis of eating and dieting behavior suggesting that stringent dieting, although subclinical, may potentially lead to future problems with eating disordered behavior potentially leading into a diagnosable clinical eating disorder. Sundgot-Borgen (1993b) further defined distinguishing features of a form of subclinical eating disorders known as anorexia athletica. Athletes suffering from this disorder experience weight loss > 5% of

expected body weight with an absence of any medical illness of affective disorder explaining the weight reduction, frequent gastrointestinal complaints, excessive fear of becoming obese and restriction of food <1,200 kcal/day. These athletes may or may not suffer from a distorted body image but may share various common psychological traits with clinical eating disorders such as high achievement orientation, obsessive-compulsive tendencies, and perfectionism.

Chronic dieting or purposeful energy restriction has been well documented in both female and male athletes (Lopez-Varela, Montero, Chandra, & Marcos, 2000; Sugiura, Suzuki, & Kobayashi, 1999) and there is a burgeoning of literature indicating a significant problem in female athletes specifically (Nuviala, Lapieza, & Bernal, 1999; Webster & Barr, 1995; Zeigler, Nelson, & Jonnalagadda, 1999). Energy balance for athletes can be difficult to quantify since depending upon the sport, the athlete may need to gain, lose or maintain weight. Not only is energy balance important for athletes, but also carbohydrate stores, vitamin and mineral stores, bone health and menstrual status in women. Any change in energy balance or nutritional status can have direct repercussions on athletic performance (Thompson, 1998). It has been well documented that adult athletes have higher energy needs than sedentary adults. In addition, athletes involved in strength/power sports have a much higher recommended dietary protein intake than athletes engaging in endurance sports (1.4-1.7g/kg vs. 1.0-1.2g/kg respectively) (Economos et al., 1993).

Due to athletes' high training volume and intensity, it has also been recommended that athletes consume a diet rich in vitamins and minerals as well (Economos, Bortz, & Nelson, 1993). Unfortunately, numerous studies measuring energy intake in female athletes frequently report caloric intake significantly below recommended values (Mulligan & Butterfield, 1990; Prior, Vigna, Schechter, & Burgess, 1990).

Decreased total energy intake (macronutrients) in female athletes would usually suggest a decrease in vitamin and mineral (micronutrients) intake as well as suggested by Sundgot-Borgen (1993a). Osteoporosis is a disorder of the skeletal system in which the bone becomes thin and fragile increasing the risk of fracture (Kohlmeier, 1999). Osteoporosis currently affects over 20 million women in the United States. Since peak bone mass is accrued between the ages of 25-30 years and the rate of bone growth is greatest during puberty, any factors such as estrogen loss (amenorrhea) or deficient calcium and vitamin D intake during this time frame could have long standing health ramifications. Common risk factors for the development of osteoporosis include

a genetic predisposition, Caucasian or Asian ethnicity, old age, low body mass index or thin body frame, steroid medication use, and estrogen deficiency. Lifestyle habits such as excessive alcohol use, low calcium intake, cigarette smoking and reduced physical activity are also associated with bone loss (Kohlmeier, 1999). Many female athletes' report decreased dietary intake of calcium and frequent menstruation problems (low estrogen) exacerbating the likelihood of experiencing low bone mineral density, increased risk of stress fractures, and an increased chance of developing osteoporosis. Although chronic dieting or purposeful energy restriction does not represent one of the current standards for a diagnosable clinical eating disorder, the ramifications of this type of behavior in female athletes are far reaching and have the potential to be severe and chronic.

Another set of factors that could potentially impact both body image and eating disordered behavior, especially in female athletes, are personality traits inherent in individuals struggling with body dissatisfaction and/or eating disordered behavior. Common traits include perfectionism, obsessive compulsive tendencies, competitiveness, drive for thinness, and ineffectiveness (Geller, Cockell, & Goldner, 2000; Neumarker, Bettle, Neumarker, & Bettle, 2000; Olsen, Williford, Richards, Brown, & Pugh, 1996). Interestingly enough, traits such as perfectionism and obsessive compulsive tendencies appear to contribute to the formation of competitive athletes and are commonly found in athletes in general (Fulkerson, Keel, Leon, & Dorr, 1999).

The literature is replete with studies indicating a strong relationship between body image dissatisfaction and eating disordered behavior in female athletes especially in aesthetic and light weight sports. However, in non-aesthetic sports, the relationship appears to be less definitive. The literature is also vague and less conclusive on the relationship of dietary intake to body image dissatisfaction and almost non-existent in the prediction of eating disordered behaviors based on dietary intake, body attitude and quantifiable personality traits.

Statement of Problem

The purpose of this study was to compare the relationship of body attitude to both quantity of dietary intake and to develop a prediction equation for body attitude using dietary intake and selected personality traits. The study focused on the following questions:

- 1) Is there a significant relationship between body attitude and dietary intake in female athletes?

- 2) Is there a significant relationship between body attitude and personality traits in female athletes?
- 3) Is there a significant difference in body attitude between aesthetic and non-aesthetic sports?
- 4) Is there a significant difference in personality traits between aesthetic and non-aesthetic sports?
- 5) Can a valid and reliable prediction equation for dietary intake be developed utilizing body attitude and selected personality traits?

Research Hypothesis

It was hypothesized that: 1) no relationships exist between body attitude and either dietary intake or personality traits; 2) no significant differences exist in personality traits and body attitude between aesthetic and non-aesthetic sports.

Significance to the Field

There is an abundance of literature relating body image dissatisfaction to eating disordered behavior in both female athletes and non-athletes. The results of this study would contribute to the present literature regarding the relationship of body attitude to both quality and quantity of dietary intake (chronic dieting behavior) in female athletes participating in aesthetic sports during competitive season. Previous studies have indicated significant relationships between energy restriction and female athletes engaged in aesthetic and light weight sports (Lopez-Varela et al., 2000; Zeigler, Nelson, & Jonnalagadda, 1999). However, the literature remains inconclusive in associating body attitude to dietary intake in females participating in non-aesthetic sports, and is even more obscure in relating personality traits to body attitude in female athletes involved in both aesthetic and non-aesthetic sports. The literature is almost non-existent in the prediction of eating disordered behavior based on dietary intake, body attitude and personality traits. The results of this study may indicate a need for educational methods to be developed in order to prevent the onset of eating disordered behavior in female athletes.

Basic Assumptions

It is assumed that the participants in this study answered the questionnaires as accurately and honestly as possible, and that they accurately recorded their 5-day diet records; and that the diet records they recorded were representative of their regular dietary intake during competitive season.

Delimitations

This study was delimited to the number of participants from the lacrosse and dance teams who volunteer to participate in this study with no incentive other than the feedback provided for them.

Variables

The dependent variables were dietary intake (total daily caloric intake, percent energy from carbohydrate, fat, and protein, and percentage met of the RDA of vitamins and minerals). The independent variables were body attitude scores and personality trait scores.

Limitations

Possible limitations that may have affected this study include the following: compliance of the participants with ability to answer all questionnaires with honesty and without bias; compliance of the participants to accurately record their food intakes within dietary records; and accurate analysis of diet based on the computer program.

Operational Definitions

1. Nutrient Quantity – absolute energy intake measured in kcal/day.
2. Nutrient Quality - % of kcal from fat, carbohydrate, and protein; % of the RDA of vitamins and minerals.
3. Body Attitude – measure of physical self perception
4. Personality Characteristics – Complex inherent or perceived traits an individual exhibits.
5. Aesthetic Sports – Those sports which entail some form of judgement or scoring based on physical appearance such as gymnastics and dance.
6. Non-Aesthetic Sports – Those sports which entail no judgement or scoring based on physical appearance such as lacrosse, basketball, softball, and field hockey.

Chapter 2

Review of Literature

Dietary intake is a valid and necessary parameter to measure when investigating body attitude and personality traits especially in female athletes during competitive season when dietary intake could potentially impact athletic performance. Dietary intake can be recorded using 24 h diet recalls, 3 to 7 day dietary food records, or food frequency questionnaires (Whitney, Cataldo, & Rolfes, 1991). Dietary intake can then be measured by downloading the recorded information into a computer program which calculates various nutrient values. Body attitude can be measured utilizing numerous questionnaires and silhouette charts developed specifically for the purpose of measuring body image and body attitude. Scores can then be calculated and compared to norms for specific populations giving an indication of an individuals' overall body attitude or body image. Numerous personality tests abound in the literature and are also easily accessible via the internet. However, the scope of this study and the literature review will be limited to the personality traits measured in the Eating Disorder Inventory (EDI) – 2.

Body Image in Female Athletes

A plethora of literature exist establishing body image dissatisfaction in relation to female athletes, particularly but not limited to aesthetic sports (Pierce & Daleng, 1998; Pierce, Evans, & Degrenier, 1991; Saint-Phard et al., 1999). Pierce and Daleng (1998) examined body image in elite female dancers. Ten female members of a professional ballet company (22.9 ± 2.4 y) were administered a 9 figure silhouette scale and asked to approximate their current and ideal body image. Body composition was also assessed. Mean scores indicated that current body image was significantly higher than ideal although body composition measures for all subjects were in normal range. The study suggested that dancers suffer from a high distortion of body image even though they are considered lean by body composition analysis. Recently, a study by Wiggins & Moode (2000) on female collegiate athletes from various sports and non-athletes found that females engaging in non-aesthetic type sports scored higher on body esteem scales than those involved in aesthetic sports. The study also found however, that all female athletes scored higher on body esteem than the non-athlete group indicating that non-athletes may exhibit the lowest body attitudes in comparison. In a similar study involving both aesthetic and non-

aesthetic sports by Pierce, Evans, & Degrenier, (1991), female athletes were asked to distinguish between current and ideal body shape using a 9 figure silhouette scale in which they were asked to approximate their current figure (current) and the figure they would desire to look like (ideal). The researchers presumed the athletes were representative of all athletes in their particular sport in both height and weight. The study found a significant difference between the athletes' mean ratings of their current (3.53) and ideal (3.13) body shape indicating that the majority of the female athletes overestimated their body shape and idealized a thinner image. No significant differences were established between aesthetic and non-aesthetic sports. A more recent study by Saint-Phard et al. (1999) on female gymnasts, cross-country runners, and track and field athletes compared self-perception between athletes and non-athletes. Both groups were administered the Self-perception Profile for college students which measures 12 subscales and generates scores that reflect the subject's perceived importance of and competence in each of the areas. A direct relationship was established between perceived athletic competence and self-worth and the athletic group demonstrated significantly lower global self-worth scores than the non-athletic group. The study indicated that female athletes may place a very large component of their self-worth on their perceived athletic endeavors. This may potentially explain the added pressure placed on female athletes to be thin and the persistent body image dissatisfaction found in both aesthetic and non-aesthetic sports.

In a study on non-aesthetic sport field hockey athletes, Marshall and Hauber (1996) attempted to determine the prevalence of eating disordered tendencies and its relationship to body composition by administering the Eating Disorder Inventory (EDI) and analyzing body composition in 111 female field hockey athletes. Nineteen of the 111 athletes (17.1%) exhibited a high score on the body dissatisfaction subset of the EDI indicating increased body dissatisfaction and 4/111 (3.6%) exhibited an elevated drive for thinness suggesting that body shape and size is a significant issue in female field hockey athletes and could potentially lead to stringent dieting practices in order to obtain their ideal body shape. Those athletes were labeled as being at a higher risk for the development of an eating disorder. However, compared to athletes not considered to be at risk, the athletes with a high body dissatisfaction score were also significantly heavier and had higher body mass indices (BMI) indicating their ideal may be influenced by comparison of themselves to their peers. Similar results were seen in a study on

male athletes including both collegiate football players and varsity swimmers. Participants in both sports demonstrated decreased body attitude scores when they also exhibited higher body fat percentages even though all athletes' body composition scores fell within norms for their age group (Huddy et al., 1993). This study would intimate that body image and shape issue is not gender biased. However, most studies completed on both male and female athletes and non-athletes confirm that females are more likely to suffer from more severe body image distortion, are more dissatisfied with their bodies, and are more likely to take extreme measures in order to obtain their ideal body shape (Fogelholm & Hilloskorpi, 1999; Page & Allen, 1995; Page & Fox, 1998; Sykora et al., 1993).

Body Image and Eating Disorders in Athletes

The literature is replete in establishing eating disordered behavior in what are considered to be aesthetic and light weight sports such as gymnastics, dance and cross-country (Benson, Allemann, Theintz, & Howald, 1990; Parks & Read, 1997; Sundgot-Borgen, 1996; Ziegler et al., 1998a; Ziegler et al., 1998b). A study on female competitive gymnasts, Sundgot-Borgen (1996) found that out of 12 members of a national team ages 13-20 years, two gymnasts met the DSM-IV criteria for anorexia nervosa, 2 met the criteria for anorexia athletica, and all gymnasts were currently dieting even though all were exceptionally lean. When asked their reasons for dieting, all 12 athletes thought it would enhance performance, 5 thought the judges would give them a higher score, 2 were dieting at their parents suggestion and 4 were dieting because the coach thought they were too fat. Parks and Read (1997) established male cross country runners exhibited increased body dissatisfaction, increased disordered eating pattern and increased concern for weight control when compared to football players of the same age. This study showed that body dissatisfaction and eating disordered behavior despite being more prevalent in female athletes, is not however limited to gender. A controversial study on female cross-country runners found that 20 collegiate long distance runners when compared to 35 female non-athlete undergraduates showed no enhanced symptomatology for eating disordered behaviors. In fact, the runners appeared to be comparatively healthy (Ryujin, Breaux, & Marks, 1999). Although the results of this study would seem promising, the rampant, pervasive presence of eating disordered behavior in the general population (Heatherton, Nichols, Mahamedi, & Keel, 1995) could make the comparison less significant. In a more intensive study, Zeigler et al.

(1998a) reported female elite figure skaters were dieting even though they were satisfied with their current body image. Of the 20 skaters who participated, 65% were currently dieting or had dieted within the past 6 months. Mean daily energy intakes were 1,422 kcal/day with 62.6% carbohydrate, 15.9% protein and 23.4% fat. The athletes also consumed only 59.1% of their estimated energy needs. This study suggested that body image dissatisfaction may not be the only contributing factor to eating disordered behavior. Nevertheless, the literature does suggest that body image is a key component in the development of eating disorders.

Juxtaposing the well established relationship between body image and eating disordered behavior in aesthetic sports, research on non-aesthetic sports has also shown similar, but less conclusive results. Fogeholm and Hilloskorpi (1999) found that when comparing body image and dieting practices in both males and female athletes participating in various sports to non-athletes, that no significant differences could be established between athletes and non-athletes of both genders. However, the study did find that overall females were more likely to use strict weight reduction techniques than their male counterparts. In addition, 85% of females engaging in sports entailing weight class such as rowing were currently dieting and purposefully restricting caloric intake. Females involved in endurance sports were also found to be overly concerned with weight and diet issues as were the non-athletes. These athletes as well as the non-athletes were thought to be at higher risk for developing an eating disorder. The study concluded that the risk for developing eating disorders is dependent on the specific athletic event in which an individual is involved. In contrast, Williamson et al. (1995) using 98 female collegiate athletes (31 swimmers, 7 tennis, 9 basketball, 12 volleyball, 14 gymnasts, 10 track, 7 cheerleaders, and 8 members of the dance team) found that a significant number from each sport suffered from social pressure to be thin and had increased concerns about body shape and size. There was no significant differences established between the aesthetic and non-aesthetic sports. Each athlete was asked to complete several questionnaires designed to measure social influence for thinness, sports competition anxiety, athletic achievement, and concern with body size and shape. They were also interviewed for evaluation of eating disorder symptoms. Results strongly indicated that over-concern with body size was a primary mediator of other risk factors for developing eating disordered behavior. Similar results were found in a study by Sykora et al. (1993) in which eating attitudes, diet patterns, weight fluctuation and various methods of weight loss were measured in 162 rowers: 82 heavyweights (56 females, 26 males) and 80 lightweights (17 females, 63 males). Overall, females were more

concerned about eating and weight than males and females exhibited more restrictive eating behaviors although there were no significant differences in scores between female heavyweight and lightweight rowers. The study indicated that females were more likely to be preoccupied with weight and weight fluctuation and were more likely to exhibit maladaptive eating behavior.

In summary, the literature suggests that body image disturbances such as preoccupation with weight, body shape, and body size and even attempts to attain the “ideal” body can potentially lead to excessive dietary restraint and other eating disordered behaviors in female athletes. The literature appears quite clear regarding the relationship between body image and eating disordered behavior in females engaging in aesthetic sports, however, the literature is less conclusive in establishing a strong relationship between body image and eating disordered behavior in females involved in non-aesthetic sport. Nevertheless, these types of behaviors might eventually, although not necessarily, lead to clinical eating disorders.

