SOCIAL PHYSIQUE ANXIETY, EATING ATTITUDES, AND NUTRITION BEHAVIORS IN FEMALE COLLEGIATE ATHLETES

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ABSTRACT

SOCIAL PHYSIQUE ANXIETY, EATING ATTITUDES, AND NUTRITION BEHAVIORS IN FEMALE COLLEGIATE ATHLETES

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The purpose of this study was to compare members of two separate Texas State University- San Marcos female sports teams (track and field and softball) in regards to their social physique anxiety, eating attitudes, and nutrition behaviors. The study design was quasi-experimental with 2 independent samples compared according to their responses to questionnaires and a three-day diet record. Results were analyzed with

independent- samples *t*-tests, Multivariate Analysis of Variance (MANOVA), and Pearson correlations. Results of this study indicated that type of sport has significant effects on social physique anxiety, eating attitudes, and actual eating patterns for two teams with opposite views on emphasis of the thin ideal. Results showed unbalanced and exaggerated eating patterns for both sports. Interpreted results and their implications could help improve future understanding of psychosocial and behavioral aspects of disordered eating and harmful eating attitudes in collegiate athletes.

CHAPTER 1

INTRODUCTION

Overview

Eating disorders constitute one of the most important and dangerous health-related problems on college campuses. Subclinical patterns of disordered eating are relatively common, especially in the population of college women (Becker, Smith, & Ciao, 2006). The definition of a subclinical eating disorder or disordered eating is "a definite disturbance of eating habits or weight control behavior that could result in a clinically significant impairment of physical health or psychosocial functioning" (Sudi, Öttl, Payerl, Baumgartl, Tauschmann, & Müller, 2004, p. 657). Shisslak, Crago, Neal, and Swain (1987) have reported that the majority of clinical diagnoses of eating disorders occur in women (approximately 90%); therefore, it is quite clear that females are considered to be at greater risk for development of eating disorders than males. Furthermore, some studies suggest that college females are at especially high risk for development of disordered eating which might or might not lead to a clinically significant eating disorder but can definitely have great negative impact on the health of a young female (Mann, Nolen-Hoeksema, Huang, Burgard, Wright, & Hanson, 1997; Thompson & Gabriel, 2004). It is estimated that the incidence of eating disorders in college females

increases 4-19% from incidence levels in high school females. Higher risk in college is thought to be due to lack of predictability of the environment, different social conduct, higher demands for academic performance, and little or no access to guidance. Participation in sports is thought to increase the potential for eating disorders among the female population of students because of the psychological distress of academic demands, hours of practice and training, and performance issues (Abood & Black, 2000; Kirk, Singh, & Getz, 2001). Therefore, college brings up a wide variety of new possible social, physical, and emotional issues influencing women's views of the ideal body image which might potentially lead to the development of an eating disorder.

The Thin Ideal and Social Pressures

One of the greatest contributors to the increased risk of developing eating disorders in women is represented by socio-cultural pressures of the thin ideal, associated with greater beauty, femininity, and self-control; over time, this ideal body image has become ingrained in our cultural mindset (Shisslak, Crago, Neal, & Swain, 1987). There are three main theories that support the idea of social and cultural influences on women's perceptions of media and its messages.

The first and most important is the objectification theory proposed by Fredrickson and Roberts (1997). Constantly comparing one's body with widely portrayed and culturally accepted ideals and constant expectations of evaluation by others has become fundamental to women's experience in our society. In current American culture, women's bodies are always looked at, evaluated, and potentially objectified. These objectification encounters are widely spread by the media which emphasizes a woman's thin body as the main attribute necessary to achieve success and the physical beauty

ideal. The media places a great value on sex appeal and the ideal female body, monopolizing women's sense of self. Researchers Fredrickson and Roberts (1997) note that only 1 in 40,000 women actually meets the requirements of a model's shape and size, therefore suggesting that the ideal female body is a myth, which is virtually unrealistic and impossible to achieve. In this culture girls and women are pressured to internalize an outsider's view of their own body. This includes constant body monitoring and self-consciousness, followed by increased shame and anxiety, derived from seeing themselves negatively in comparison with the cultural ideal. Habitual self-consciousness and body monitoring limit women's physical activities because when they are active more attention is drawn to their body, which can increase the potential for social exposure and objectification. Constant feelings of objectification can trigger varied mental health problems that are more prevalent in women: unipolar depression, sexual dysfunction, and eating disorders (Fredrickson & Roberts, 1997).

The second theoretical view explaining social and cultural contributions to women's eating disorders involves social comparison theory proposed by Festinger (1954). This theory links attitudes and behaviors suggesting that people tend to look at what they perceive to be achievable images and then make comparisons among themselves, other people, and those idealized images. The original theory states that "given an opportunity to make a comparison with others, the opportunity will be taken and the comparison would have a considerable impact on the self-evaluation" (p. 122). When a discrepancy arises with respect to one's personal strengths and thoughts, individuals will tend to change their own position so as to move closer to the others in the ideal group. The more attractive a group is to a person, the more important that group will

be for this individual's comparison. Bissel and Zhou (2004) report that athletes with the leanest physique portrayed in the sports media are usually the ones who have received numerous awards and achieved many successes in their athletic careers. Therefore, researchers suggest that it is reasonable for women exposed to sports media to desire a leaner physique and therefore higher achievements. This conclusion is based on social cognitive theory, which states that individuals are more likely to follow the model of certain behaviors if these conditions are present: a) models portrayed in the media are attractive, b) models portrayed in the media are idealized, and c) models in the media receive rewards rather than punishment for their behaviors (Bandura, 1994, p. 71). Women who are exposed to ideal images portrayed in the media tend to internalize the comparison between themselves and the ideal, and then they tend to behave in a way that will bring them closer to their ideal image (Bissel, 2004). Also, Jones (2001) suggested that "social comparison becomes a relevant mechanism for learning about the appearance-related social expectations among peers and for evaluating the self in terms of those standards" (p. 647).

The third important contributing theoretical view includes social cognitive theory (Bandura, 1994) and social cognitive theory of mass communication (Bandura, 2001). The original social cognitive theory suggests that individuals tend to model certain behaviors in the case of the following conditions being present: a) models portrayed in the media are attractive, b) models portrayed in the media are idealized, and c) models portrayed in the media tend to receive rewards rather than punishment (Bandura, 1994). Thus, exposure to thin female ideal messages in the media can be theoretically tied to self-esteem and body image disturbances because young women are modeling what they

see in the media and feeling increased shame and anxiety because they feel they don't measure up, leading to practices of disordered eating. The social cognitive theory of mass communication (Bandura, 2001) suggests that television has been increasingly used as the "principle vehicle of justification" of the unattainable images being ideal (p. 279). Bandura states that a great amount of social learning occurs intentionally or unintentionally from models in a person's immediate environment but a lot of information also comes from the symbolic models of the media. Heavy exposure to the symbolic models on television tends to make people believe the televised version of reality. Strong media influences are able to re-shape individual personal pre-existing attributes, creating either personal pride in socially acceptable behaviors or condemnation of socially unacceptable behaviors. Bandura suggests that "behavior is especially susceptible to external influences in the absence of countervailing self-sanctions" (p. 274). The greater the benefit a person sees in adopting certain behaviors or attitudes, the higher the incentive and motivation to adopt it. Since athletes regularly endure high intensity exercise, they must balance their energy expenditure by proper diet and necessary caloric intake. Therefore, food can be viewed as a variable that could potentially be used to manipulate weight, since it seems like the easiest and most direct way of weight management that can be controlled by the individual. It has been reported that athletes engage in various diet and weight control practices that affect metabolism, health and performance (Brownell, Steen, & Wilmore, 1987). In order for healthy body weight regulation to take place, equilibrium between compensatory responses and energy intake must be maintained. This balance can easily be thrown off by maladaptive dietary practices failing to compensate for energy expenditure which breaks the circuit of

required energy exchange and leads to pathological regulation, such as challenging energy intake, output, or expenditure (which includes limiting caloric/nutrient intake, overexercising, vomiting, abuse of laxatives, etc.) (Berthoud, 2002).

Also, stress frequently is associated with food as a means of coping, and criteria for mood disorders also involve changes in the appetite, which are connected to food (APA, 2000, p. 345). Immediate and unlimited access to food and disorganized eating patterns can potentially evolve into maladaptive coping mechanisms that will produce severe damage to an athlete's body and its processes. Research also suggests that media influences are one of the major variables related to the increased occurrence of disordered eating in college and adolescent females due to the ideal body image becoming thinner and therefore less frequently represented in the general population (Bissel, 2004). Reading sports media magazines especially have been linked to anorexia, bulimia, a drive for thinness, and body dissatisfaction in women (Bissel & Zhou, 2004).

Sport-specific Issues

Although exposure to sports media is considered to be one of the variables connected to body image and self-esteem, another very important variable is the actual sport participation. Beals and Manore (2002) found that 32% of female athletes participating in aesthetic, endurance, and team sports from seven universities across the country could be classified as "at risk" for an eating disorder. Borgen and Corbin (1987) reported that participation in sports where a lean body is emphasized increases the likelihood of weight, body size, and shape preoccupation among female athletes. Female thin-sport athletes scored higher on behavioral and attitudinal subscales (drive for thinness, bulimia, body dissatisfaction, and ineffectiveness) and also higher on

psychological trait subscales (perfectionism, interpersonal distrust, interoceptive awareness (i.e., ability to discriminate between sensations and feelings), and maturity fears (i.e., perceived inability to adequately perform tasks of adulthood) than female athletes who participated in non-lean sports or non-athletes. Smolak, Murnen and Ruble (2000) also concluded that among college students, athletes in general tend to be at significantly higher risk for developing eating problems than non-athletes. Earlier, Black (1991) suggested that "college campuses are stressful and semi-closed communities that may intensify the sociocultural pressures to be thin" (p. 18). Therefore, college women and college women athletes are exposed to a great amount of pressure which can lead to development of unhealthy eating behaviors in order to fit the stereotypical ideal widely accepted and promoted by the media and the wider society.

Social Physique Anxiety

Social pressure, self-esteem, body image and competition anxiety are risk factors for restrained or disordered eating in female university athletes (Berry & Howe, 2000). According to Berry and Howe, regardless of sport, all athletes could be at risk for development of disordered eating if the predisposing factors listed earlier are present.

In a general female undergraduate sample, Sabiston, Crocker, and Munroe-Chandler (2005) found that perceptions of individual body size, shape, and appearance concerns were associated with social physique anxiety. Due to placing such great importance on physical appearance, female students reported negative psychosocial affect in relation to body image. Because of the inability to measure up to the ideal standard of beauty and thinness, women tend to express body-related anxiety. According to the same group of authors, the term *social physique anxiety* has its roots in self-presentation

concerns. It arises when individuals desire to produce a certain impression (mainly positive physical impressions) on others but lack the confidence in their ability to do so. Self-presentation is also called impression management (Haase & Prapavessis, 1998; Milligan & Pritchard, 2006). The main reason for such behavior is the "attempt by an individual to selectively present aspects of his/her self and/or omit self-relevant information in order to maximize the likelihood that a positive social impression will be generated and an undesired impression will be avoided" (Haase & Prapavessis, 1998, p. 201). Haase and Prapavessis defined social physique anxiety as a "subtype of social anxiety that occurs as a result of the prospect or presence of interpersonal evaluation involving one's physique" (p. 202). In the same study, this concept was found to correlate with different psychosocial variables such as self-esteem, body esteem, weight dissatisfaction, and body dissatisfaction. It was also linked to physical competence, physical attractiveness, exercise motives, weight control, and eating attitudes. According to this research, individuals with high social physique anxiety engage in healthy eating behaviors in order to assist them in positive self-presentation. On the opposite end of the spectrum, it is possible that individuals with high social physique anxiety engage in abnormal eating behaviors because they strongly desire to create this favorable impression. Consistent with previous statements, Haase and Prapavessis note that certain physical characteristics such as weight, height, and percent of body fat have been found to be positively correlated with dysfunctional eating attitudes. Results of this study showed that social physique anxiety scores and therefore disturbed eating attitudes scores were higher for females than for males. Such gender differences can be explained by

previously outlined cultural norms for females as opposed to males, especially media-influenced ideal body image internalization and social pressures to be thin and fit.

Krane, Waldron, Stiles-Shipley, and Michalenok (2002) agree with the idea that social physique anxiety is a type of self-presentation concern. It is viewed as constant self-consciousness about one's body, and it is believed to be a type of emotional response to concern about being judged by others. Due to this fact, social physique anxiety is also considered to be one of the risk factors influencing development of unhealthy eating and exercise behaviors.

As much as the concepts of social physique anxiety and body dissatisfaction seem to be synonyms, the two constitute rather distinct constructs. Body dissatisfaction is related to social physique anxiety but the two terms cannot be used interchangeably. Social physique anxiety is related to individual concern with possible negative evaluation of one's physique by other people, while body dissatisfaction is the actual feeling of satisfaction/dissatisfaction with one's physical self (Haase & Prapavessis, 1998). Body image dissatisfaction is believed to occur if an individual internalizes the idea of a culturally accepted ideal body image and after self-comparison discovers major discrepancies with that ideal (Smolak, Murnen, & Ruble, 2000).