Eating Disorders and Female Athletes

Some studies have even indicated that the prevalence of eating disorders may be underreported in female athletes. The results of a study on elite female athletes from 35 sports by Sundgot-Borgen (1993a) found that out of 522 female athletes, 18% were found to suffer from a clinically diagnosable eating disorder following interviews and clinical examinations. These results were established following the exclusion of female athletes who were diagnosable for an eating disorder based on the Eating Disorder Inventory, demonstrating a significant underreporting of eating disorders among female athletes. The study also found that 22% of the athletes were at risk of developing an eating disorder. Although only a small percentage of athletes from both studies actually met the DSM-IV criteria for an eating disorder, it is apparent that a much larger percentage would most likely meet the criteria for subclinical eating disorders which can have similar implications on long term health and performance. It is also apparent that underreporting of eating disorders by female athletes needs to be taken into consideration when diagnosing and evaluating these athletes. Nevertheless, the literature is consistent in demonstrating that eating disorders, although possibly underreported in female athletes, are problematic in the female athletic population.

A significant contributor to the problem of eating disorders in athletes may be the lack of knowledge about eating disordered behavior by the coaches themselves. In a recent study designed to assess collegiate coaches knowledge of eating disorders over 50% of the coaches responded that they

had never attended an educational program about eating disorders and 20% of the coaches could not even identify common risk factors for eating disordered behavior. The majority of coaches also responded that they felt uncomfortable with the topic of eating disorders in athletes. This study suggested that a strong need exists for coaches to become more knowledgeable regarding eating disorders and eating disordered behavior and that educational programs about eating disorders should be sponsored by athletic departments for both coaches and athletes (Turk, Prentice, Chappell, & Shields, 1999).

Nutrient Intake in Athletes

Despite the extensive amount of literature outlining the necessity of athletes to consume the appropriate total macronutrient and micronutrient intake, numerous studies indicate that athletes, especially female athletes fail to meet the suggested dietary requirements (Fogelholm et al., 1995; Lopez-Varela et al., 2000; Nuviala, Lapieza, & Bernal, 1999; Steen, Mayer, Brownell, & Wadden, 1995; Suguira, Suzuki, & Kobayashi, 1999; Webster & Barr, 1995; Zeigler, Nelson, & Jonnalagadda, 1999). In a groundbreaking study, Fogelholm et al. (1995) examined the hypothesis that female athletes involved in aesthetic sports compared to female athletes involved in non-aesthetic sports would have a greater deficit between reported energy intake (EI) and estimated energy expenditure (EE). The study included female athletes involved in gymnastics and figures skating (aesthetic) and soccer players (non-aesthetic). Results indicated a significantly larger difference in reported EI (7.04 ± 2.23 MJ/d) than EE (10.23 ± 1.48 MJ/d) in the aesthetic group versus an EI (8.97 ± 1.68) than EE (9.42 ± 0.90) in the non-aesthetic group. This reported EI was 45% lower than EE in the aesthetic group leading the researchers to hypothesize that either the aesthetic group was significantly underreporting their dietary intake or that these athletes' metabolic rates might have adapted to chronic weight control or restricted caloric intake. A study on dietary intake in female collegiate heavyweight rowers showed similar results for both energy intake and micronutrient intake. Sixteen female heavyweight collegiate rowers completed a 5-day food record during the sprint racing phase of their season. Mean daily caloric intake was $2,633 \pm 449$ kcal/d and ranged from 2,025-3,858 kcal/d which may appear adequate. However, the mean daily energy expenditure of these athletes was estimated to be over 3,000 kcal/d. Micronutrient intake fell below two-thirds of the RDA for calcium, zinc, B₆ and B₁₂ for the majority of the athletes. The researchers suggested this particular group of athletes would largely benefit from some form of nutritional counseling in order to prevent malnutrition from occurring. Sundgot-Borgen (1993a) reported

a significant number of clinical anorexic and anorexic athletica elite female athletes to consume diets deficient in total calories, carbohydrate, protein, iron, calcium and vitamin D after athletes recorded 3-day and 24 hour food records. The study indicated that energy and nutritional inadequacy coupled with the use of purging behavior should be a primary concern for those dealing with eating disordered behavior in female athletes.

Unfortunately, these trends appear to have continued despite the knowledge of an addressable problem with dietary intake in athletes. In a recent study on U.S. national figure skaters ages 11-18 years, dietary intake of both male and female skaters were found to be deficient in both macronutrient and micronutrient content. Mean dietary intake of male skaters was found to be deficient in magnesium, zinc and iodine; while mean dietary intake of females was found to be far below recommended values for calcium, iron, phosphorus, magnesium, and zinc. Although biochemical indices of nutritional status fell within normal limits in all skaters, plasma electrolyte concentrations were indicative of potential dehydration status. Results of this study strongly suggested a need to develop dietary intervention and educational programs for proper nutrient and fluid intakes in these athletes (Zeigler, Nelson, & Jonnalagadda, 1999). In a similar study by Lopez-Varela et al. (2000), nutritional status of 10 elite female gymnasts aged 13-17 years was evaluated. The total weekly energy intake was significantly lower in the gymnast than a control group despite the reported weekly physical exercise of the gymnasts averaging 48 h/week while the control group averaged around 12 h/week. The two groups were matched for all anthropometric parameters with the exception of height. These results support other studies indicating the necessity for educational intervention in order to prevent malnutrition in these athletes.

Health Implications of Inadequate Dietary Intake

One long-term health consequence of decreased energy intake in females is amenorrhea (cessation of menstruation), a primary risk factor for the development of osteoporosis. Several studies comparing energy intakes of amenorrheic and eumenorheic runners reported that amenorrheic runners self reported lower energy intakes (200-900kcal lower) than eumenorrheic counterparts even though they had similar body weights, body composition and training regimens (Myerson et al., 1991; Nelson et al., 1986). However, female athletes can experience a high incidence of menstrual abnormalities from several factors including weight loss, low body fat levels, loss of fat stores, and excessive training even when dietary intake is adequate (Benson, Engelbert-Fenton, & Eisenman, 1996). Nevertheless,

amenorrhea can have long reaching health implications for athletes as well as non-athletes. In a study by Keen and Drinkwater (1997), the purpose was to determine whether bone mineral density (BMD) of former oligomenorrheic (irregular menses) or amenorrheic athletes normalized following several years of normal menstruation or the use of oral contraceptives. Twenty-nine athletes were present to be studied at time period 1 and time period 2 (eight years later). No significant changes were seen in height, weight or activity status between the time points. Bone mineral density was measured using dual energy x-ray absorptiometry. Vertebral BMD was significantly lower at time 1 and time 2 for oligomenorrheic and amenorrheic athletes than eumenorrheic subjects despite either menstruating normally for several years or the use of oral contraceptives. This study suggests that female athletes suffering from amenorrhea caused by either inadequate dietary intake or other factors may have a significantly increased likelihood of developing osteoporosis in the future even if they begin menstruating regularly. In a study on female ultramarathon runners, Micklesfield, Lambert, Fataar, Noakes, & Myburgh, (1995) concluded that low lumbar spine BMD was related to a history of oligo/amenorrhea regardless of resumption of regular menstrual cycles in subjects and that prolonged oligomenorrhea could also have negative impacts on peak adult BMD. However, in sharp contrast, Kirchner, Lewis, & O'Conner (1995) reported that the BMD of competitive gymnasts was higher than matched controls even though the gymnasts reported inadequate dietary calcium intake and a higher propensity to experience an interruption in their menstrual cycle. Nevertheless, the literature strongly suggests that chronic energy deprivation is one of the strongest factors contributing to menstrual dysfunction (Barr, Prior, & Vigna, 1994; Dueck, Manore, & Matt, 1996; Reichman et al., 1992). In a recent study designed to reverse athletic amenorrhea by improving energy balance and nutritional status in 4 amenorrheic athletes, a 20-week program provided a daily sport nutrition supplement to the athletes. The intervention provided an increased protein and micronutrient intake. Three of the 4 athletes resumed menstrual function either during or shortly after the intervention program indicating that amenorrheic athletes can improve energy and nutrient status thereby possibly preventing or at least diminishing the long term ramifications of menstrual disturbances (Kopp-Woodroffe, Manore, Dueck, Skinner, & Matt, 1999).

In theory, chronic energy restriction and/or inadequate micronutrient intake in addition to excessive training regimens should decrease athletic performance. However, the difficulty to accurately measure the effects of inadequate energy intake on performance is apparent since most athletes cannot

be carefully monitored over any extended period of time and many other factors may also impact performance (Beals & Manore, 1994). Still the literature suggests that optimal performance cannot be attained without the appropriate nutrition in athletes (Brownell & Steen, 1992; Celsing, Blomstrand, Werner, Pihlstedt, & Ekblom, 1986; Costill & Hargreaves, 1992). Nevertheless, consistently female athletes have reported dietary intakes lacking in both macronutrients and micronutrients (Mulligan & Butterfield, 1990; Prior et al. 1990). The impact of such dietary practices on performance is yet to be established.

Personality Characteristics in Female Athletes

Psychological characteristics are known to be significantly related to both body dissatisfaction and eating disordered behavior in female athletes (Geller, Cockell, & Goldner, 2000; Neumarker, et al., 2000; Olsen et al., 1996). In a study by Fulkerson et al. (1999), high school athletes were assessed for risks of developing an eating disorder with non-athletic controls. Comparisons were made utilizing the EDI, Restraint Scale, Risk Symptom Checklist, and Multidimension Personality Questionnaire. Perfectionistic tendencies were found to put some athletes at a higher risk for the development of an eating disorder when compared to controls. A study on ballet school students aged 13-17 years compared male ballet dancers to female dancers and controls using the EDI. Significant differences were established between female dancers and controls in drive for thinness, bulimia, interpersonal distrust, ineffectiveness, and perfectionism with the dancers scoring higher on all five subscales. The study indicated that psychological inconsistencies exist between female ballet dancers and controls, while the profile of male ballet dancers was similar to that of controls (Neumarker et al., 2000). Drive for thinness is another psychological trait associated with eating disordered behavior. Marshall & Harber (1996) found that 3.6% of elite Canadian field hockey players exhibited an elevated drive for thinness and these athletes were found to be at greater risk for the development of an eating disorder after the implementation of the EDI-2. Within the field hockey group, 17.1% also exhibited an increased body dissatisfaction, which is another psychological characteristic associated with the development of eating disordered behavior.

Summary

Although body dissatisfaction has been implicated in the development of eating disordered behavior in both male and female athletes, the true causes of eating disordered behavior are

multifactorial. According to the literature however, a strong link does exist between preoccupation of body weight and body size and the development of eating disordered behavior in both aesthetic and non-aesthetic sports. In addition, certain personality traits inherent in competitive athletes may also exacerbate the onset of eating disordered behavior in female athletes. Subclinical eating disorders and inadequate dietary intake may pose an even more serious threat to female athletes simply because they are more difficult to quantify and diagnose, although the long-term health implications are equivalent to that of clinical eating disorders.

Chapter 3

Methods

Introduction

The purpose of this study was to compare the relationship of body attitude to both quantity and quality of dietary intake and to selected personality characteristics. It was hypothesized that no relationship exists between body attitude and both quantity and quality of dietary intake and personality characteristics; and that no significant differences exist in personality traits and body attitude between aesthetic and non-aesthetic sports. In addition, it was hypothesized that a valid and reliable prediction equation for dietary intake can be developed utilizing body attitude and personality traits.

Subjects

In season collegiate female lacrosse players (n=27) and dance team members (n=20) ages 18-23 years from a Division 1A Mid-Atlantic University were recruited to participate in the study. Recruitment of athletes was coordinated through respective team coaches. Respective coaches were contacted separately and given a brief outline of the purpose of the study. At this time, a designated meeting was established between the primary researcher and the coaches on different occasions in order to explain in depth the purpose of the study and the potential requirements for their athletes who chose to participate. Following the initial meeting with the coaches, a time was established for the researcher to meet with the lacrosse team and dance team members separately, in order to explain the purpose and participant requirements to the athletes. Athletes who were interested in participating gave their names and e-mail addresses to the primary researcher for further contact. Coaches confirmed that athletes from both athletic populations engaged in strenuous practices or rehearsals an average of 5 days per week not including lacrosse matches or dance performances.

Females participating in various physical activity courses within the same university during the competitive season of the collegiate athletes were recruited (n=64) to serve as comparisons. Comparisons were assumed to be representative of the general student body since all undergraduate majors must complete at least two physical activity courses in order to meet graduation requirements. All comparisons were engaging in at least two sessions of physical activity per week based on their participation in the physical activity courses. Participants were recruited from university weight training, fitness running, golf, racquetball, and exercise and weight control courses.

Various physical activity course instructors were contacted and given a brief overview of the study. The instructors then gave their permission for the primary researcher to visit the various classes and attempt to recruit interested participants. The researcher met with several of the physical activity courses during their assigned class times and explained the purpose and participant requirements to all females falling within the selected age range and who were not participating in a varsity sport during the semester. Interested participants were asked to give their names and e-mail addresses to the researcher for further contact. All participants voluntarily signed an informed consent statement approved by the University Institutional Review Board (Appendix A).

Data Collection

Due to the large numbers interested in participating from both the lacrosse and dance teams, administration of all questionnaires was coordinated through team coaches. All questionnaires were administered at the same time to respective teams. The researcher met with the lacrosse and dance teams prior to individual team practices and verbally read and distributed the Informed Consent Form to the athletes. The following day, the researcher met with the lacrosse and dance teams prior to individual practices, collected the signed Informed Consent Forms and administered the various questionnaires. Prior to questionnaire administration, dietary records (Appendix B) were also distributed and the investigator verbally instructed the athletes on diet record keeping. The investigator explained the necessity of recording specific quantities, types, cooking methods and name brands or restaurant brand foods and drinks. Both measuring cups and 4 and 8 oz. scoops were used to demonstrate to participants the spatial recognition of amounts and quantities of foods. Participants were asked to be as specific as possible with types of foods such as differences between whole wheat bread and white bread; skim, 1%, 2% or whole milk etc... Participants were also asked to record the diet records for three consecutive weekdays and 2 weekend days within the next week. Following dietary record instructions, the researcher verbally explained procedures for all the questionnaires which were completed within the next 45-55 minutes with the researcher remaining present in case of participant questions. Dietary records were collected within a week of distribution from all participants.

The investigator contacted the physical activity course instructors, in courses which study participants volunteered, to establish a convenient class period in which the investigator could verbally read and distribute the Informed Consent Form to the controls. At that time, a second class period was established for the following week to collect the Informed Consent Forms and administer the

questionnaires. Both athletes and controls completed the questionnaires and dietary records within two weeks of respective groups. Exact procedures for dietary record keeping as well as questionnaire administration for the controls were the same as procedures followed for the athletes.

Instrumentation

Dietary Records

Athletes and comparisons completed a 5-day dietary intake record (Appendix B) including 3 weekdays and 2 weekend days at one time point during the middle of the athlete's competitive season. Dietary intakes were analyzed for total daily caloric intake; total daily intake from carbohydrate(g), fat(g), and protein(g); percent energy from carbohydrate, fat, and protein; dietary fiber(g); and percentage of the Recommended Dietary Allowances (RDA) of vitamins and minerals. After completion of the dietary records, analysis of nutrient composition was conducted using the Food Processor software program (version 5.3, 1993) (ESHA Research, Salem, Oregon) which contains nutrient composition data on 2,400 foods and analyzes for 30 food components.

Eating Disorder Inventory – 2

Participants were administered the Eating Disorder Inventory-2 (EDI-2) (Appendix C) which is a 91-item self-report measure whose subscales measure eleven established personality traits associated with the development of clinically diagnosable eating disorders including: drive for thinness, ineffectiveness, body dissatisfaction, interpersonal distrust, bulimia, perfectionism, maturity fears, interoceptive awareness, impulse regulation, social insecurity, and asceticism. The EDI-SC was administered in order to screen for any participants who may be suffering from a clinically diagnosable eating disorder. The questionnaire also establishes information regarding any chronic illnesses that could potentially alter dietary behavior. The EDI-2 provides normative data for male and female college-age students and is scored on a 6-point rating scale. Internal consistency reliability estimates for 354 nonpatient female comparison groups were calculated by Shore and Porter (1990) and can be found in Table 1. Three week test-retest reliability for nonpatient samples reported by Wear and Pratz (1987) can be found in Table 2.

Table 1.

Internal Consistency Reliability Estimates

EDI Subscale	(N=354)
Drive for Thinness	0.81
Bulimia	0.69
Body Dissatisfaction	0.91
Ineffectiveness	0.82
Perfectionism	0.70
Interpersonal Distrust	0.77
Interoceptive Awareness	0.78
Maturity Fears	0.65

Table 2.