Athletes, Body Image, and Eating Disorders

As mentioned by Black (1991) earlier, female athletes are considered at much greater risk for being susceptible to psychosocial pressures for thinness and ideal body image. Literature supports the notion that female athletes must meet the expectations of two different cultures: the sport culture characterized by a certain degree of masculinity, and the greater social culture of being a woman with stereotypical and wide-spread ideals

of femininity and fragility (Krane, Choi, Baird, Aimar, & Jauer, 2004). In its essence, being athletic is counter positioned to being feminine. In the athletic environment, terms such as "beautiful", "graceful", and "sexy" are associated with "feminine" and "womanly" and on the other hand, "athletic" and "strong" are associated with "manly" and "masculine." Attractiveness and appearance concerns seem to be related to the factor of femininity in sports which is facilitated by the objectification of the female body by the masculine culture. Researchers suggest that females are also socialized from an early age to compare their appearance with the dominant cultural ideal and value themselves based on that comparison (Koivula, 2001). Instead of promoting diversity among female body types, the media portrays and accepts similar ideal images and does not accept any deviation from those images (Krane, Choi, Baird, Aimar, & Jauer, 2004). This fact has multiple negative effects on females that participate in sports: their body image, eating behaviors, self-presentation, and self-esteem.

There are controversial findings about the effects of sport participation on women. Some research suggests that females participating in sports have a more positive body image, higher self-esteem, and healthier patterns of eating. For example, Reinking and Alexander (2005) reported that female athletes do not exhibit greater frequency of disordered eating than non-athletes. In this study, athletes also reported less body image dissatisfaction than non-athletes. Several other studies concluded that female athletes are not at greater risk for disordered eating and that sport participation serves as a protective factor against body image dissatisfaction and unhealthy eating patterns.

Others identify multiple factors justifying the belief that female athletes in all sports are at some risk for developing an eating pathology resulting in physical

complications (Rudd & Carter, 2006). Tylka and Subich (2004) described specific categories for the variables influencing eating disorders: personal factors (internalization of the thin ideal stereotype, introspective awareness, negative affect and dissatisfaction with own body image), sociocultural factors (pressure for thinness), and relational factors (social support from family and friends). Pressures for thinness within the society directly link to the family and friends' influences, body image disturbances, internalization of the image and negative affect connected to it. All of these variables are supported by previous research as contributors to the development of disordered eating among female athletes.

Eating disorders are known to be a preferred coping mechanism for life stress for many individuals, particularly women. College is a very stressful environment on its own and it poses a great challenge for a young individual searching for his/her identity without parents' direct guidance. Taking into consideration specific athletic pressures that are added to the load, development of eating disorders in collegiate athletes is significantly influenced by the combination of sociocultural pressures for thinness combined with pressure from coaches and friends, anxiety about athletic performance, and negative self-appraisal of individual athletic achievement. These factors mediate one of the most common misconceptions in certain sports- that increased and in some cases excessive concern over body size and shape in young female athletes, serve as risk factors for eating disorder symptoms (Williamson, et al., 1995; Mallin, 2007). Giacobbi and colleagues (2004) have identified major stressors for college athletes. Those include training intensity, high performance expectations, interpersonal relationships, being away from home, and academic pressures. Especially for the first year students, balancing

school and sport demands together with social life and adjusting to a new environment forms a major challenge. Students tend to report chronic stress related to increased training intensity, performance expectations, academic challenges and personal stress. Tracey and Corlett (1995) conducted interviews with first-year track and field athletes over a period of 6 months. Participants reported being overwhelmed mentally and physically and also feeling isolated and lonely due to lack of freedom and increased responsibilities linked to the strict team regime. Athletes were challenged by the need to balance academic and athletic expectations.

The majority of coaches and athletes truly believe that leaner physique and low body weight is a necessary component of successful athletic performance. This myth is most likely to result in excessive and inappropriate use of extreme measures of weight control (Sudi, Öttl, Payerl, Baumgartl, Tauschmann, & Müller, 2004). Connected with the lean body and ideal weight pressures, athletes' uniforms have become a unique source of stress for thin-build sports such as swimming, gymnastics, and track and field (Krane, Choi, Baird, Aimar, & Jauer, 2004). The revealing nature of the uniforms for these types of sports creates numerous self-presentation issues and anxieties for some females due to exposure of their bodies to the audience. Krane et al. (2004) also found that female athletes who had to wear revealing uniforms were highly concerned about their appearance. These worries sometimes might lead to distorted thinking and unhealthy weight control behaviors (dieting, excessive exercise, disordered eating). Wearing revealing attire may increase a female's perceptions of her body being evaluated and objectified, increasing body shame and social physique and athletic performance anxiety related to restrained eating (Fredrickson et al., 1998; Mallin, 2007).

A lean physique and below-average body weight or body mass index are most desirable among athletes who strive for competitive leadership in their sport. Thinness is widely associated with successful performance, and the image of alarmingly underweight and extremely lean-looking athletes has become an acceptable and expected norm among athletes across a number of different sports.

Social Pressures for Thinness Coming from Coaches and Friends

Social pressures from family, friends, and especially media can affect women's self-esteem, body image attitudes by means of distorted self-image, excessive drive for thinness, compulsive overexercising, and unhealthy and extreme weight control strategies (Mallin, 2007). Researchers also mention the argument that women athletes, in addition to the cultural pressures for being thin and feminine, are additionally exposed to the unique pressures of the athletic arena, such as pressures from coaches and friends and issues with uniforms and related self-presentation concerns (Tylka & Subich, 2004; Mallin, 2007). Athletes are at a greater risk for development of either clinically significant or subclinical eating disorders, when other studies suggest that it is not simply athletic involvement but the type of sport, in particular, that has a greater influence on development of eating disorders (Furia, 1999; Smolak, Murnen, & Ruble, 2000; Sudi, Öttl, Payerl, Baumgartl, Tauschmann, & Müller, 2004; Vaughan, King, & Cortell, 2004; Hulley, Currie, Njenga, & Hill, 2007). Also, Sanborn, Horea, Siemers, and Dieringer (2000) have reported that prevalence of eating disorders (meeting the clinical criteria for anorexia nervosa and bulimia nervosa) among female collegiate athletes ranges between 4 and 39%, and as many as 62% of female athletes reported maladaptive weight control behaviors. Most recent data suggests that prevalence of eating disorders in female

athletes is believed to be 15-62% (Hinton & Beck, 2005). Sundgot- Borgen (1994) reported that coaches' comments and suggestions to lose weight triggered a significant number of collegiate athletes to start dieting, restricting caloric intake and also possible use of pathogenic weight control measures such as caloric restriction, binging/purging, overexercising, or fasting. Griffin and Harris (1996) also noticed that coaches tend to view females as needing to lose weight and males needing to gain weight for successful athletic performance. Athletes often try to alter their body weight in order to achieve the ideal weight for their particular sport and progress in athletic careers. This pressure from the society to achieve the thin feminine ideal combined with the comments from coaches, friends, and family about individual weight, cause female athletes to be overly concerned with their body weight, potentially increasing the chances for developing disordered eating patterns (Sudi, Öttl, Payerl, Baumgartl, Tauschmann, & Müller, 2004).

Beals and Manore (1998) compared athletes participating in aesthetic (cheerleading, diving, gymnastics), endurance (basketball, cross-country and track distance running, soccer, swimming), and team/anaerobic (track/field events, golf, softball, tennis, and volleyball) sports. Athletes in aesthetic sports reported lower weight than endurance sports athletes and team sports athletes, and also reported lower desirable body weight, greater weight concern and dieting behaviors. A greater proportion of athletes in aesthetic sports experienced pressure to maintain certain body weight, reported greater use of extreme weight control methods including very-low-calorie diets, fasting, vomiting, or laxative abuse. This is consistent with the current hypothesis that the type of sport might potentially increase the risk of development of clinical or subclinical eating disorder (Rudd & Carter, 2006).

A study among female collegiate athletes (Beals & Manore, 2002) showed that 22% of participants reported being extremely concerned with food and eating, 6% indicated engaging in binge eating behaviors, 11% reported pathogenic weight control behaviors like fasting, 15% reported caloric restriction diets, 4% used laxatives, 8% used diet pills, and 7% of individuals engaged in self-induced vomiting. There was a report of athletes' concern and fear of becoming overweight or fat (43%); 55% of athletes reported pressure from the society to maintain current weight or suggestions from the coaches or parents to lose some extra body mass. But for the majority (63%) the pressure to maintain or lower weight was self-imposed, which reflects a greater sensitivity to the subject of body weight among females in general (Thompson & Trattner -Sherman, 1993; Beals & Manore, 2002).

To further investigate the most vulnerable group for eating disorders, Blacker, Drake, Reed, Almeida, and Raudenbush (2007) conducted a study among 61 female intercollegiate athletes assessing body image satisfaction using a scale of muscularity. Athletes from a variety of sports such as track and field, soccer, basketball, cheerleading, softball, and volleyball participated in this study. As a result, soccer players reported the lowest body dissatisfaction and volleyball players reported the highest. Track and field athletes reported significantly higher scores on the bulimia scale than basketball athletes. Track and field athletes have also reported higher traits of perfectionism compared to cheerleading, which had the lowest scores.

In conclusion, these studies identify female college athletes as possessing the greatest vulnerability for development of eating disorders due to the social pressures they face from those around them. Female college athletes participating in sports that require

thinness are considered to be at higher risk than females participating in sports that do not require extreme thinness.

Eating Disorders and Nutrition

As summarized earlier, researchers have introduced a number of theories about various contributions to eating disorders in women. Some of the examples include a combination of social, psychological, and physiological factors, such as pressure from the society to stay thin and equalizing thinness to the definition of ultimate beauty and attractiveness. Any female who does not believe she fits the image of a thin person is likely to develop self-esteem and confidence issues that might lead her to adopt negative coping strategies such as disordered eating and excessive exercise which can, in combination, have a significant effect on her health. Findings show that female athletes are up to three times more likely than female non-athletes to develop eating disorders (Vaughan, King, & Cottrell, 2004).

This phenomenon in the athletic world that involves patterns of disordered eating, amenorrhea and osteoporosis due to inadequate energy intake and expenditure and excessive exercise is defined as the "Female Athlete Triad". This concept was first described in 1992. The central issue of concern is considered to be disordered eating, involving caloric restriction, poor nutrition combined with intense training that results in "energy deficit", following micronutrient deficiencies (particularly calcium and vitamin D), decreased metabolic rate, disturbances in endocrine and reproductive function (Furia,1999; Thompson & Gabriel, 2004; Sudi, Öttl, Payerl, Baumgartl, Tauschmann, & Müller, 2004; Stafford, 2005; Nattiv, Loucks, Manore, Sanborn, Sundgot-Borgen, & Warren, 2007). A deficit of energy causes the body to shut down the production of

estrogen; this process shuts down functioning of the ovaries which in turn causes absence of menstruation. This is believed to be an adaptive function of the hypothalamic-pituitary axis performing a particular survival mechanism in times of severe emotional stress, starvation/food deprivation, and intense physical activity. Sanborn, Horea, Siemers, and Dieringer (2000) reported that athletes tend to have higher prevalence of amenorrhea than non-athletes: 2-5% in the general population versus the much wider range of 3.4-66% in athletes. The highest frequency of amenorrhea was noticed in ballet dancers and runners. The athletic world's demands for excessive caloric expenditure by the athlete can result in lack of energy to maintain the endocrine reproductive system. Lack of estrogen and poor nutrition, characterized by a diet lacking in calcium and vitamin D, results in lower bone density. Hypothalamic amenorrhea and the state of lowered levels of estrogen have serious implications on the density of the bone mass of a female athlete. Short term consequences are scoliosis and also increased number of stress fractures. There is an increased risk of developing osteoporosis within a year since the onset of amenorrhea (Johnson, Powers, & Dick, 1999). The mechanism of the triad components related to the bone density damage usually follows those steps: restricted caloric intake is responsible for deficits in energy, which results in decrease of metabolic rates within the body, and it also hinders performance of the musculoskeletal and cardiovascular systems of the body (Furia, 1999). A great number of athletes and their coaches believe that lower body weight is a vital condition for optimal athletic performance (Stice, et al., 1996). Many of them are often mislead by the initial improvement after a small weight loss, which can be a very dangerous trap for falling into an eating disorder. In addition to losing fat, an individual also loses muscle mass, and that can potentially lead to deterioration of

performance. Poor nutritional choices are reflected in electrolyte imbalance, depressed mood, anemia, and fatigue. All of these conditions can contribute to poor performance and impair an athlete's health in the long run.

That is why it is important to be aware of the Female Athlete Triad and how specific circumstances in an athlete's life might contribute to the necessity of assessing an athlete's dietary intake in order to improve their diet and enhance athletic performance.