Three Week Test-Retest Reliability

EDI Subscale	(N=70)
Drive for Thinness	0.92
Bulimia	0.90
Body Dissatisfaction	0.97
Ineffectiveness	0.85
Perfectionism	0.88
Interpersonal Distrust	0.81
Interoceptive Awareness	0.85
Maturity Fears	0.65

Ben-Tovim Walker Body Attitude Questionnaire (BAQ)

Participants were administered the Ben-Tovim Walker Body Attitude Questionnaire (BAQ) (Appendix D) which is a 44-item self-report questionnaire whose subscales encompass six distinct aspects of whole body experience: feelings of overall fatness; self-disparagement; strength; salience of weight; feelings of attractiveness; and consciousness of lower body fat (Ben-Tovim & Walker, 1991). The participants were asked to respond to each question by selecting one of the five weighted responses: Strongly agree = 5, Agree = 4, Neutral = 3, Disagree = 2, Strongly Disagree = 1. Subscales were

calculated by adding the corresponding item scores with reverse scores for questions 3, 10, 11, 12, 16, 17, 20, 41, 43. Four week test-retest reliability was shown to be $r=.83$ and Table 3 represents intercorrelations of the BAQ subscales and the body dissatisfaction subscale of the EDI.

Table 3.

Intercorrelations of BAQ Subscales and EDI Body Dissatisfaction Subscale.

BAQ subscales	EDI
Feeling Fat	0.83*
Disparagement	0.48*
Strength	-0.20
Saliency	0.59*
Attractiveness	-0.56
Lower body fat	0.55*

* $p<0.01$

Cognitive Behavior Dieting Scale (CBDS)

Participants were administered the Cognitive Behavioral Dieting Scale (CBDS) (Appendix E) which is a 14-item scale designed to measure current dieting behavior and related thoughts within the past two weeks and is scaled on a 5-point Likert continuum (Martz, Sturgis, & Gustafson, 1996). Each subject was asked to circle the appropriate answer to how they have felt, thought, and behaved within the past two weeks. Internal consistency was reported using Cronbach's $\alpha = .95$ and test-retest reliability was reported at $r=.97$. Strong correlations were reported between the CBDS and the weight concern factor of the Body Esteem Scale ($r=-.60$) and the Three Factor Eating Questionnaire ($r= .60$) (Martz, Sturgis, & Gustafson, 1996).

Silhouette Scale

Participants were administered a nine-figure silhouette scale (Appendix F) which represented a monotonic increase in percent size from the first to the ninth silhouette. Subjects were given three repeated scales and asked to circle the best representation of how they "think" they look (cognitive), how they "feel" they look (emotional) and how they "want" to look (ideal) on separate scales. Each figure is scored on a scale of 1-9 with 1 being the thinnest and 9 being the heaviest. The scale will be reproduced from the original drawings of Stunkard, Sorenson, and Schulsinger (1983).

Statistical Analysis

Statistical analysis was performed using the Statistical Analysis System (SAS), Cary, NC. Significance was set at 0.05. Group mean differences on the dietary intake, questionnaires and personality traits were analyzed using one-way analysis of variance. Post-hoc analyses were performed using the Tukey procedure and the Kruskal-Wallis Test. Relationships were determined between dietary intake, body attitude and personality traits utilizing the Pearson Product Moment Correlation procedures. Correlations included quantity (total daily energy intake, % carbohydrate, % fat, % protein); selected body attitude scores from the EDI-2 and BAQ (feelings of fatness, body dissatisfaction, drive for thinness, feelings of attractiveness); and selected personality traits from the EDI-2 (ineffectiveness, interpersonal distrust, bulimia, perfectionism, maturity fears, interoceptive awareness, impulse regulation, social insecurity, and asceticism). Stepwise multiple regression techniques were utilized in the attempt to develop a valid and reliable prediction equation for dietary intake using body attitude and selected personality characteristics.

Chapter 4

Results

All participants (lacrosse = 27, dance = 20, control = 64) were administered the EDI-2, Ben-Tovim Walker Body Attitude Questionnaire, Cognitive Behavior Dieting Scale, and a Silhouette Scale. There was 100% compliancy within the lacrosse team pertaining to dietary record intake (n = 27). Seventy-five percent of the dance team members (n = 15) and 89% of the controls (n = 57) completed the dietary intake records. Descriptive group data (mean \pm SD) of participants are presented in Tables 4, 5 and 6.

Table 4.

Descriptive Lacrosse Group Data, Means \pm SD (n=27)

Variable	Mean \pm SD
Age (yr)	19.4 \pm 1.1
Height (cm)	167.4 \pm 4.8
Weight (kg)	63.7 \pm 6.6

Table 5.

Descriptive Dance Group Data, Means \pm SD (n=20)

Variable	Mean \pm SD
Age (yr)	19.5 \pm 1.4
Height (cm)	165.9 \pm 4.8
Weight (kg)	58.9 \pm 5.1

Table 6.

Descriptive Control Group Data, Means \pm SD (n=64)

Variable	Mean \pm SD
Age (yr)	20.6 \pm 1.4
Height (cm)	166.1 \pm 6.3
Weight (kg)	64.3 \pm 7.8

Eating Disorder Inventory-2

Descriptive EDI-2 data (mean \pm SD) for all participants are presented in Table 7.

Table 7. Higher scores indicate stronger personality characteristics or stronger predispositions.

Eating Disorder Inventory-2 Group Data, Means \pm SD

Group	DT	I	BD	ID
Lacrosse	6.5 \pm 5.6	1.8 \pm 2.7	14.4 \pm 7.5	2.9 \pm 4.0
Dance	9.1 \pm 6.9	3.2 \pm 3.5	16.4 \pm 8.9	3.6 \pm 4.2
Control	5.8 \pm 5.7	1.8 \pm 2.5	11.1 \pm 8.2	1.3 \pm 1.5

Note: DT = Drive for Thinness, I = Ineffectiveness, BD = Body Dissatisfaction, ID = Interpersonal Distrust

Table 7 (continued)

Eating Disorder Inventory-2 Group Data, Means \pm SD

Group	P	MF	IA	IR
Lacrosse	6.9 \pm 3.7	3.6 \pm 3.5	3.7 \pm 4.9	0.8 \pm 1.7
Dance	8.7 \pm 3.4	3.0 \pm 2.9	2.1 \pm 3.2	0.9 \pm 1.5
Control	6.2 \pm 4.1	1.7 \pm 2.0	1.6 \pm 2.5	1.5 \pm 2.2

Note: P = Perfectionism, MF = Maturity Fears, IA = Interoceptive Awareness, IR = Impulse Regulation

Table 7 (continued)

Eating Disorder Inventory-2 Group Data, Means \pm SD

Group	Social Insecurity	Asceticism	Bulimia
Lacrosse	2.8 \pm 2.4	4.0 \pm 2.8	2.6 \pm 3.7
Dance	2.5 \pm 3.7	4.1 \pm 2.0	2.7 \pm 3.2
Control	1.3 \pm 1.3	3.4 \pm 2.7	0.8 \pm 1.5

Ben-Tovim Walker Body Attitude Questionnaire

Descriptive BAQ data (means \pm SD) for all participants are presented in Table 8.

Table 8. Higher scores on feelings of fatness, self-disparagement, salience of weight, and consciousness of body fat indicate stronger body dissatisfaction. Higher scores on feelings of attractiveness and strength indicate a higher body esteem in those areas.

Table 8.

Ben-Tovim Walker Body Attitude Questionnaire, Means \pm SD

Group	FOF	SD	S
Lacrosse	48.9 \pm 9.1	15.8 \pm 3.3	22.7 \pm 2.5
Dance	49.3 \pm 11.6	14.9 \pm 4.4	21.0 \pm 3.3
Control	46.2 \pm 10.8	14.3 \pm 3.6	21.2 \pm 3.8

Note: FOF = Feelings of Overall Fatness, SD = Self-Disparagement, S = Strength

Table 8 (continued)

Ben-Tovim Walker Body Attitude Questionnaire, Means \pm SD

Group	SW	FOA	CBF
Lacrosse	23.1 \pm 4.9	17.4 \pm 2.3	10.3 \pm 1.9
Dance	23.5 \pm 7.5	16.3 \pm 4.6	9.9 \pm 3.1
Control	21.7 \pm 5.9	18.8 \pm 2.2	9.7 \pm 2.5

Note: SW = Salience of Weight, FOA = Feelings of Attractiveness, CBF = Consciousness of Body Fat

Cognitive Behavior Dieting Scale

Descriptive CBDS data (means \pm SD) for all participants are presented in Table 9.

Table 9.

Cognitive Behavior Dieting Scale, Means \pm SD

Group	CBDS
Lacrosse	38.3 \pm 12.7
Dance	42.8 \pm 12.4
Control	42.9 \pm 13.1

Silhouette Scale

Descriptive silhouette scale data (means \pm SD) for all participants are presented in Table 10.

Table 10.

Silhouette Scale, Means \pm SD

Group	Cognitive	Emotional	Ideal
Lacrosse	3.83 \pm 0.66	4.11 \pm 0.94	2.59 \pm 0.55
Dance	3.85 \pm 1.09	4.55 \pm 1.46	2.52 \pm 0.69
Control	3.96 \pm 1.01	4.47 \pm 1.30	2.79 \pm 0.71

Dietary Intake

Descriptive dietary intake group data (means \pm SD) for all participants are presented in

Table 11.

Table 11.

Five Day Average Group Dietary Intake, Means \pm SD

Nutrient	Lacrosse(n=27)	Dance(n=15)	Control(n=57)
Kilocalories	2073 \pm 539	1812 \pm 465	1819 \pm 418
%Carbohydrate	58.5 \pm 7.9	60.8 \pm 7.4	61.0 \pm 9.7
%Protein	14.7 \pm 4.0	15.4 \pm 3.5	13.7 \pm 4.2
%Fat	26.7 \pm 8.0	23.8 \pm 7.0	25.1 \pm 8.3
Carb(g)	302.4 \pm 86.4	267.5 \pm 81.2	280.4 \pm 81.7
Protein(g)	73.8 \pm 22.3	67.8 \pm 18.2	61.4 \pm 19.8
Fat(g)	62.8 \pm 25.9	47.4 \pm 19.1	50.1 \pm 19.1
Fiber(g)	14.5 \pm 5.2	13.4 \pm 3.5	11.1 \pm 3.9
Vit A (RE)	3899 \pm 1396	4212 \pm 2131	3557 \pm 1742
Vit C (mg)	89.5 \pm 63.5	117.9 \pm 48.9	62.5 \pm 33.5
Vit D (ug)	4.9 \pm 0.9	4.7 \pm 1.2	4.3 \pm 0.7
Vit E (mg)	5.6 \pm 1.3	5.3 \pm 0.9	5.4 \pm 1.5
Vit K (ug)	26.4 \pm 10.2	22.9 \pm 12.7	23.7 \pm 14.9
Thiamin (mg)	1.9 \pm 0.5	1.8 \pm 1.1	1.6 \pm 1.5
Ribo (mg)	2.6 \pm 1.5	2.7 \pm 1.3	2.1 \pm 1.4
Niacin (mg)	19.4 \pm 7.6	21.0 \pm 8.4	17.5 \pm 10.2
Vit B-6 (mg)	2.5 \pm 1.1	2.3 \pm 0.9	2.7 \pm 1.3
Vit B-12 (mg)	6.2 \pm 3.3	7.1 \pm 2.4	6.0 \pm 3.5
Folate (ug)	459 \pm 174	373 \pm 216	312 \pm 222
Calcium (mg)	864 \pm 275	812 \pm 298	714 \pm 313
Magnesium (mg)	444 \pm 216	315 \pm 246	371 \pm 254
Iron (mg)	14.5 \pm 5.2	13.5 \pm 5.7	11.8 \pm 4.6
Zinc (mg)	10.1 \pm 3.4	9.3 \pm 2.7	8.4 \pm 4.1
Potassium(mg)	3331 \pm 1004	2194 \pm 921	2964 \pm 1108
Copper (mg)	1.1 \pm 0.7	0.9 \pm 0.7	1.0 \pm 0.9

Differences in Dietary Intake, Selected Body Attitude Scores, and Selected Personality Traits
Between Groups

Significant differences were found between the lacrosse and control groups on interoceptive awareness ($p=0.0320$), maturity fears ($p=0.0054$), social insecurity ($p=0.0037$), dietary protein (g) ($p=0.0362$), dietary fat (g) ($p=0.0208$), and dietary fiber intake (g) ($p=0.0035$).

Significant differences were found between the dance and control groups on feelings of attractiveness ($p=0.0018$), body dissatisfaction ($p=0.0234$), perfectionism ($p=0.0464$), and body weight (kg) ($p=0.0139$). There were also significant differences found between the control group and the athletes on bulimia ($p=0.0013$), interpersonal distrust ($p=0.0025$) and dietary vitamin C (mg) intake ($p=0.0001$). There were no significant differences between the lacrosse and dance groups on any measured parameter.

Significant differences were found between both athletic groups in “ideal” body image versus “cognitive” and “emotional” perceptions ($p<0.001$). The control groups “cognitive”, “emotional”, and “ideal” images were all significantly different from one another ($p<0.001$). Figures 1-13 demonstrate mean group differences and Figures 14-16 demonstrate within group differences on silhouette scale scores.

Figure 1.

Group Mean Interoceptive Awareness Differences

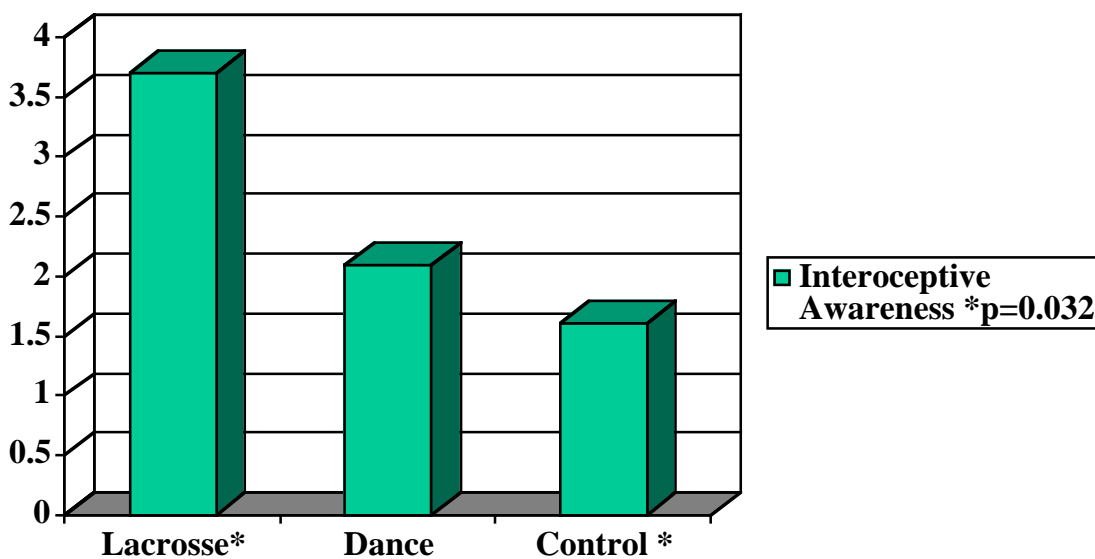


Figure 2.

Group Mean Maturity Fears Differences

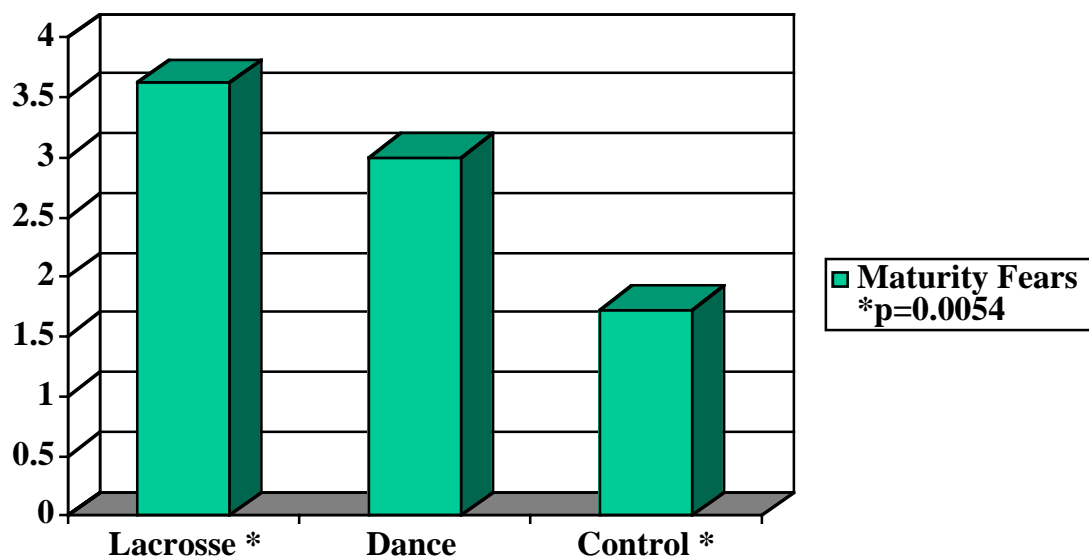


Figure 3.

Group Mean Social Insecurity Differences

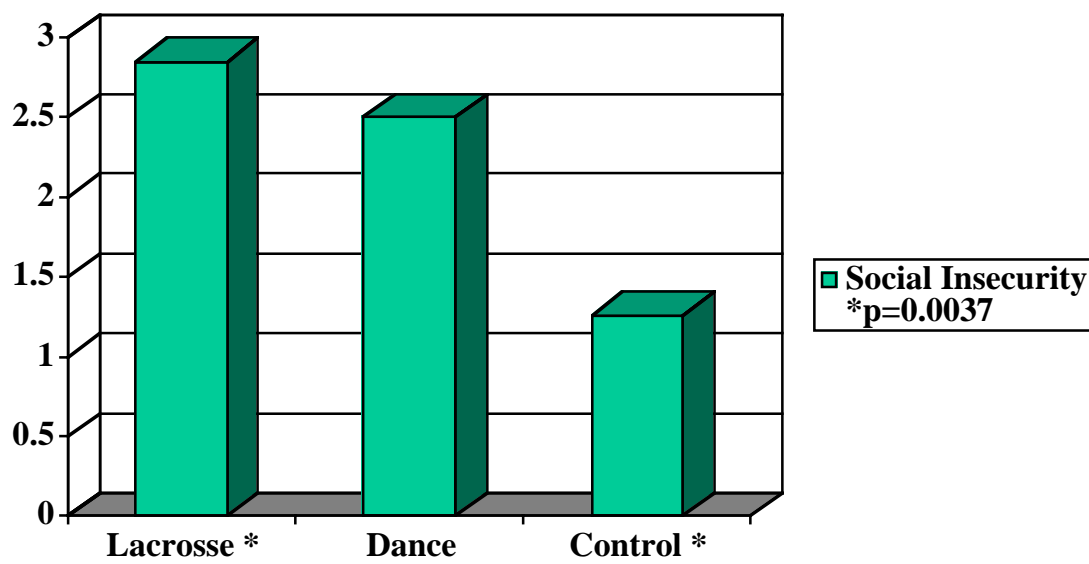


Figure 4.

Group Mean Dietary Protein Intake Differences

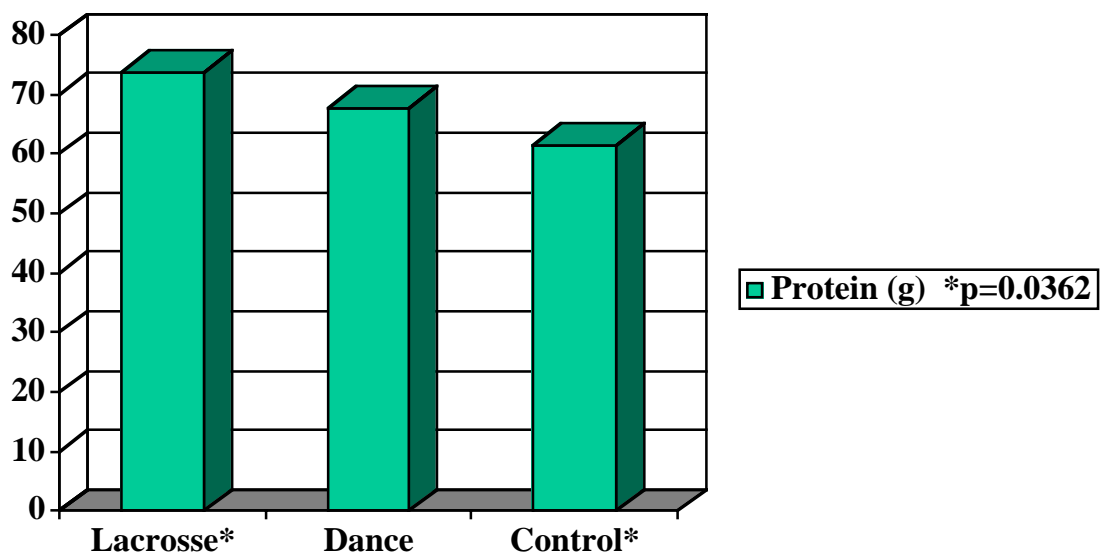


Figure 5.

Group Mean Dietary Fat Intake Differences

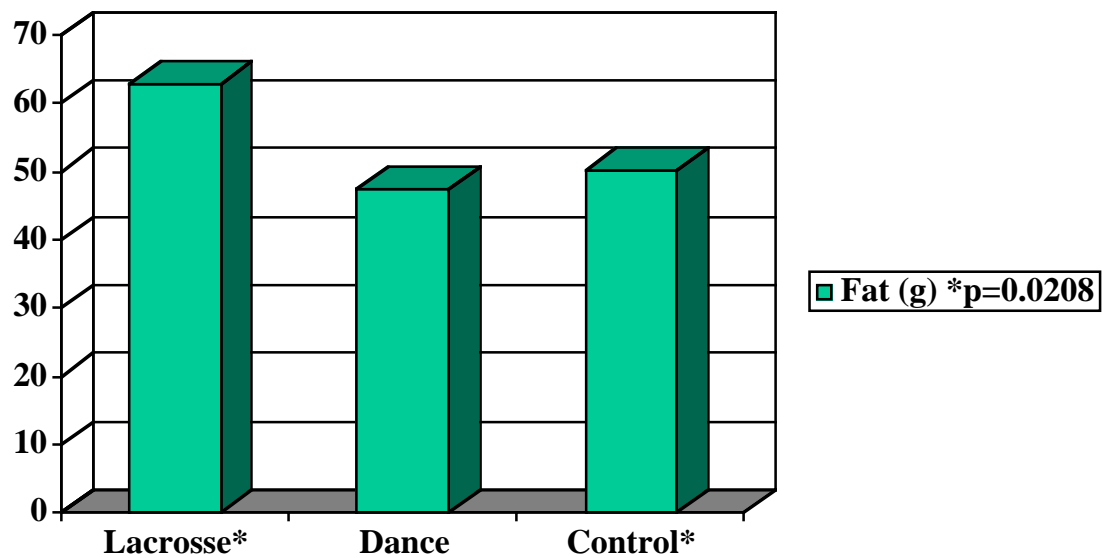


Figure 6.

Group Mean Dietary Fiber Intake Differences

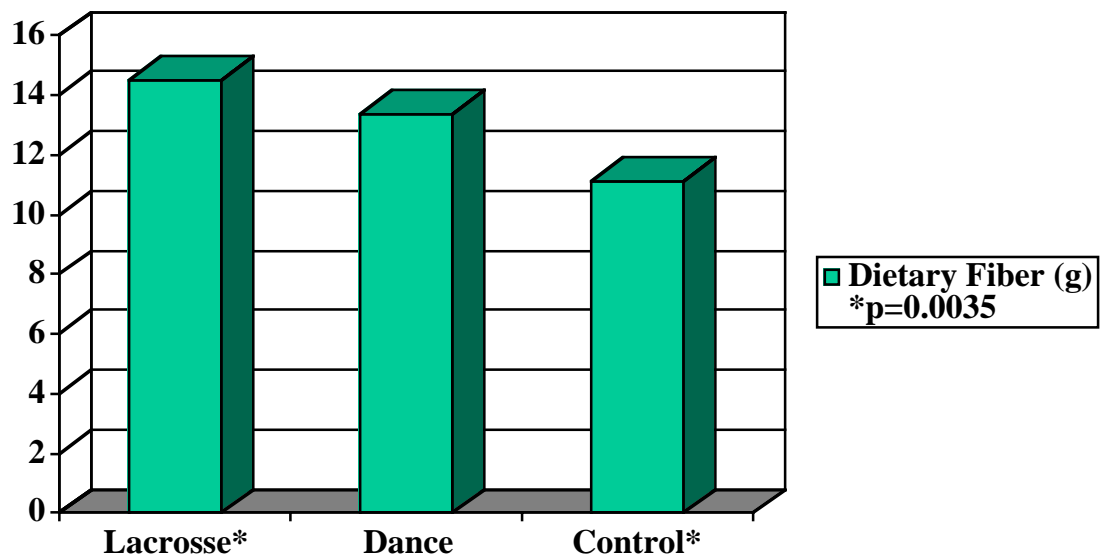


Figure 7.

Group Mean Feelings of Attractiveness Differences

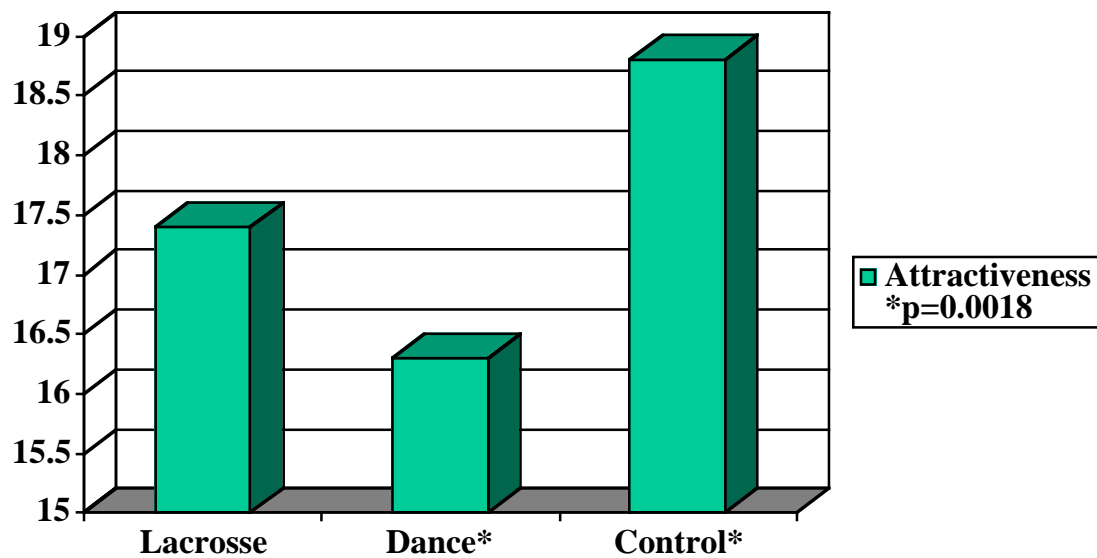


Figure 8.

Group Mean Body Dissatisfaction Differences

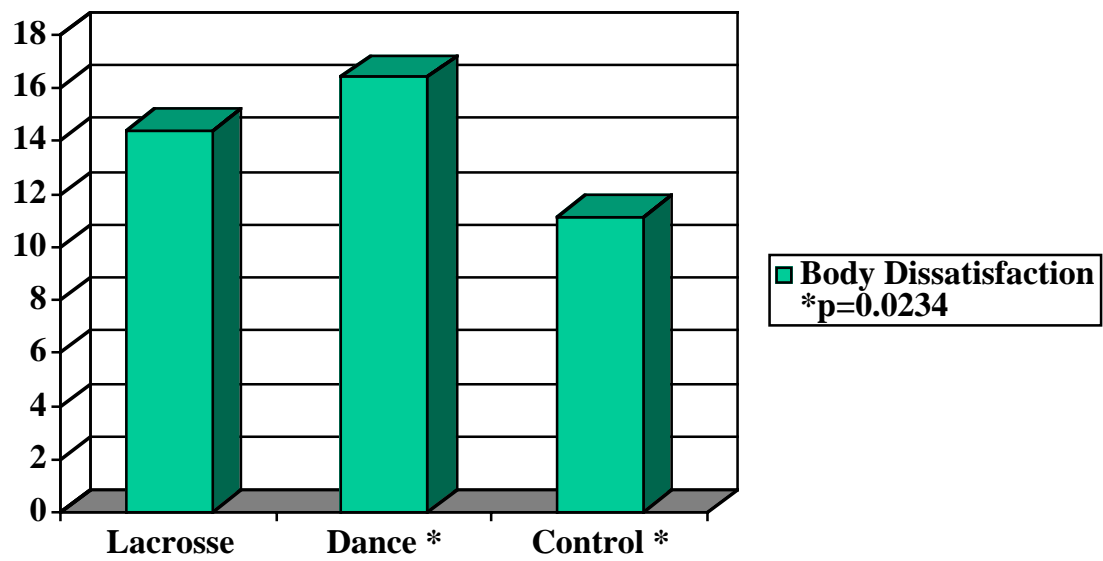


Figure 9.

Group Mean Perfectionism Differences

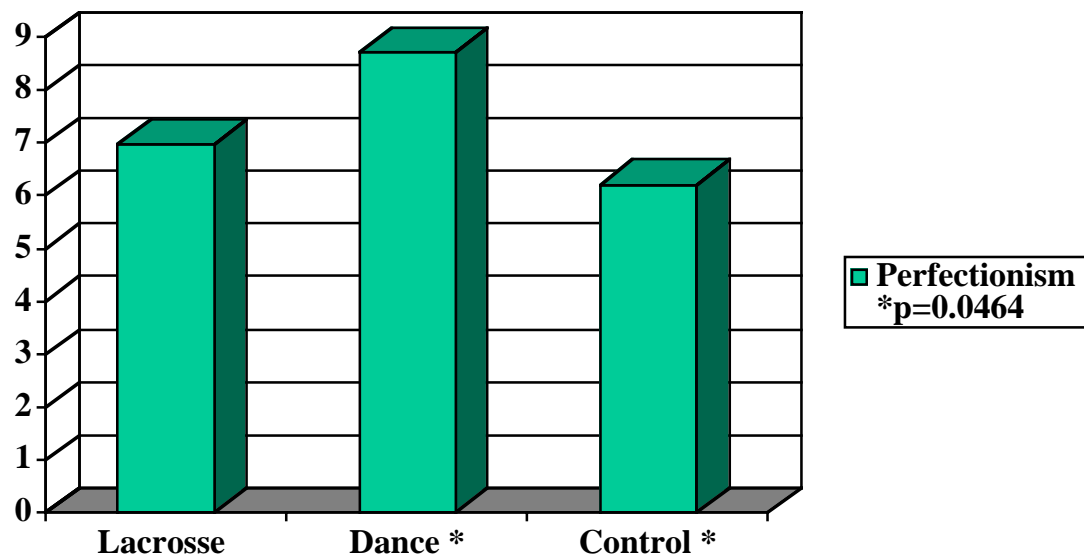


Figure 10.

Group Mean Body Weight Differences

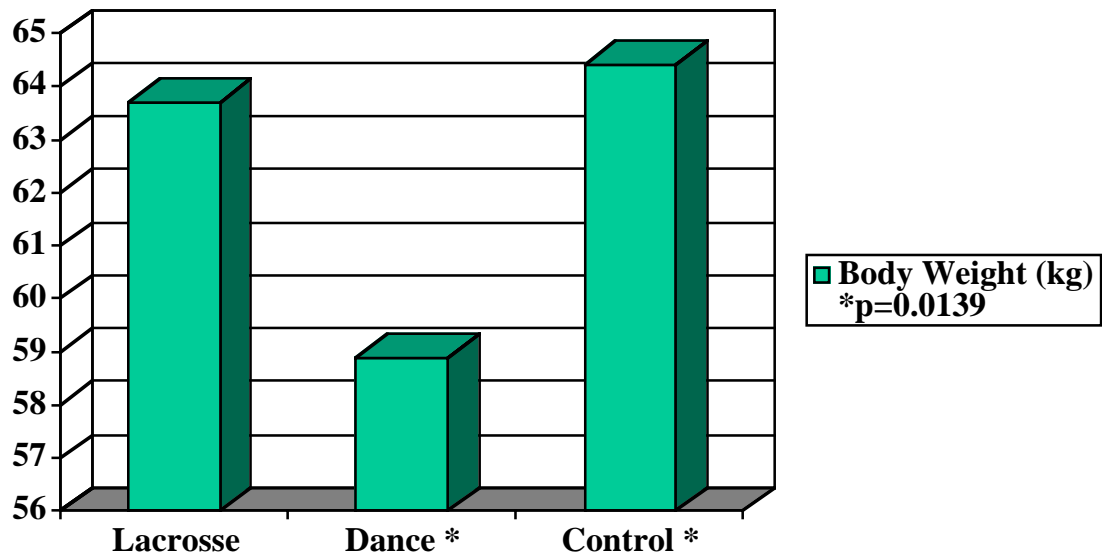


Figure 11.