Common Dietary Intake and Nutritional Knowledge Deficiencies in College Athletes College athletes are at greater risk for developing poor eating habits because of the competition road trips, weekend competitions, poor choices of dormitory foods, lack of cooking facilities, and practice schedules that conflict with normal meal times. Athletes need to be educated on how to be prepared for these situations and what would be the best options in unexpected circumstances (Chieppa, 2000).

Recent data suggests that nutritional knowledge and attitudes may have an effect on female collegiate runners' eating habits. 83% of the participants in one study indicated that individual's nutritional knowledge affects individual's eating patterns (Zawila, Steibt, & Hoogenboom, 2003). Athletes engage in a variety of disordered eating behaviors that may not have a uniform impact on nutrient intake. Those behaviors might be mostly of a restrictive nature and thus lead to reduction in total nutrient intake (Hinton & Beck, 2005). Throughout the literature, dieting behaviors are often considered to result in energy deficits, menstrual irregularities, and increased risk for loss of bone mass. Female Athlete Triad components often start with dieting. The most common nutritional issues in athletes with disordered eating and/or menstrual dysfunction are poor energy

intake and/or poor food selection, which can lead to poor intakes of protein, carbohydrates and essential fatty acids. The most commonly reported problems in dietary intakes of athletes are low energy intake, high protein intake of roughly 20% of total energy intake, low carbohydrate intake, and combination of carbohydrate intake under 60% of total energy and fat intake greater than 30% of total energy. In addition several micronutrients that are consistently reported low include bone-building nutrients such as calcium, the B vitamins, iron and zinc (Sundgot-Borgen & Torstveit, 2003; Abood et al. 2004).

Manore (1999) suggests that in order to maintain appropriate healthy body weight, female athletes of any age must consume enough energy to cover the energy costs of daily living, the energy costs of their sports, and the energy costs associated with building and repairing muscle tissue. Females of reproductive age also must cover the costs of menstruation and growth. Female athletes that typically exercise 10-20 hours or more per week require at least 2000-2500 kcal per day to maintain body weight. However, female athletes tend to restrict their energy intake to less than 1800kcal, and therefore are at much greater risk for fatigue, frequent injuries, irritability, and poor athletic performance. Results of the study by Hinton and Beck (2005) indicate those energy and carbohydrate intakes are the most apparent dietary inadequacies among all athletes. Significant gender differences were also found regarding disordered eating and nutrient intake.

Female athletes with poor energy intake frequently report having poor vitamin and mineral intake, especially calcium, iron, magnesium, zinc and some B-complex and antioxidant vitamins. These micronutrients are especially important for the maintenance

of bone health, energy metabolism, tissue building and repair, and hemoglobin synthesis. Calcium plays a major role in blood coagulation, neuromuscular excitability, cellular adhesiveness, transmission of nerve impulses, maintenance and function of cell membranes, and activation of enzyme reactions and hormone secretion (Volpe, 1999). Studies have shown that on average one-half of adult women consume less than 65-70% of the recommended amount of calcium. The impact is even greater if an exercising woman has a low calcium intake through elimination of dairy products from her diet, because she will lose more calcium in sweat and urine than a sedentary woman (Volpe, 1999). Female athletes in thin-build sports (ballet, gymnastics, and track and field) report the lowest intake of dietary calcium. Inadequate intake of calcium increases the risk for poor bone mineral density and stress fractures. This is especially true for athletes with poor energy intake and menstrual dysfunction (Manore, 1999).

Another very important micronutrient that is reported being deficient in female athletes' diet is iron. Iron is used for the synthesis of hemoglobin (iron-containing pigment that transports oxygen to the tissues after conversion in the lungs) and myoglobin (red iron-containing pigment in muscles similar to hemoglobin). Iron is incorporated into transporting electrons in respiratory reactions of the body. Normal value for hemoglobin concentration in the blood for an adult female equals to 13.9 $g \cdot dL^{-1}$ (for untrained female), and 14.9 $g \cdot dL^{-1}$ (for trained female athlete) (Brown, Miller, & Eason, 2006). Anemia (blood concentration of hemoglobin less than $11g \cdot 100mL^{-1}$) caused by the deficit of iron in the diet impairs not only oxygen-mediated production of ATP (molecules that transfer energy to many different chemical reactions within the body during the metabolic process) in skeletal muscle, but also impairs the capacity for

prolonged exercise (Volpe, 1999; Brown, Miller, & Eason, 2006). Resting whole body metabolism requires around 250 ml $O_2 \cdot min^{-1}$(Brown, Miller, & Eason, 2006). Mild iron deficiency anemia has been shown to impair psychomotor development, intellectual performance, and exercise performance. Iron deficiency is one of the most prevalent nutrient deficiencies observed in female athletes. It occurs in 30-50% of female athletes, especially in those who participate in endurance sports (Volpe, 1999). Avoidance of foods high in heme iron, such as meat, poultry, and fish, combined with low energy intake contribute to iron depletion. Female athletes also have increased iron loss through menstrual blood, sweat, feces, and urine (Manore, 1999).

Zinc is involved in almost 300 metabolic reactions in the body. Many women, particularly 50% of female distance runners report dietary intake of zinc less than recommended. Decrease in serum zinc levels in some athletes may be attributed to urinary and sweat losses, tissue damage, and/or poor dietary intakes. Avoiding such products as meat, poultry, shellfish leads to subsequent deficiencies in dietary intake of zinc (Volpe, 1999). Manore (1999) also reported that 88% of female athletes with a subclinical eating disorder and 83% of control athletes consumed less than the recommended amount of dietary zinc. Athletes need to be careful with balancing dietary intake of different micronutrients, because high intake of zinc may result in an imbalance of iron and copper status, possibly resulting in anemia, as well as impaired immune status. High dietary intake of protein also enhances zinc absorption (Volpe, 1999). Exercising women have different nutrient concerns than their male counterparts. Strategies to increase micronutrients require planning and are necessary for optimal health and performance (Volpe, 1999). That is why it is important to use tools like diet

history records filled out by athletes over a certain period of time to analyze their natural eating patterns and provide valuable feedback for the athletes about suggested improvements in their diets that will help them enhance their performance.

Overview of the Current Study

The current study addressed the issues of psychosocial pressures, eating attitudes and actual eating behaviors in two female collegiate athletic teams at Texas State University-San Marcos. Participating teams consisted of track and field and softball. Psychosocial pressures were represented by assessing social physique anxiety using the Social Physique Anxiety Scale (Hart, Leary, & Rejeski, 1989). Eating attitudes were assessed with the Eating Attitudes Test (Garner & Garfinkel, 1979). Nutrient and energy intake and accompanying deficits were assessed in the form of a 3-day dietary history analyzed with SQL Food processor nutritional software (Version 10.3) (ESHA Research, 2008).

Results of assessment of athletes in two different sports were expected to provide knowledge about general and specific psychosocial correlates and nutritional needs and concerns for female athletes. Interpreted results and their implications will be considered for future development of an effective intervention program for decreasing eating pathologies in collegiate athletes. Several hypotheses guided this study:

Hypotheses:

1) Athletes on the track and field team will have higher scores on the Social Physique Anxiety Scale indicating higher social physique anxiety for that population of athletes compared to athletes from the softball team.

2) Athletes on the track and field team will exhibit higher scores on the Eating Attitudes Test indicating greater frequency of behaviors related to disordered eating compared to athletes from the softball team.
3) Athletes on the track and field team will exhibit lower indexes of deficit (greater degree of restriction) in caloric, energy and essential nutrient intake compared to estimated needs than athletes from the softball team.
4) Type of sport will have a significant effect on the combination of dependent variables: Eating Attitudes Test scores, Social Physique Anxiety Scale scores, and Index of Deficit.

CHAPTER 2

METHOD

This was a quasi-experimental study design with 2 independent samples. The dependent variables were Social Physique Anxiety test scores, Eating Attitudes Test scores, and energy and nutrient intake (represented by the "index of deficit" variable, which is described further below). The independent variable was the type of sport team. Gender was controlled by participants only being female.

Participants and Procedures

Female athletes from two collegiate sport teams- track and field (running and jumping events) and softball- at Texas State were recruited to participate in this study. It was important to focus on two different types of collegiate athletic teams that require lean vs. non-lean body mass, both requiring greater estimated caloric intake, high energy expenditure, and endurance training than is required for non-athletes. Athletes and college females are two particular examples of populations that are vulnerable to making poor nutritional choices due to lack of adequate knowledge and forming disordered eating habits. The female athlete population is especially considered to be at risk because women are generally at a higher risk for development of disordered eating due to regular college student pressures combined with performance demands and media influences for

being thin and feminine. Many athletes develop disordered eating patterns or make poor nutritional choices in unexpected circumstances or even on a regular basis due to lack of adequate nutritional knowledge and misconceptions about food options. As described earlier, research shows that most athletes' energy intake and food selection is poor, leading to inadequate intake of carbohydrates and essential fatty acids, and high protein intake. Also, athletes' micronutrient intake often lacks calcium, vitamin D, zinc, and iron (Sundgot-Borgen & Torstveit, 2003; Abood et al. 2004).

The athletic teams were contacted through the coaches who gave their support for their athletes to be recruited. The primary investigator then visited with the teams, explained the study and recruited volunteers to participate in the study. Informed consent documents were reviewed and signed by the volunteers prior to the study (Appendix A). It was not possible to measure and record participants' height and weight prior to the completion of the survey packets due to scheduling and facilities constraints, therefore, we relied on self-reported measures. The recruited number of participants was 46 female student athletes ages 18-25. IRB approval was obtained and confidentiality of the data was ensured prior to the study.

Measures

Individual packets for each athlete included an informed consent form, athlete information form, the Social Physique Anxiety Scale (SPAS), the Eating Attitudes Test (EAT), and a 3-day diet history record sheet accompanied by an educational handout containing hints for estimating servings of food for the diet history record.

Athlete information form. The athlete information form asked questions such as height, weight, sport played, "in-season" or "off-season" at this time, college rank, age,

and ethnic background. They were also asked to provide information necessary for health problems screening such as hypoglycemia, diabetes, food allergies/intolerance, etc., which can affect an athlete's diet in a certain way. The athlete information form can be found in Appendix B.

Dietary Intake Assessment. At the time of the initial meeting, the participating athletes were provided with a three-day diet record form. Athletes were instructed to write down everything they ate during the day including snacks (specifying before and after workout). The specific form (Appendix C) asked athletes to record the date and time of the meal, list each food with detailed description of its characteristics, amount eaten, how it was prepared, where it was eaten, and also their mood while eating to assess emotional state during the meal. Participants were also asked to report amount and type of physical activity during the day. This information was used in further analysis to calculate individual energy intake. Information about food supplements and also vitamin/mineral supplements consumed by athletes was also required. In order to help athletes determine the exact amount of food and accurately record it, there was an accompanying educational handout to help estimate the size of portions for the record. Athletes were encouraged to be truthful in recording their diets. They were encouraged to describe food in as much detail as possible to ensure valuable feedback. This diet record was analyzed for quantitative intake using SQL Food processor software program (ESHA Research, 2008). The individual's actual dietary intake was compared to the recommended daily intake (RDI). Afterwards, individual percentage of the recommended dietary nutrient intake of an athlete was identified and a new variable called "index of deficit" was created, which was used in further statistical analysis.

Eating Attitudes Test (EAT) The Eating Attitudes Test (EAT) created by Garner and Garfinkel (1979) (Appendix D) is a 40-item self report measure of attitudes about food and diet patterns, in which certain reported attitudes are similar to those of patients clinically diagnosed with anorexia nervosa or bulimia nervosa. It measures levels of behavior related to eating disorders but does not diagnose eating disorders. Each item is scored on a 6-point Likert-type scale ranging from *always* (1) to *never* (6) (Kirk, Singh, & Getz, 2001). The validity coefficient for the EAT-40 is .87 ($p < 0.001$), which means that this tool accurately predicts group membership. The internal reliability coefficient is .94 ($p < .05$) (Garner & Garfinkel, 1979). Criterion validity for the EAT-40 is also very high (.91) ($p < .05$). This demonstrates high accuracy rates of assessment, measurement and indication of increased eating pathology even in nonclinical samples (Mintz & O'Halloran, 2000). Items on the EAT represent three factors: 1) dieting, 2) bulimia and food preoccupation, and 3) oral control. Scores over 30 on EAT represent individuals who are "at risk" for developing a clinical disorder (Lane, Lane, & Matheson, 2004).

Social Physique Anxiety Scale (SPAS). The Social Physique Anxiety Scale (SPAS) developed by Hart, Leary, and Rejeski (1989) (Appendix E) has helped researchers facilitate the examination of social physique anxiety, which is the degree to which individuals experience anxiety regarding their physiques while being observed by others. Social physique anxiety is a conceptually distinct construct from the concept of body image dissatisfaction and it is appropriate for understanding a person's involvement (or lack thereof) in exercise behaviors. Women have been found to be significantly more conscious about their weight and body shapes than men due to environmental pressures (Petrie, Diehl, Rogers, & Johnson, 1996). The Social Physique Anxiety Scale consists of

12 items on a 5-point scale that reflect feelings of anxiety and comfort in response to evaluation of one's physique by others. Research shows that the SPAS can be confidently used in studies assessing social physique anxiety among female and male teenagers and young adults and it is one of the most well-researched paper-and-pencil assessments in exercise and sport psychology (Molt & Conroy, 2001). Psychometric evaluation of the SPAS yielded good results. The Cronbach's alpha coefficient was reported at .90 ($p < .05$), which indicates high inter-item reliability. Test-retest reliability after 8 weeks was .82 ($p<.05$) (Hart, Leary, & Rejeski, 1989).