Group Mean Bulimia Differences

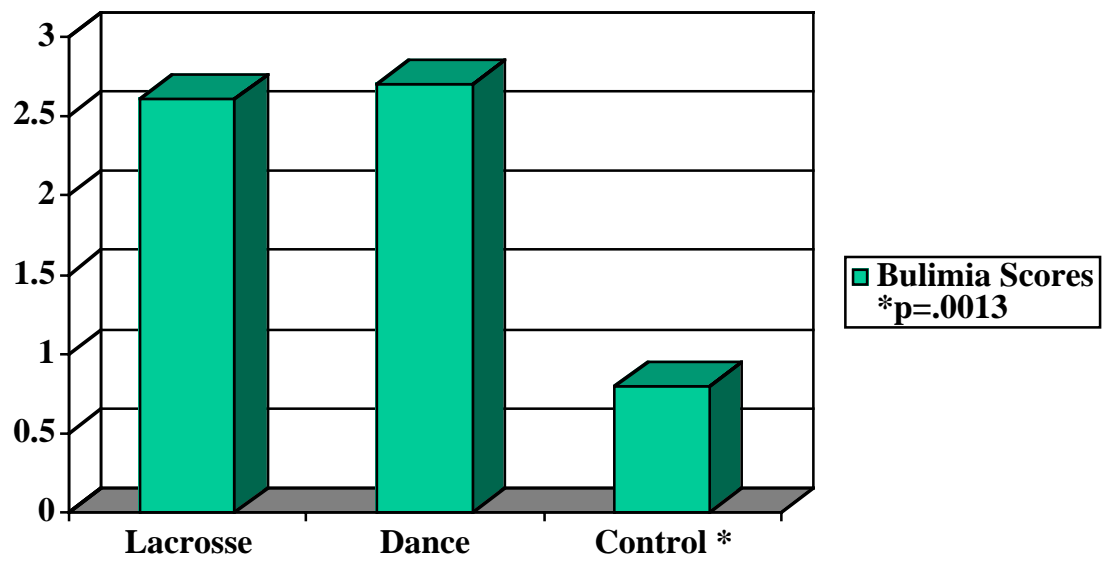


Figure 12.

Group Mean Interpersonal Distrust Differences

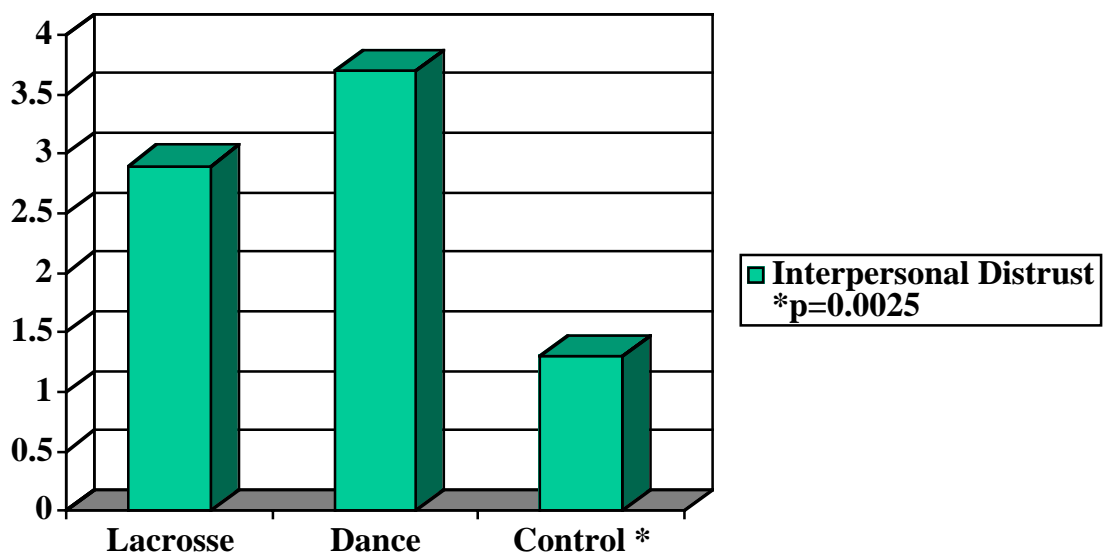


Figure 13.

Group Mean Vitamin C Intake Differences

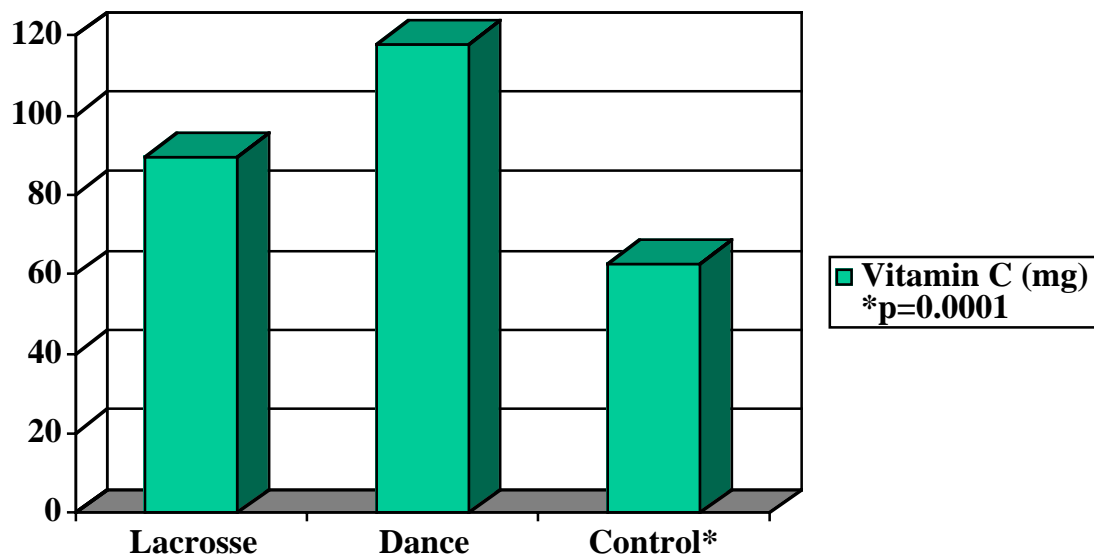


Figure 14.

Mean Lacrosse Silhouette Score Differences



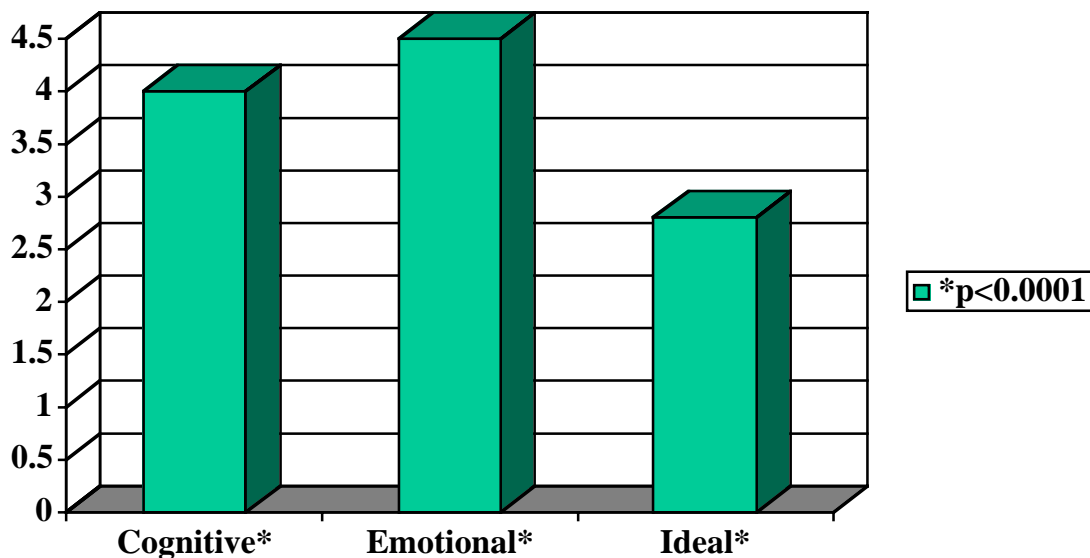
Figure 15.

Mean Dance Silhouette Score Differences



Figure 16.

Mean Comparison Silhouette Score Differences



Relationship of Dietary Intake to Body Attitude and Personality Characteristics

Lacrosse

Within the lacrosse team participants there was a significant negative relationship between total caloric intake and the Cognitive Behavior Dieting Scale (CBDS) ($r=-0.46$, $p=0.01$). There were no other significant relationships between total caloric intake and body attitude scores. A significant positive relationship was found between percentage of caloric intake in carbohydrate and feelings of fatness (FOF) ($r=0.46$, $p=0.01$). A significant positive relationship was also found between percentage of caloric intake in protein and drive for thinness (DT) ($r=0.42$, $p=0.02$). There were significant negative relationships found between percentage of caloric intake in fat and the CBDS ($r=-0.46$, $p=0.01$) and FOF ($r=-0.51$, $p=0.006$). A significant negative relationship was found between protein intake (g) and feelings of strength ($r=-0.46$, $p=0.01$). There were significant negative relationships found between fat intake (g) and the CBDS ($r=-0.64$, $p=0.0003$) and FOF ($r=-0.51$, $p=0.005$). There were no other significant relationships found between macronutrients and body attitude scores within the lacrosse

participants. Table 12 represents the r values for dietary intake (macronutrients) and their relationship to body attitude scores within the lacrosse group.

Table 12.

Correlational Values for Dietary Intake and Body Attitude Scores

Score	Kcal	%CHO	%PRO	%FAT	CHO(g)	PRO(g)	FAT(g)
FOF	-0.32	0.46*	0.10	-0.51*	-0.05	-0.26	-0.51*
DT	-0.28	-0.02	0.42*	-0.18	-0.24	0.05	-0.38
BD	-0.11	0.22	0.17	-0.31	0.02	-0.01	-0.26
Attr	0.05	-0.08	-0.11	0.12	0.01	-0.04	0.05

Note FOF= feelings of fatness, DT= Drive for Thinness, BD= Body Dissatisfaction, Attr= feelings of attractiveness
*denotes significance at $p < 0.05$

Table 13 represents the r values for the CBDS to body attitude scores within the lacrosse group.

Table 13.

Correlational Values for the CBDS and Body Attitude Scores

Score	CBDS
Feelings of Fatness	0.56*
Drive for Thinness	0.58*
Body Dissatisfaction	0.34
Feelings of Attractiveness	-0.17

*denotes significance at $p < 0.05$

There were positive significant relationships found between feelings of fatness (FOF) and the CBDS ($r=0.57$, $p=0.002$), bulimia ($r=0.57$, $p=0.001$), asceticism ($r=0.45$, $p=0.018$), self-disparagement ($r=0.47$, $p=0.013$), salience of weight ($r=0.62$, $p=0.0005$), and consciousness of body fat ($r=0.54$, $p=0.003$). Significant positive relationships were also found between drive for thinness and the CBDS ($r=0.58$, $p=0.001$), maturity fears ($r=0.44$, $p=0.02$), bulimia ($r=0.70$, $p < 0.0001$), interoceptive awareness ($r=0.50$, $p=0.007$), ineffectiveness ($r=0.46$, $p=0.01$), asceticism ($r=0.50$, $p=0.007$), self-disparagement ($r=0.44$, $p=0.02$), salience of weight ($r=0.72$, $p < 0.0001$), and consciousness of body fat ($r=0.49$, $p=0.008$).

There were significant positive relationships between body dissatisfaction and bulimia ($r=0.45$, $p=0.01$), interoceptive awareness ($r=0.48$, $p=0.01$), asceticism ($r=0.54$, $p=0.003$), self-disparagement ($r=0.60$, $p=0.0009$), salience of weight ($r=0.50$, $p < 0.0001$), and consciousness of body fat ($r=0.75$, $p < 0.0001$). A significant positive relationship was found between feelings of

attractiveness and feelings of strength ($r=0.46$, $p=0.015$). No other significant relationships were established between body attitude scores and selected personality traits. Table 14 represents the r values for selected body attitude scores and personality traits within the lacrosse group.

Table 14.

Correlational Values for Body Attitude Scores and Personality Traits Within Lacrosse Group

Score	FOF	DT	BD	FA
Maturity Fears	0.32	0.44*	0.36	-0.17
Bulimia	0.57*	0.70*	0.45*	0.11
Interoceptive Awareness	0.36	0.50*	0.48*	0.21
Ineffectiveness	0.36	0.46*	0.34	0.33
Perfectionism	0.19	0.25	0.33	0.01
Interpersonal Distrust	0.22	0.36	0.33	0.28
Impulse Regulation	0.18	0.13	0.37	0.24
Asceticism	0.44*	0.50*	0.54*	0.18
Social Insecurity	0.14	0.35	0.30	-0.14
Self-Disparagement	0.46*	0.44*	0.60*	-0.37
Feelings of Strength	0.05	-0.03	-0.20	0.47*
Salience of Weight	0.62*	0.72*	0.50*	-0.08
Consciousness of Body Fat	0.54*	0.49*	0.75*	-0.26

Note FOF = Feelings of Fatness, DT = Drive for Thinness, BD = Body Dissatisfaction, FA = Feelings of Attractiveness
*denotes significance at $p<0.05$

Dance Group

Within the dance team participants there were significantly negative relationships found between total caloric intake and the CBDS ($r=-0.53$, $p=0.04$), feelings of fatness ($r=-0.79$, $p=0.0005$), body dissatisfaction ($r=-0.75$, $p=0.001$); and a positive significant relationship between total caloric intake and feelings of attractiveness ($r=0.65$, $p=0.008$). A significant positive relationship was found between percentage of total caloric intake in protein and body dissatisfaction ($r=0.66$, $p=0.006$) and a significant negative relationship with feelings of attractiveness ($r=-0.52$, $p=0.04$). There were significant negative relationships found between dietary carbohydrate intake (g) and feelings of fatness ($r=-0.61$, $p=0.01$) and body dissatisfaction ($r=-0.64$, $p=0.009$) and a significant positive relationship with feelings of attractiveness ($r=0.65$, $p=0.008$). Significant negative relationships were found between dietary fat intake (g) and feelings of fatness ($r=-0.57$, $p=0.02$) and body dissatisfaction ($r=-0.68$, $p=0.004$). There were no

other significant relationships found between dietary intake (macronutrients) and body attitude in the dance group. Table 15 represents r values for dietary intake and body attitude scores within the dance group.

Table 15.

Correlational Values for Dietary Intake and Body Attitude Scores

Score	Kcal	%CHO	%PRO	%FAT	CHO(g)	PRO(g)	FAT(g)
FOF	-0.79*	0.14	0.25	-0.27	-0.61*	0.55	-0.57*
DT	-0.40	0.11	0.42	-0.33	-0.29	0.01	-0.36
BD	-0.76*	0.05	0.66*	-0.39	-0.64*	-0.06	-0.68*
Attr	0.65*	0.18	-0.52*	0.06	0.65*	0.15	0.42

Note FOF= feelings of fatness, DT= Drive for Thinness, BD= Body Dissatisfaction, Attr= feelings of attractiveness
*denotes significance at $p<0.05$

Table 16 represents r values for the CBDS and body attitude scores within the dance group.

Table 16.

Correlational Values for the CBDS and Body Attitude Scores

Score	CBDS
Feelings of Fatness	0.83*
Drive for Thinness	0.71*
Body Dissatisfaction	0.57*
Feelings of Attractiveness	-0.41

*denotes significance at $p<0.05$

There were significant relationships found between feelings of fatness and self-disparagement ($r=0.62$, $p=0.01$), feelings of strength ($r=-0.56$, $p=0.02$), salience of weight ($r=0.77$, $p=0.0007$), asceticism ($r=-0.59$, $p=0.01$), consciousness of body fat ($r=0.60$, $p=0.01$), bulimia ($r=0.48$, $p=0.06$), ineffectiveness ($r=0.68$, $p=0.004$), and perfectionism ($r=0.70$, $p=0.003$). There were significant positive relationships found between drive for thinness and salience of weight ($r=0.58$, $p=0.022$) and bulimia ($r=0.73$, $p=0.002$). Significant relationships were found between body dissatisfaction and self-disparagement ($r=0.78$, $p=0.0006$), feelings of strength ($r=-0.52$, $p=0.04$), consciousness of body fat ($r=0.61$, $p=0.014$), interoceptive awareness ($r=0.53$, $p=0.04$), ineffectiveness ($r=0.64$, $p=0.009$), and perfectionism ($r=0.79$, $p=0.0005$). Significant negative relationships were found between feelings of attractiveness and self-disparagement ($r=-0.79$, $p=0.0004$), consciousness of body fat ($r=-0.63$, $p=0.011$), interoceptive awareness ($r=-0.61$, $p=0.014$), ineffectiveness ($r=-0.81$, $p=0.0002$), social insecurity ($r=-0.65$, $p=0.008$) and interpersonal distrust ($r=-0.66$, $p=0.006$). There were no other significant

relationships found between body attitude scores and personality traits. Table 17 represents r values for body attitude scores and personality traits within the dance group.

Table 17.

Correlational Values for Body Attitude Scores and Personality Traits Within Dance Group

Score	FOF	DT	BD	FA
Maturity Fears	0.17	0.30	0.10	0.13
Bulimia	0.48*	0.73*	0.44	-0.25
Interoceptive Awareness	0.50*	0.46	0.53*	-0.61*
Ineffectiveness	0.68*	0.33	0.64*	-0.81*
Perfectionism	0.70*	0.49	0.79*	-0.48
Interpersonal Distrust	0.40	0.10	0.35	-0.66*
Impulse Regulation	-0.02	-0.14	-0.10	-0.24
Asceticism	0.37	0.31	0.43	-0.32
Social Insecurity	0.34	0.10	0.29	-0.65*
Self-Disparagement	0.62*	0.44	0.78*	-0.79*
Feelings of Strength	-0.56*	-0.43	-0.52*	0.51
Salience of Weight	0.77*	0.58*	0.48	-0.24
Consciousness of Body Fat	0.61*	0.40	0.73*	-0.63*

Note FOF = Feelings of Fatness, DT = Drive for Thinness, BD = Body Dissatisfaction, FA = Feelings of Attractiveness

*denotes significance at $p < 0.05$

Comparison Group

There were significant positive relationships found between drive for thinness and dietary protein intake (g) ($r=0.38$, $p=0.004$), and the CBDS ($r=0.64$, $p<0.0001$). Significant positive relationships were found between the CBDS and feelings of fatness ($r=0.71$, $p<0.001$), and body dissatisfaction ($r=0.62$, $p<0.0001$). There were no significant relationships found between total caloric intake, percentage of dietary intake in carbohydrate or protein, carbohydrate (g) or fat (g) to any other body attitude score. Table 18 represents the r values for the relationship of dietary intake to body attitude scores within the control group.

Table 18.

Correlational Values for Dietary Intake and Body Attitude Scores

Score	Kcal	%CHO	%PRO	%FAT	CHO(g)	PRO(g)	FAT(g)
FOF	0.17	0.15	0.04	-0.16	0.19	0.16	0.25
DT	0.12	0.04	0.17	-0.11	0.11	0.38*	0.26
BD	0.09	0.09	0.09	-0.12	0.11	0.22	0.12
Attr	-0.06	-0.15	0.20	0.07	-0.11	-0.10	0.11

Note FOF= feelings of fatness, DT= Drive for Thinness, BD= Body Dissatisfaction, Attr= feelings of attractiveness
*denotes significance at $p<0.05$

Table 19 represents the r values for the relationship of body attitude scores to the CBDS within the control group.

Table 19.

Correlational Values for the CBDS and Body Attitude Scores

Score	CBDS
Feelings of Fatness	0.71*
Drive for Thinness	0.64*
Body Dissatisfaction	0.62*
Feelings of Attractiveness	-0.14

*denotes significance at $p<0.05$

There were significant positive relationships found between feelings of fatness and self-disparagement ($r=0.66$, $p<0.0001$), salience of weight ($r=0.74$, $p<0.0001$), consciousness of body fat ($r=0.69$, $p<0.0001$), maturity fears ($r=0.27$, $p=0.04$), bulimia ($r=0.38$, $p=0.004$), perfectionism ($r=0.31$, $p=0.02$), ineffectiveness ($r=0.34$, $p=0.01$), impulse regulation ($r=0.38$, $p=0.004$), and asceticism ($r=0.32$, $p=0.015$). There were also significant positive relationships found between drive for thinness and self-disparagement ($r=0.58$, $p<0.0001$), salience of weight ($r=0.75$, $p<0.0001$), consciousness of body fat ($r=0.58$, $p<0.0001$), maturity fears ($r=0.30$, $p=0.02$), bulimia ($r=0.55$, $p<0.0001$), interoceptive awareness ($r=0.43$, $p=0.0009$), ineffectiveness ($r=0.53$, $p<0.0001$), perfectionism ($r=0.38$, $p=0.004$), impulse regulation ($r=0.38$, $p=0.004$), and asceticism ($r=0.32$, $p=0.01$). Significant positive relationships were found between body dissatisfaction and self-disparagement ($r=0.55$, $p<0.0001$), salience of weight ($r=0.63$, $p<0.0001$), consciousness of body fat ($r=0.80$, $p<0.0001$), maturity fears ($r=0.28$, $p=0.33$), bulimia ($r=0.41$, $p=0.002$), interoceptive awareness ($r=0.29$, $p=0.03$), and ineffectiveness ($r=0.37$, $p=0.004$). Negative significant relationships were found between feelings of attractiveness and self-disparagement ($r=-0.46$, $p=0.0004$), salience of weight ($r=-0.28$, $p=0.03$), bulimia ($r=-0.33$, $p=0.01$),

interpersonal distrust ($r=-0.26$, $p=0.04$), asceticism ($r=-0.26$, $p=0.04$) and social insecurity ($r=-0.28$, $p=0.03$). Table 20 represents r values for body attitude scores and personality traits within the control group.

Table 20.

Correlational Values for Body Attitude Scores and Personality Traits Within Control Group

Score	FOF	DT	BD	FA
Maturity Fears	0.27*	0.30*	0.28*	-0.07
Bulimia	0.43*	0.55*	0.41*	-0.33*
Interoceptive Awareness	0.24	0.43*	0.29*	-0.11
Ineffectiveness	0.40*	0.54*	0.37*	-0.21
Perfectionism	0.30*	0.38*	0.18	0.04
Interpersonal Distrust	0.12	0.17	0.06	-0.26*
Impulse Regulation	0.38*	0.54*	0.37*	-0.10
Asceticism	0.32*	0.42*	0.26	-0.27*
Social Insecurity	0.04	0.05	-0.02	-0.28*
Self-Disparagement	0.66*	0.58*	0.55*	-0.46*
Feelings of Strength	-0.19	-0.18	-0.17	0.14
Salience of Weight	0.74*	0.75*	0.63*	-0.29*
Consciousness of Body Fat	0.69*	0.59*	0.81*	-0.11

Note FOF = Feelings of Fatness, DT = Drive for Thinness, BD = Body Dissatisfaction, FA = Feelings of Attractiveness

*denotes significance at $p<0.05$

Prediction Equation Using Stepwise Multiple Regression

Lacrosse

Using selected body attitude scores (feelings of fatness, body dissatisfaction, drive for thinness, feelings of attractiveness), selected personality characteristics (self-disparagement, strength, maturity fears, ineffectiveness, perfectionism, asceticism, salience of weight, consciousness of body fat) and CBDS scores Table 21 represents the summary of stepwise selection within the lacrosse group.

Table 21.

Stepwise Selection Within Lacrosse Group

Variable	Model R-Square	F Value	P Value
CBDS	0.2155	6.87	0.0147
Strength	0.2962	2.75	0.1102
Ineffectiveness	0.3603	2.31	0.1426
Perfectionism	0.4796	5.04	0.0351

* $p<.15$ level of significance

Using the model $y = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_4x_4 + \epsilon$ where y = total caloric intake (kcal), the equation would follow:

$$\text{Kcal} = 5221.7 - 25.8(\text{CBDS}) - 84.4(\text{Strength}) + 93.1(\text{Ineffectiveness}) - 59.6(\text{Perfectionism})$$

Dance Group

Using selected body attitude scores (feelings of fatness, body dissatisfaction, drive for thinness, feelings of attractiveness), selected personality characteristics (self-disparagement, strength, maturity fears, ineffectiveness, perfectionism, social insecurity, asceticism, salience of weight, consciousness of body fat) and CBDS scores Table 22 represents the summary of stepwise selection within the dance group.

Table 22.

Stepwise Selection Within Dance Group

Variable	Model R-Square	F Value	P Value
Ineffectiveness	0.7015	3.10	0.1039
Social Insecurity	0.8638	13.10	0.0040
Consciousness Body Fat	0.8984	5.45	0.0396

* $p < .15$ level of significance

Using the model $y = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_4x_4 + \epsilon$ where y = total caloric intake (kcal), the equation would follow:

$$\text{Kcal} = 2698.1 - 44.1(\text{Consciousness of Body Fat}) - 180.6(\text{Ineffectiveness}) + 110.3(\text{Social Insecurity})$$

Comparison Group

Using selected body attitude scores (feelings of fatness, body dissatisfaction, drive for thinness, feelings of attractiveness), selected personality characteristics (self-disparagement, strength, maturity fears, ineffectiveness, perfectionism, social insecurity, asceticism, salience of weight, consciousness of body fat) and CBDS scores Table 23 represents the summary of stepwise selection within the control group.

Table 23.

Stepwise Selection Within Control Group

Variable	Model R-Square	F Value	P Value
Self-Disparagement	0.0847	4.91	0.0311

* $p < .15$ level of significance

Using the model $y = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_4x_4 + \varepsilon$ where y = total caloric intake (kcal), the equation would follow:

$$\text{Kcal} = 1286.9 + 37.4(\text{Self-disparagement})$$

Combined Groups

Using selected body attitude scores (feelings of fatness, body dissatisfaction, drive for thinness, feelings of attractiveness), selected personality characteristics (self-disparagement, strength, maturity fears, ineffectiveness, perfectionism, social insecurity, asceticism, salience of weight, consciousness of body fat) and CBDS scores Table 24 represents the summary of stepwise selection within combined groups.

Table 24.

Stepwise Selection Using All Groups

Variable	Model R-Square	F Value	P Value
CBDS	0.0820	8.39	0.0047
Self-Disparagement	0.1142	3.39	0.0690

* $p < .15$ level of significance

Using the model $y = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_4x_4 + \varepsilon$ where y = total caloric intake (kcal), the equation would follow:

$$\text{Kcal} = 2083.5 - 14.1(\text{CBDS}) + 26.6(\text{Self-disparagement})$$

Dummy Variable Combined Regression

Using combined CBDS, Ben-Tovim Walker and EDI-2 scores Table 25 represents the summary of stepwise selection within all groups and combined.

Table 25.

Stepwise Selection Using All Groups and Combined Scores

Variable	Model R-Square	F Value	P Value
CBDS	0.0813	8.32	0.0049

* $p < .15$ level of significance

Using the model $y = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_4x_4 + \varepsilon$ where y = total caloric intake (kcal), the equation would follow:

$$\text{Kcal} = 2350.5 - 11(\text{CBDS})$$

Using combined CBDS, Ben-Tovim Walker and EDI-2 scores and with the use of dummy variables within the data set Table 26 represents the summary of stepwise selection within all groups combined.

Table 26.

Stepwise Selection Using Combined Groups and Dummy Variables

Variable	Model R-Square	F Value	P Value
Ben-Tovim Walker	0.0641	6.43	0.0128

Using dummy variables and solving for β_0 , β_1 , β_2 , and β_3 the model $y = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \beta_4x_4 + \varepsilon$ where y = total caloric intake (kcal), the equation would follow:

$$\text{Kcal} = 1816 + 26.9(\text{Ben-Tovim Walker})$$

Chapter 5

Discussion

This study examined the differences between aesthetic and non-aesthetic sports in body attitude and personality traits; the relationships of dietary intake and body attitude, and body attitude and personality traits in female athletes; and attempted to develop a prediction equation for dietary intake utilizing selected body attitude scores and personality traits. Nine major findings resulted from this investigation:

- I. no significant differences were found between aesthetic (dance) and non-aesthetic (lacrosse) sports in body attitude or personality traits, although several significant differences were found between the control group and both athletic populations including significant differences between the lacrosse and control group on interoceptive awareness, maturity fears, social insecurity, protein intake (g), fat intake (g) and fiber intake (g); and the dance and control groups on feelings of attractiveness, body dissatisfaction and perfectionism; and the control group and athletic groups on bulimia, interpersonal distrust and vitamin C intake (mg);
- II. significant differences were found within the individual groups silhouette scale scores on how they “think” they look, how they “feel” they look, and how they “want” to look including significant differences between the lacrosse and dance teams “ideal” versus “cognitive” and “emotional” perceptions and significant differences between the control groups “cognitive”, “emotional” and “ideal” perceptions;
- III. significant relationships were found between dietary intake and body attitude scores in all three groups: within the lacrosse group significant positive relationships were found between feelings of fatness and percentage of dietary intake in carbohydrate, and the CBDS, and significant negative relationships with percentage of dietary intake in fat, and dietary intake of fat (g); significant positive relationships were found between drive for thinness and percentage of dietary intake in protein and the CBDS;
- IV. significant negative relationships within the dance group were found between feelings of fatness and total caloric intake (Kcal), dietary intake of carbohydrate (g), dietary intake in fat (g), and a significant positive relationship with the CBDS; significant negative relationships were found between body dissatisfaction and Kcal, dietary intake of

- carbohydrate (g), dietary intake of fat (g), and significant positive relationships with percentage of dietary intake in protein, and the CBDS; significant positive relationships were found between feelings of attractiveness and Kcal, dietary intake in carbohydrate (g), and a significant negative relationship with percentage of dietary intake in protein;
- V. significant positive relationships within the control group were found between feelings of fatness and the CBDS; significant positive relationships were found between drive for thinness and dietary intake in protein (g) and the CBDS; a significant positive relationship was found between body dissatisfaction and the CBDS;
- VI. significant relationships were found between body attitude and personality traits within all three groups: within the lacrosse group, significant positive relationships were found between feelings of fatness and bulimia, asceticism, self-disparagement, salience of weight, and consciousness of body fat; significant positive relationships were found between drive for thinness and maturity fears, bulimia, interoceptive awareness, ineffectiveness, asceticism, salience of weight and consciousness of body fat; significant positive relationships were also found between body dissatisfaction and bulimia, interoceptive awareness, asceticism, self-disparagement, salience of weight and consciousness of body fat; a significant positive relationship was found between feelings of attractiveness and feelings of strength;
- VII. within the dance group, significant positive relationships were found between feelings of fatness and bulimia, interoceptive awareness, ineffectiveness, perfectionism, self-disparagement, salience of weight, consciousness of body fat and a significant negative relationship with feelings of strength; significant positive relationships were found between drive for thinness and bulimia and salience of weight; significant positive relationships were also found between body dissatisfaction and interoceptive awareness, ineffectiveness, perfectionism, self-disparagement, consciousness of body fat, and a significant negative relationship with feelings of strength; significant negative relationships were found between feelings of attractiveness and interoceptive awareness, ineffectiveness, interpersonal distrust, social insecurity, self-disparagement and consciousness of body fat;

- VIII. within the comparison group, significant positive relationships were found between feelings of fatness and maturity fears, bulimia, ineffectiveness, perfectionism, impulse regulation, asceticism, self-disparagement, salience of weight, and consciousness of body fat; significant positive relationships were also found between drive for thinness and maturity fears, bulimia, interoceptive awareness, ineffectiveness, perfectionism, impulse regulation, asceticism, self-disparagement, salience of weight and consciousness of body fat; significant positive relationships were found between body dissatisfaction and maturity fears, bulimia, interoceptive awareness, impulse regulation, self-disparagement, salience of weight and consciousness of body fat; significant negative relationships were found between feelings of attractiveness and bulimia, interpersonal distrust, asceticism, social insecurity, self-disparagement and salience of weight;
- IX. regression equations were calculated for each group independently and then with combined data with results indicating the following prediction equations for dietary intake:

Lacrosse

$$\text{Kcal} = 5221.7 - 25.8(\text{CBDS}) - 84.4(\text{Strength}) + 93.1(\text{Ineffectiveness}) - 59.6(\text{Perfectionism})$$

Dance

$$\text{Kcal} = 2698.1 - 44.1(\text{Consciousness of Body Fat}) - 180.6(\text{Ineffectiveness}) + 110.3(\text{Social Insecurity})$$