Recruitment

During one of the team meetings, the primary investigator briefly explained the purpose of the study to the athletes and distributed packets with study materials to those who volunteered to participate. Each athlete that was interested in participating read and signed the informed consent form. Further, all participating athletes were given the individual study packet (general athlete information, SPAS, EAT, and 3-day diet history record form). In order to differentiate between the two teams, packets for the track and field team had "1" in front of each individual packet number, and packets for the softball team had "2" in front of each individual number. No names or any specific identifying information was asked of the participants on any of the surveys. Participants agreed to provide their preferred email address on the informed consent for the purpose of receiving a mass email reminder after the given time frame to fill out the packet. Athletes were expected to fill out and return the test packets within 2 weeks. In order to return the packets to the primary investigator, athletes were instructed either to drop off the complete packet at the front office of the psychology department or use campus mail

which does not require stamps to send the packet to the primary investigator without indicating their return address to keep the data confidential. Athletes who had not responded within a given period of time were notified by mass email to return packets. The email was distributed in the blinded form to everyone on the list so the participants were not able to see each others' email addresses. Athletes who had returned the packets were asked to disregard the email. For athletes who failed to return the packets within a week after the reminder, one more meeting was organized when the primary investigator came to team practice and collected the rest of the packets from athletes who had completed them but did not get a chance to mail them in. After the final meeting no more notifications were given and the consent forms with the email addresses were destroyed immediately to maintain confidentiality.

Statistical Analysis

Dietary nutrient intake history was analyzed with the help of the Food Processor SQL program (Version 10.3, 2008, ESHA Research). This software program is approved by USDA and includes information based on National Nutrient Database for Standard Reference, Release 16 (Fischer, et al., 2005). It is known to be extensively used in clinical practice and research (Stumbo, 2008). The software allows individual analysis and averaging of each of the 3 days of diet record into a number which is also compared with recommended amounts. The percentage of recommended amounts was translated into a new variable "index of deficit" which was used in further analysis. A lower index of deficit would be indicative of greater degree of restriction due to the interpretation of this variable as lower amount of recommended daily intake consumed. Subsequently, higher scores on the index of deficit variable would indicate greater adherence to the

recommended caloric intake standards and, therefore, a smaller degree of restriction. Level of activity for track and field athletes was set as "very active" and level of activity for softball athletes was set as "lightly active" due to sport-specific differences in required skills (ADA, 2006).

Data were also analyzed using SPSS version 16.0. Descriptive statistics (mean, standard deviation, range, etc.) were computed. Pearson correlations were performed to assess relationships between dependent variables. Independent-samples t-tests were computed to identify the differences in each dependent variable (EAT scores, SPAS scores, and indexes of deficit) sorted by the independent variable (type of sport). Multivariate analysis of variance (MANOVA) was also computed to examine the effects of sport on the three dependent variables as a group. Additional descriptive analyses of nutrient intake and ethnic differences in nutrient intake and psychosocial measures were also conducted. Results were considered statistically significant if the p value was less than .05.

CHAPTER 3

RESULTS

Descriptive Analyses

Forty-six packets were distributed during the initial recruiting stage. It was not possible to recruit the expected number of participants consisting of 66 athletes (total number of athletes on both teams) due to scheduling conflicts for some athletes and not wanting to participate for others. The final number of returned packets was 28. This constituted 42% of the originally hoped-for sample size, and 60.87% of distributed packets. Athletes formed even groups of 14 individuals representing each sport. Table 1 shows mean and standard deviation values of age, weight, and body mass index (BMI) for the entire sample and for each team separately. Class rank for the total sample and each team individually is summarized in Table 2.

Table 1

Means of Age, Weight, and BMI for Track and Softball Teams

Variable	Total Sample	SD	Mean Track	SD	Mean Softball	SD
Age	20.32	1.63	20.14	1.99	20.5	1.22
Weight	142.5	23.74	130.00	12.64	155.00	25.97
BMI	23.19	3.18	21.31	1.52	25.07	3.34

Table 2

Summary of Class Rank for Track and Softball Teams

	Class Rank				
	Freshman	Sophomore	Junior	Senior	Other
Total sample	6 (21.4%)	5 (17.9%)	8 (28.6%)	8 (28.6%)	1 (3.6%)
Track	4 (28.6%)	2 (14.3%)	3 (21.4%)	4 (28.6%)	1 (7.1%)
Softball	2 (14.3%)	3 (21.4%)	5 (35.7%)	4 (28.6%)	0

A significant difference between the teams was found in their BMI measure (t (26) = -3.831, p = .001). Softball participants had higher BMI measures (M=25.07, SD= 3.34), compared to track and field participants (M= 21.31, SD= 1.52). Regarding BMI reports, a value under 18.5 is indicative of being underweight, and a value over 25 indicates being overweight. One person from the track team participants (7.1% of the participating members) reported a BMI of 18.88 which approaches the cut-off criteria for being underweight. A total of 6 softball team participants (42%) reported a BMI over 25 which is indicative of being overweight.

Main Findings

There were four main hypotheses for this study. First, athletes on the track and field team were hypothesized to have higher scores on the Social Physique Anxiety Scale, indicating higher social physique anxiety for that population of athletes compared to athletes from the softball team. Second, athletes on the track and field team were hypothesized to exhibit higher scores on the Eating Attitudes Test, indicating greater frequency of behaviors related to disordered eating compared to athletes from the softball team. The third hypothesis stated that athletes on the track and field team would exhibit lower index of deficit (greater degree of restriction) in caloric, energy and essential nutrient intake compared to estimated needs than athletes from the softball team. The fourth hypothesis stated that type of sport would have a significant effect on the group of dependent variables (Eating Attitudes Test scores, Social Physique Anxiety Scale scores, and Index of Deficit).

Comparison of Team Mean Scores on SPAS, EAT, and Index of Deficit (Hypotheses 1-3)

Table 3 summarizes the results of the independent samples t-tests performed for each of the dependent variables to determine whether there were significant differences between the two teams.