Comparison

$$\text{Kcal} = 1286.9 + 37.4(\text{Self-disparagement})$$

Combined Groups

$$\text{Kcal} = 2083.5 - 14.1(\text{CBDS}) + 26.6(\text{Self-disparagement})$$

Combined Groups and Subscale Scores

$$\text{Kcal} = 2350.5 - 11(\text{CBDS})$$

Dummy Variable

$$\text{Kcal} = 1816 + 26.9(\text{Ben-Tovim Walker})$$

Body Attitude, Personality Traits and Aesthetic and Non-Aesthetic Sports

Numerous studies have examined body image within female athletes engaging in aesthetic and non-aesthetic sports (Marshall & Hauber, 1996, Pierce & Daleng, 1998; Pierce, Evans, & Degrenier, 1991; Saint-Phard et al., 1999). Pierce and Daleng (1998) found that a group of elite female dancers suffered from a high distortion of body image even though they were considered lean by body composition analysis. In a similar study on female athletes participating in a non-aesthetic sport (field hockey), a significant percentage of those athletes scored highly on the body dissatisfaction and drive for thinness subscales of the EDI suggesting that body shape and size is a significant issue in non-aesthetic sports as well. In contrast, Wiggins & Moode (2000) found that females engaging in non-aesthetic sports scored higher on body esteem scales than those involved in aesthetic sports, indicating females participating in aesthetic sports are more likely to struggle with body esteem issues than females participating in non-aesthetic sports. Interestingly, the same study also found that all female athletes scored higher on body esteem than non-athlete groups, a reversal of the results from this current study. The results from this study indicated that the athletic groups, both aesthetic and non-aesthetic, scored significantly higher than the control group on several subscales of the Ben-Tovim Walker Body Attitude Questionnaire and the EDI-2 including body dissatisfaction and perfectionism for the dance group, interoceptive awareness, maturity fears, and social insecurity for the lacrosse group; and the dancers also scored significantly lower on feelings of attractiveness than the control group. The lacrosse group scored higher on the body dissatisfaction and perfectionism subscales than the control group, although the results were not significant. Both athletic groups scored significantly higher than the control group on bulimia and interpersonal distrust. No significant differences were found between the lacrosse and dance groups on any measured subscale for either body attitude or personality traits. This potentially indicates that females engaging in both aesthetic and non-aesthetic sports are equally likely to struggle with body image issues, and that both groups are more susceptible to the development of eating disordered behavior than non-athletic counterparts. Similar results were seen in a study by Williamson et al. (1995) where no significant differences were established between aesthetic and non-aesthetic sports on questionnaires designed to measure both personality traits and body dissatisfaction. Another study with similar results as reported in this study, Fulkerson et al. (1999) found that

high school athletes scored higher on perfectionistic tendencies than a group of non-athlete controls. In a similar study by Neumarker et al. (2000), significant differences were established between female dancers and controls in drive for thinness, bulimia, interpersonal distrust, ineffectiveness and perfectionism with the dancers scoring significantly higher on all five subscales. The results of that study would suggest that athletes, particularly aesthetic sport athletes, exhibit personality traits associated with eating disordered behavior. The results of the current study would indicate that although there are no significant differences in personality traits or body attitude scores between aesthetic and non-aesthetic sports; athletes are potentially more likely to struggle with personality characteristics and body image disturbances associated with the development of eating disordered behavior than non-athletic controls.

Silhouette Scale Body Attitude

Body image can be measured using several techniques ranging from questionnaires to silhouette scales. Although the use of silhouette scales can never give an accurate indication of what an individual's true body shape may be, the often significant discrepancies between "ideal" and "cognitive" or "emotional" can demonstrate the inconsistencies in body image or perception from an individual standpoint. Pierce, Evans & Degrenier (1991) using non-aesthetic sport female athletes found significant differences between the athlete's mean ratings of their current and ideal body shape on a silhouette scale indicating the majority of even non-aesthetic female athletes possibly overestimated their body shape and idealized a thinner image. In a similar study on dancers, Pierce and Daleng (1998) found that mean current scores on a silhouette scale were significantly higher than ideal scores intimating females involved in aesthetic sports may also overestimate their body shape and idealize a thinner image. Similar results were found in the current study where both the lacrosse and dance teams "ideal" mean scores were significantly lower than that of their "cognitive" and "emotional" scores suggesting that both groups idealized a body image far less than what they either thought they looked like or felt they looked like. These types of results are too often common adding to the pressure for female athletes to achieve an "ideal" body shape, which may in all likelihood be unhealthy for female athletes or just impossible to attain. This "idealizing" a certain body image can also lead to drastic and harmful behaviors in the attempt to attain that ideal, which can be particularly harmful for female athletes engaging in such behaviors during their competitive season. Numerous studies have shown a

significant relationship between body image distortion and eating disordered behavior (Fogeholm & Hilloskorpi, 1999; Parks & Read, 1997; Sundgot-Borgen, 1996). Such significant differences between “ideal” scores and “cognitive” and “emotional” scores would give cause for concern, particularly in female athletes during their competitive season.

Body Attitude and Dietary Intake

The results of this study suggest that a significant relationship does exist between dietary intake and body attitude in female athletes. Within the lacrosse team, significant positive relationships were found between feelings of fatness and percentage of dietary intake in carbohydrate and the CBDS. Significant negative relationships were found between feelings of fatness and percentage of dietary intake from fat as well as dietary intake of fat (g). These results would indicate that lacrosse athletes who feel larger may be consciously lowering their fat intake and consequently increasing their carbohydrate intake. They might certainly be purposefully dieting by limiting fat intake as indicated by the relationship to the CBDS. Interestingly, drive for thinness was found to be significantly positively related to percentage of dietary intake in protein and the CBDS as well. This might indicate that those lacrosse athletes with a higher drive for thinness, probably brought on by a higher body dissatisfaction, are consciously dieting and may be consuming a diet higher in relative protein intake, the newest diet fad.

Within the dance team, significant negative relationships were found between feelings of fatness and total caloric intake (Kcal), dietary intake in carbohydrate (g) and dietary intake in fat (g). A significant positive relationship was also established with the CBDS. These results might intimate the conscious effort to restrict caloric intake as well as dietary carbohydrate and dietary fat when the athletes feel as though they are fat or overweight. In addition, significant negative relationships were found between body dissatisfaction and kcal, dietary carbohydrate (g) and fat (g), and significant positive relationships with percentage of dietary intake in protein as well as the CBDS. These results suggest that at least within the dance group, individual struggling with feelings of fatness also exhibit a high body dissatisfaction and are purposefully restricting kcal, and dietary carbohydrate and fat. The positive relationship with percentage of dietary intake in protein may indicate that those individuals who are restricting dietary carbohydrate and fat may be consciously increasing their relative protein intake, once again, the latest weight loss fad.

These results may be almost irrefutable since significant positive relationships were found between feelings of attractiveness and kcal as well as dietary carbohydrate (g); and a negative relationship was found between feelings of attractiveness and percentage of dietary intake in protein indicating those individuals who felt better about themselves consumed more total calories, carbohydrate and less protein.

Within the comparison group, feelings of fatness, drive for thinness and body dissatisfaction were found to be significantly positively related to the CBDS and drive for thinness was significantly positively related to percentage of dietary intake in protein. Surprisingly, these were the only significant relationships between body attitude and dietary intake in the control group. Nevertheless, these results would also indicate a conscious effort to diet by those individuals with higher feelings of fatness, drive for thinness and body dissatisfaction although they may not be restricting any of the macronutrients as severely as the athletes. Once again, percentage of dietary intake in protein was higher in individuals exhibiting a higher drive for thinness indicating even the controls may be under the spell of the latest fad diets.

The literature is replete in indicating a causal relationship between body image distortion and dieting practices in female athletes (Fogeholm & Hillokorpi, 1999; Sundgot-Borgen, 1996; Sykora et al., 1993; Williamson et al., 1995). In a study on female competitive gymnast (Sundgot-Borgen, 1996), 100% of the national team were found to be dieting and over 50% of the gymnast had either been told they were too fat or thought the judges would give them a higher score if they were thinner. In a study on both aesthetic and non-aesthetic sports by Fogeholm & Hillokorpi (1999), 85% of females engaging in aesthetic of light weigh sports were currently dieting and purposefully restricting caloric intake, and a significant number of female athletes involved in all sports were found to be overly concerned with body weight and diet issues. Similar results were found in a study by Williamson et al. (1995) where a significant number of both aesthetic and non-aesthetic sport participants were found to suffer from social pressure to be thin and had increased concerns about body shape and size. Sykora et al. (1993) also established that female athletes were more likely to be preoccupied with weight and weight fluctuations and were more likely to exhibit maladaptive eating behavior than male counterparts.

The results of this study juxtapose the results of other studies suggesting a significant relationship between body attitude and dietary intake in both athletes and controls.

Body Attitude and Personality Traits

Body attitude was found to demonstrate significant relationships to several personality traits in both groups of athletes and in the control group. In the lacrosse group, feelings of fatness were found to be significantly positively related to bulimia, asceticism, self-disparagement, salience of weight and consciousness of body fat. Drive for thinness was found to be significantly positively related to maturity fears, bulimia, interoceptive awareness, ineffectiveness, asceticism, salience of weight and consciousness of body fat. Significant positive relationships were also found between body dissatisfaction and bulimia, interoceptive awareness, asceticism, self-disparagement, salience of weight and consciousness of body fat. Surprisingly, a significant positive relationship was found between feelings of attractiveness and strength. These results suggest that lacrosse athletes with increased feelings of fatness, higher drive for thinness and increased body dissatisfaction also exhibit similar personality traits such as asceticism, self-disparagement, salience of weight, interoceptive awareness and consciousness of body fat. The results also suggest these athletes are more likely to become susceptible to eating disordered behavior as measured by the bulimia subscale. The positive relationship found between feelings of attractiveness and strength would indicate that physical strength serves as a body esteem enhancement in this group of athletes.

Within the dance group, significant positive relationships were found between feelings of fatness and bulimia, interoceptive awareness, perfectionism, self-disparagement, salience of weight and consciousness of body fat. A significant negative relationship was found between feelings of fatness and strength. Significant positive relationships were found between drive for thinness and bulimia and salience of weight. Significant positive relationships were also found between body dissatisfaction and interoceptive awareness, ineffectiveness, perfectionism, self-disparagement, and consciousness of body fat. A significant negative relationship was also established between body dissatisfaction and strength. Several significantly negative relationships were also found between feelings of attractiveness and interoceptive awareness, ineffectiveness, interpersonal distrust, social insecurity, self-disparagement and consciousness of

body fat. As with the lacrosse athletes, these results suggest that within the dance group, those individuals with increased feelings of fatness and increased body dissatisfaction quite possibly experience similar personality traits such as interoceptive awareness, ineffectiveness, perfectionism, self-disparagement and consciousness of body fat. In addition, individuals struggling with enhanced feelings of fatness as well as an increased drive for thinness also shared salience of body weight. Interestingly, feelings of attractiveness were negatively associated with several of the shared personality traits indicating individuals who felt more attractive were less likely to experience feelings of fatness, increased drive for thinness and increased body dissatisfaction. Once again, bulimia was a common personality trait within individuals struggling with enhanced feelings of fatness, increased drive for thinness, and increased body dissatisfaction suggesting that these athletes may be more prone to the development of eating disordered behavior or could already be struggling with those types of behaviors. Another note of significance was the negative relationship between strength and feelings of fatness as well as body dissatisfaction indicating that physical strength may also serve as a body esteem enhancement in this group of athletes.

Within the control group, significant positive relationships were found between feelings of fatness and maturity fears, bulimia, ineffectiveness, perfectionism, impulse regulation, asceticism, self-disparagement, salience of weight and consciousness of body fat. Significant positive relationships were also found between drive for thinness and maturity fears, bulimia, ineffectiveness, interoceptive awareness, perfectionism, impulse regulation, asceticism, self-disparagement, salience of weight and consciousness of body fat. Significant positive relationships were also found between body dissatisfaction and maturity fears, bulimia, interoceptive awareness, ineffectiveness, impulse regulation, self-disparagement, salience of weight and consciousness of body fat. Significant negative relationships were found between feelings of attractiveness and bulimia, interpersonal distrust, asceticism, social insecurity, self-disparagement and salience of weight. All of these results suggest that similar personality traits are related to overall body attitude in both the athletic population and the non-athletic population including the relationships to bulimia and overall susceptibility to eating disordered behavior with these shared characteristics. Several of these characteristics and their association with body dissatisfaction and eating disordered behavior are well documented in the literature (Geller,

Cockell, & Goldner, 2000; Neumarker et al., 2000; Olsen et al., 1996). Fulkerson et al. (1999) found perfectionistic tendencies to put athletes at a higher risk for the development of an eating disorder when compared to controls. Neumarker (2000) found that female ballet dancers scored significantly higher than controls on drive for thinness, bulimia, interpersonal distrust, ineffectiveness and perfectionism. Marshall & Harber (1996) found that a significant number of elite female field hockey players exhibited an elevated drive for thinness and body dissatisfaction when compared to non-athlete controls. These athletes were found to be at a greater risk for the development of an eating disorder based on several other measured psychological constructs. The results of the current study indicate that several of the personality traits associated with eating disordered behavior are also strongly associated with overall body attitude, possibly exacerbating body dissatisfaction, one of the strongest correlates to the development of eating disordered behavior.

Dietary Intake Prediction Equation

A regression equation was calculated for each group independently and then with combined data with results indicating the following prediction equations for dietary intake:

Lacrosse

$$\text{Kcal} = 5221.7 - 25.8(\text{CBDS}) - 84.4(\text{Strength}) + 93.1(\text{Ineffectiveness}) - 59.6(\text{Perfectionism})$$

Dance

$$\text{Kcal} = 2698.1 - 44.1(\text{Consciousness of Body Fat}) - 180.6(\text{Ineffectiveness}) + 110.3(\text{Social Insecurity})$$

Comparison

$$\text{Kcal} = 1286.9 + 37.4(\text{Self-disparagement})$$

All Groups Combined

$$\text{Kcal} = 2083.5 - 14.1(\text{CBDS}) + 26.6(\text{Self-disparagement})$$

Since each group demonstrated different personality traits and body attitude scores as being the best predictors, the subscales were combined into total EDI-2, total BAQ and total CBDS and were then calculated to observe the best dietary intake predictor:

All Groups and Subscales Combined

$$\text{Kcal} = 2350.5 - 11(\text{CBDS})$$

Based on the results indicating such a discrepancy between each individual group's best predictor for dietary intake, dummy variables were substituted in place of the combined subscale scores in order to test for inter-group body attitude in relation to dietary intake. With the use of dummy variables in place of the combined total EDI-2, BAQ, and CBDS the following prediction equation was formulated:

Dummy Variables

$$\text{Kcal} = 1816 + 26.9(\text{Ben-Tovim Walker})$$

With the use of these dummy variables, the inter-group relationships between body attitude and dietary intake were confirmed indicating that each group's body attitude relates differently to dietary intake. Noting these differences in the best predictors of dietary intake based on individual groups, a truly reflective equation of all groups combined would appear to be difficult to accurately demonstrate; particularly since the results would indicate a different equation for each group might be the best predictor and most reflective of dietary intake in each individual groups.

Conclusions

This study determined differences in body attitude and personality traits between aesthetic and non-aesthetic sports and determined relationships between body attitude and dietary intake, and body attitude and personality characteristics in female athletes. In addition, the study determined whether a valid and reliable prediction equation for dietary intake could be developed utilizing selected body attitude scores and personality traits. Several significant differences in body attitude and personality traits were found between the athletic groups and the controls, however, no significant differences were found in body attitude or personality traits between aesthetic or non-aesthetic groups. Therefore, it could be concluded that both athletic populations struggle with similar body esteem issues and exhibit similar personality traits which could potentially lead to the development of eating disordered behavior. Noting the large variances within the comparison group might also intimate that although significant differences were established between the comparison group and both athletic populations, the groups might actually be more similar than dissimilar.

There were several significant relationships established between body attitude scores and dietary intake in both athletic populations and the controls. Several of the relationships would indicate purposeful total caloric and fat intake restriction particularly in the athletes, and that all groups are potentially following the latest dieting trends with significantly increased protein intake. Results intimated that both female athletes and controls with higher body dissatisfaction or feelings of fatness are more likely to consciously attempt to engage in dieting as a weight loss practice, a behavior which could have detrimental health ramifications particularly for female athletes engaging in these practices during their competitive season.

There were significant relationships found between body attitude and personality traits in all three groups. Very few of the associating personality traits were found to differ between the groups indicating these shared personality traits may play a larger role in body esteem, which is an established correlate to the development of strict dietary practices and the development of eating disordered behaviors.

Different regression equations were found to best predict dietary intake for each individual group. When all groups were combined, a fourth equation was generated with different predictors than the individual group equations. A fifth equation was generated by combining all group scores and then combining all the subscales into their respective questionnaires leading to an entirely new equation. Dummy variables were used to test for inter-group differences in body attitude and its relation to dietary intake, and the study confirmed that differences do exist between each group and its body attitude's relationship to dietary intake.

Recommendations

Future research is needed in this area to determine whether significant differences could exist between all aesthetic and non-aesthetic populations in body attitude and personality traits or if this current study happened to use athletic groups from both populations with similar characteristics. This study should be repeated utilizing different aesthetic and non-aesthetic groups.

Further research is needed to determine the extent to which dietary intake relates to body attitude since there were several significant relationships found between dietary intake and body attitude, but relationships differed among the groups. More research is also needed to establish if

these relationships change pendent upon whether or not the athletes are in or out of competitive season.

Future research is also needed to further study the impact of the relationships between body attitude and personality traits. A study designed to establish whether some type of personality questionnaire could be administered to athletes so that athletes exhibiting known personality characteristics associated with body esteem problems might receive counseling to prevent a problem before it becomes another statistic would be prudent.

More research and further studies are also needed to further and narrow the prediction equations developed in this study for the prediction of dietary intake. Several studies would be necessary to establish a valid and reliable regression equation for the prediction of dietary intake.

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Appendices

Appendix A
Informed Consent Statement

Informed Consent for Participants of Investigative Projects

Title of Project: Relationship of Body Attitude and Personality Characteristics to Dietary Intake in Female Collegiate Athletes During Competitive Season

Investigators: Tiffany M. Reiss, M.S.; Charles R. Baffi, Ph.D.

I. The Purpose of this Research Project

The purpose of this research project is to examine the relationship between body attitude and personality characteristics to dietary intake of female collegiate athletes while in competitive season. I understand that I will be selected for this study based on my team sport participation or if serving as a control, I will be selected based on my participation in a physical activity course Spring semester 2001. When participating in this study, I will answer questions regarding my body attitude and personality characteristics. At home I will complete a 5-day dietary intake record and return that record to investigators. I understand that a group of collegiate athletes from several different sports aged 18 to 23 will participate in this study and a group of non-athletes will serve as controls.

II. Procedure

Once selected for this research project, I will complete the following:

- 1) Complete the Eating Disorder Inventory-2 (EDI-2) which is a 91-item self report measure whose subscales measure eleven established personality traits associated with the development of eating disordered behavior. (30 minutes)
- 2) Complete the Ben-Tovim Walker Body Attitude Questionnaire (BAQ) which is a 44-item self report questionnaire whose subscales encompass six distinct aspects of whole body experience. (10 minutes)
- 3) Complete the Cognitive Behavioral Dieting Scale which is a 14-item scale designed to measure current dieting behavior and related thoughts within the past two weeks. (5 minutes)
- 4) Circle how I “think” I look, “feel” I look and “want” to look on a Silhouette Scale which is a 9-figure silhouette scale representing a monotonic increase in percent size from the first to the ninth silhouette. (5 minutes)
- 5) Complete a 5-day dietary intake record including everything I have consumed during the course of the day for a five day period including 3 weekdays and 2 weekend days. (15 minutes per day)

I understand that I may require more or less time than estimated to complete each procedure. I further understand that I will be given ample opportunity to complete all procedures in an unhurried manner.

III. Risks

I understand that there are no known risks to completing body attitude questionnaires, personality characteristic questionnaires and dietary intake records.

IV. Benefits of this Project

It is likely that I will benefit from my participation in this research in several ways including: (1) my personality characteristics analysis, (2) my body attitude assessment, and (3) analysis of my in-season dietary intake. I will be provided with my individual results from each of these procedures at the completion of the project, and I may contact the investigators at a later date for a summary of the overall investigation results.

I understand that my participation in this research project is voluntary. I understand that there is no promise that I will benefit from participation in this research project.

V. Extent of Anonymity and Confidentiality

Due to the inability to assure anonymity, I understand that confidentiality of my results will be preserved. I understand that this means that all my answers to questions that I am asked will be kept confidential. A three-digit code number will be assigned to me. All questionnaires and dietary records will be identified by code number only, and not by my name. I understand that a master list of participant's code numbers will be kept in a locked filing cabinet separate from completed data which will also be maintained in a locked filing cabinet. I further understand that only the investigators will be allowed access to any data.

VI. Compensation

I will not be compensated or paid to be in this research project. However, I will receive my individual results from each procedure that I complete at the end of the project.

VII. Freedom to Withdraw

I understand that I can withdraw from this study at any time without penalty. I am free to not answer any questions or to not participate in any of the procedures included in this study without penalty. I understand that there may be circumstances under which the investigators may determine that I should not continue to participate in this project.

VIII. Approval of Research

This research project has been approved, as required, by the Institutional Review Board for Research Involving Human Subjects at Virginia Polytechnic Institute and State University and by the Department of Education and Curriculum Instruction.

IX. Subjects Permission

I have read and understand the Informed Consent and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent for participation in this project.

If I participate, I may withdraw at any time without penalty. I agree to abide by the rules of this project.

Participant's Signature

Date

Investigator's Signature

Date

Should I have any questions about this research or its conduct, I may contact:

Tiffany M Reiss, Investigator: (540) 552-9411

Dr. Charles Baffi, Investigator: (540) 231-8284

David Moore, IRB, Research Division: (540) 231-4991

Appendix B
Dietary Record

Appendix C

Eating Disorder Inventory-2

INSTRUCTIONS

First, write your name and the date on your EDI-2 Answer Sheet. Your ratings on the items below will be made on the EDI-2 Answer Sheet. The items ask about your attitudes, feelings, and behavior. Some of the items relate to food or eating. Other items ask about your feelings about yourself.

For each item, decide if the item is true about you ALWAYS (A), USUALLY (U), OFTEN (O), SOMETIMES (S), RARELY (R), or NEVER (N). Circle the letter that corresponds to your rating on the EDI-2 Answer Sheet. For example, if your rating for an item is OFTEN, you would circle the O for that item on the Answer Sheet.

Respond to all of the items, making sure that you circle the letter for the rating that is true about you. DO NOT ERASE! If you need to change an answer, make an "X" through the incorrect letter and then circle the correct one.

1. I eat sweets and carbohydrates without feeling nervous.
2. I think that my stomach is too big.
3. I wish that I could return to the security of childhood.
4. I eat when I am upset.
5. I stuff myself with food.
6. I wish that I could be younger.
7. I think about dieting.
8. I get frightened when my feelings are too strong.
9. I think that my thighs are too large.
10. I feel ineffective as a person.
11. I feel extremely guilty after overeating.
12. I think that my stomach is just the right size.
13. Only outstanding performance is good enough in my family.
14. The happiest time in life is when you are a child.
15. I am open about my feelings.
16. I am terrified of gaining weight.
17. I trust others.
18. I feel alone in the world.
19. I feel satisfied with the shape of my body.
20. I feel generally in control of things in my life.
21. I get confused about what emotion I am feeling.
22. I would rather be an adult than a child.
23. I can communicate with others easily.
24. I wish I were someone else.
25. I exaggerate or magnify the importance of weight.
26. I can clearly identify what emotion I am feeling.
27. I feel inadequate.
28. I have gone on eating binges where I felt that I could not stop.
29. As a child, I tried very hard to avoid disappointing my parents and teachers.
30. I have close relationships.
31. I like the shape of my buttocks.
32. I am preoccupied with the desire to be thinner.
33. I don't know what's going on inside me.
34. I have trouble expressing my emotions to others.
35. The demands of adulthood are too great.
36. I hate being less than best at things.
37. I feel secure about myself.

38. I think about bingeing (overeating).
39. I feel happy that I am not a child anymore.
40. I get confused as to whether or not I am hungry.
41. I have a low opinion of myself.
42. I feel that I can achieve my standards.
43. My parents have expected excellence of me.
44. I worry that my feelings will get out of control.
45. I think my hips are too big.
46. I eat moderately in front of others and stuff myself when they're gone.
47. I feel bloated after eating a normal meal.
48. I feel that people are happiest when they are children.
49. If I gain a pound, I worry that I will keep gaining.
50. I feel that I am a worthwhile person.
51. When I am upset, I don't know if I am sad, frightened, or angry.
52. I feel that I must do things perfectly or not do them at all.
53. I have the thought of trying to vomit in order to lose weight.
54. I need to keep people at a certain distance (feel uncomfortable if someone tries to get too close).
55. I think that my thighs are just the right size.
56. I feel empty inside (emotionally).
57. I can talk about personal thoughts or feelings.
58. The best years of your life are when you become an adult.
59. I think my buttocks are too large.
60. I have feelings I can't quite identify.
61. I eat or drink in secrecy.
62. I think that my hips are just the right size.
63. I have extremely high goals.
64. When I am upset, I worry that I will start eating.
65. People I really like end up disappointing me.
66. I am ashamed of my human weaknesses.
67. Other people would say that I am emotionally unstable.
68. I would like to be in total control of my bodily urges.
69. I feel relaxed in most group situations.
70. I say things impulsively that I regret having said.
71. I go out of my way to experience pleasure.
72. I have to be careful of my tendency to abuse drugs.
73. I am outgoing with most people.
74. I feel trapped in relationships.
75. Self-denial makes me feel stronger spiritually.
76. People understand my real problems.
77. I can't get strange thoughts out of my head.
78. Eating for pleasure is a sign of moral weakness.
79. I am prone to outbursts of anger or rage.
80. I feel that people give me the credit I deserve.
81. I have to be careful of my tendency to abuse alcohol.
82. I believe that relaxing is simply a waste of time.
83. Others would say that I get irritated easily.
84. I feel like I am losing out everywhere.

85. I experience marked mood shifts.
86. I am embarrassed by my bodily urges.
87. I would rather spend time by myself than with others.
88. Suffering makes you a better person.
89. I know that people love me.
90. I feel like I must hurt myself or others.
91. I feel that I really know who I am.

Appendix D

Ben-Tovim Walker Body Attitude Questionnaire

THE BEN-TOVIM WALKER BODY ATTITUDE QUESTIONNAIRE

INSTRUCTIONS: This questionnaire contains a number of statements. Please read each one and circle the word or words that show how much you agree or disagree with the statement.

1. I usually feel physically attractive.
Strongly Agree Agree Neutral Disagree Strongly Disagree
2. I prefer not to let other people see my body.
Strongly Agree Agree Neutral Disagree Strongly Disagree
3. People hardly ever find me sexually attractive.
Strongly Agree Agree Neutral Disagree Strongly Disagree
4. I get so worried about my shape that I feel I ought to diet.
Strongly Agree Agree Neutral Disagree Strongly Disagree
5. I feel fat when I can't get clothes over my hips.
Strongly Agree Agree Neutral Disagree Strongly Disagree
6. People avoid me because of my looks.
Strongly Agree Agree Neutral Disagree Strongly Disagree
7. I feel satisfied with my face.
Strongly Agree Agree Neutral Disagree Strongly Disagree
8. I worry that other people can see rolls of fat around my waist and stomach.
Strongly Agree Agree Neutral Disagree Strongly Disagree
9. I think I deserve the attention of potential significant others.
Strongly Agree Agree Neutral Disagree Strongly Disagree
10. I hardly ever feel fat.
Strongly Agree Agree Neutral Disagree Strongly Disagree
11. There are more important things in life than the shape of my body.
Strongly Agree Agree Neutral Disagree Strongly Disagree
12. I think it is ridiculous to have plastic surgery to improve your looks.
Strongly Agree Agree Neutral Disagree Strongly Disagree
13. I like to weigh myself.
Strongly Agree Agree Neutral Disagree Strongly Disagree
14. I feel fat when I wear clothes that are tight around the waist.
Strongly Agree Agree Neutral Disagree Strongly Disagree
15. I have considered suicide because of the way I look to others.
Strongly Agree Agree Neutral Disagree Strongly Disagree
16. I quickly get exhausted if I overdo it.
Strongly Agree Agree Neutral Disagree Strongly Disagree
17. I have a slim waist.
Strongly Agree Agree Neutral Disagree Strongly Disagree

18. My life is being ruined because of the way I look.
Strongly Agree Agree Neutral Disagree Strongly Disagree
19. Wearing loose clothing makes me feel thin.
Strongly Agree Agree Neutral Disagree Strongly Disagree
20. I hardly ever think about the shape of my body.
Strongly Agree Agree Neutral Disagree Strongly Disagree
21. I feel that my body has been mutilated.
Strongly Agree Agree Neutral Disagree Strongly Disagree
22. I am proud of my physical strength.
Strongly Agree Agree Neutral Disagree Strongly Disagree
23. I feel that I have fat thighs.
Strongly Agree Agree Neutral Disagree Strongly Disagree
24. I couldn't join in with games or exercise because of my shape.
Strongly Agree Agree Neutral Disagree Strongly Disagree
25. Eating sweets, cakes or other high calorie food, makes me feel fat.
Strongly Agree Agree Neutral Disagree Strongly Disagree
26. I have a strong body.
Strongly Agree Agree Neutral Disagree Strongly Disagree
27. I think my buttocks are too large.
Strongly Agree Agree Neutral Disagree Strongly Disagree
28. I feel fat when I have my photo taken.
Strongly Agree Agree Neutral Disagree Strongly Disagree
29. I try to keep fit.
Strongly Agree Agree Neutral Disagree Strongly Disagree
30. Thinking about the shape of my body stops me from concentrating.
Strongly Agree Agree Neutral Disagree Strongly Disagree
31. I spend too much time thinking about food.
Strongly Agree Agree Neutral Disagree Strongly Disagree
32. I am preoccupied with the desire to be lighter.
Strongly Agree Agree Neutral Disagree Strongly Disagree
33. If I catch sight of myself in a mirror or shop window it makes me feel bad about my shape.
Strongly Agree Agree Neutral Disagree Strongly Disagree
34. People laugh at me because of the way I look.
Strongly Agree Agree Neutral Disagree Strongly Disagree
35. I often feel fat.
Strongly Agree Agree Neutral Disagree Strongly Disagree

36. I spend a lot of time thinking about my weight.
Strongly Agree Agree Neutral Disagree Strongly Disagree
37. I am a bit of an “Iron-Man”.
Strongly Agree Agree Neutral Disagree Strongly Disagree
38. I feel fat when I am lonely.
Strongly Agree Agree Neutral Disagree Strongly Disagree
39. I worry that my thighs and bottom look dimply.
Strongly Agree Agree Neutral Disagree Strongly Disagree
40. People often complement me on my looks.
Strongly Agree Agree Neutral Disagree Strongly Disagree
41. Losing two pounds in weight would not really affect my feelings about myself.
Strongly Agree Agree Neutral Disagree Strongly Disagree
42. I feel fat when I can no longer get into clothes that used to fit.
Strongly Agree Agree Neutral Disagree Strongly Disagree
43. I have never been very strong.
Strongly Agree Agree Neutral Disagree Strongly Disagree
44. I try to avoid clothes which make me especially aware of my shape.
Strongly Agree Agree Neutral Disagree Strongly Disagree

Appendix E
Cognitive Behavioral Dieting Scale

CBDS

Martz, D. M., Sturgis, E.T., & Gustafson, S.B. (1996). Development and preliminary validation of the Cognitive Behavioral Dieting Scale. International Journal of Eating Disorders, 19(3), 297-309.

Denise Martz, Ph.D. (704) 262-2715 or e-mail MARTZDM@APPSTATE.edu

Directions: Please circle the appropriate answer to how you have felt, thought, and behaved within the **past two weeks**.

1-----2-----3-----4-----5
Never Hardly Ever Sometimes Often Always

1. I have felt fat
2. I have used the nutritional labels on foods to determine if I eat a certain food or not
3. I have planned out what I am allowed to eat for the day.
4. I have restricted my calorie intake to help me lose weight
5. I am skipping meals to help me lose weight
6. I have tried to reduce my calorie consumption for weight control
7. I have eaten foods that I don't prefer, just because they are low in calories
8. I have felt guilty about something I ate

1-----2-----3-----4-----5
Disagree Somewhat Disagree Neutral Agree Somewhat Strongly Agree

9. I have been dieting to help control my weight
10. The main reason I have exercised is to burn off calories
11. I would have eaten much differently if I had not been concerned about my weight
12. I have made food choices based on how I feel about my weight
13. I have believed that dieting is good for my health
14. I have increased my exercise in order to lose weight

Appendix F
Silhouette Scale

Please circle how you "think" you look



Please circle how you "feel" you look



Please circle how you "want" to look



Vita

Tiffany Michelle Reiss**Education**

Virginia Polytechnic Institute and State University Blacksburg, VA
Ph.D., Health Promotion May 2001

Appalachian State University Boone, NC
M.S., Exercise Physiology August 1996

Appalachian State University Boone, NC
Completed Didactic Program in Dietetics May 1994

Appalachian State University Boone, NC
B.S., Exercise Physiology May 1992