Table 3

Summary of T-test Results Comparing Track and Field and Softball Participants on EAT Scores, SPAS Scores, and Index of Deficit

Dependent Variable	*t*	*df*	p	M Track	SD	M Softball	SD
EAT scores	.787	26	.438	10.64	6.99	9.00	3.48
SPAS scores	-1.397	26	.174	26.50	6.59	30.57	8.68
Index of Deficit	-1.750	26	.092	65.62	15.38	81.30	29.78

Social Physique Anxiety Scale. An independent samples t-test for social physique anxiety scores did not reveal a significant difference between the two groups (t (26) = -1.39, p = 174). The mean score for the total sample was 28.54 (SD=7.84). The mean SPAS scores were higher for softball athletes (M=30.57, SD= 8.68) than for track athletes (M=26.50, SD= 6.59). If the same result would have presented itself during replication with a bigger sample, then the direction of this difference would contradict the first hypothesis. However, since the difference was not statistically significant, there is a higher possibility that the result occurred due to chance.

Eating Attitudes Test. There was no significant difference between the teams on the EAT questionnaire (t (26) = .787, p = .438) so the second hypothesis was not supported. However, track athletes had slightly higher mean scores (M=10. 64, SD=6.99) than softball athletes (M=9.00, SD= 3.48). If this result would repeat itself during future replication with a bigger sample, it is possible that the hypothesis would be supported. However, since the difference was not statistically significant, there is a stronger possibility that this result occurred due to chance. There was greater variability in EAT scores among track athletes. The mean EAT score for both teams was 9.82 (SD=5.48). The cut-off score for clinical significance for this measure is the score of 30. Two athletes on the track team scored 23 and 26, respectively. These scores are approaching the cut-off criteria and therefore, individuals can be considered "at risk" for developing a clinically significant concern with weight (Lane, Lane, & Matheson, 2004). Regarding specific items within the EAT, the majority of athletes from both teams (20 athletes) reported behaviors and thoughts associated with dieting behavior including oral control, and 8 individuals on both the track team and softball teams displayed strong preoccupation with the thought of having fat on their bodies and being thinner. Two individuals on the softball team reported sometimes having an impulse to vomit after meals (Bulimia factor). No food preoccupation was reported by any members of the teams.

Index of Deficit. There was no significant differences in index of deficit (total caloric intake) between the groups (t = -1.750, p = .092).The finding is approaching significance ($p < .10$); therefore, we can speculate that there is a trend approaching statistical significance in the sample suggesting that participating track and field athletes

did report lower values on indexes of deficit than softball participants which represents a tendency for greater degree of caloric restriction among track and field participating athletes.

Analysis of Effect of Type of Sport on the Combined Dependent Variables (Hypothesis 4)

Box's test of equality of covariance matrices revealed that equal variances can be assumed (F (6, 4897.811) = 2.109, p = .049); therefore, Wilk's lambda was used as test statistic. Multivariate analysis of variance (MANOVA) revealed significant effects of the type of sport on the group of dependent variables that include EAT scores, SPAS scores and Index of Deficit (Wilk's Λ = .652, F (3, 24) = 4.265, p = 015, multivariate partial η^2 = .348). This finding indicates that there are significant differences between the two teams with respect to the combined dependent variables of social physique anxiety, eating attitudes and indexes of deficit. After discovering significance on the multivariate test, univariate ANOVA test results revealed that none of the individual dependent variables significantly contributed to the degree to which the two teams differed for each variable. As mentioned earlier, only one finding could be classified as approaching significance and that was the difference between the teams in Index of Deficit. Track and field participating athletes reported lower indexes of deficit (greater degree of restriction) compared to the softball athletes ($p < .092$). The summary of univariate ANOVA tests for each of the dependent variables is presented in Table 4. This table shows the level of significance and the effect size for each of the dependent variables.

Table 4

Summary of Univariate Analyses of Variance for Each of the Dependent Variables

Variable/Sport	*df*	*F*	*p*	Partial η^2
Total SPAS	1	1.950	.174	.070
Index of Deficit	1	3.061	.092	.105
Total EAT	1	.619	.438	.023

In MANOVA, dependent variables are assumed to essentially test the same concept, although in this study the three dependent variables are not all significantly inter-correlated. Therefore, the interpretation of the results of this analysis can be stated as follows: the combination of SPAS scores, EAT scores, and Index of Deficit as a group factor representing the degree of disordered eating behaviors and attitudes in college female athletes were significantly different between the two sports teams. This means that overall there is a tendency for the two sports to differ in the dependent variables that represent disordered eating mentality and behaviors, but when analyzed separately, only one of the dependent variables was approaching statistical significance. This provides evidence for the original research question and the fourth hypothesis that the type of sport does have a significant effect on the eating attitudes, nutrition behaviors, and also the amount of social physique anxiety in female college athletes.

Correlation Analyses

Pearson correlation tests revealed significant relationships between SPAS scores and Index of Deficit, BMI and weight. There was no significant correlation between SPAS and EAT scores for this sample. Individuals who reported higher social physique

anxiety also reported lower caloric intake (indicated by lower Index of Deficit). Also, participants who reported higher weight and higher BMI measure were found to have higher social physique anxiety scores. Another set of Pearson correlation tests revealed that SPAS scores were negatively correlated with all the nutrients analyzed and significant correlations were found. Also, EAT scores, Index of Deficit, BMI, and weight were correlated with the majority of the nutrients. Participants with higher social physique anxiety reported lower intake of protein, carbohydrates, fats, vitamin B complex, iron, magnesium, and folate. Higher EAT scores (more abnormal eating attitudes) were associated with higher intake of protein, calcium, vitamin B complex, iron, zinc, magnesium. Lower index of deficit (less percentage consumed) was associated with lower intake of protein, carbohydrates, fats, vitamin B complex, and important micronutrients like iron, zinc, and magnesium. Higher BMI was reported by individuals with lower protein, vitamin B2, iron, magnesium and folate consumption. Lower protein, carbohydrate, iron, magnesium and folate intake was reported by individuals with higher weight. The summary of correlations between the intake of single nutrient and psychosocial and weight measurements is presented in Table 5.

Table 5

Summary of Correlations between Single Nutrient Intake and Psychosocial and Weight Measures

Variable	SPAS	EAT	Index of Deficit	BMI	Weight
Protein	-.461*	.493**	.643**	-.531**	-.541**
Carbohydrates	-.462*	.360	.911**	-.275	-.395*
Fat	-.400*	.153	.927**	.032	-.200
Calcium	-.271	.442*	.368	-.258	-.043
Vitamin C	-.069	.190	-.203	-.387*	-.235
Thiamine(B1)	-.185	.633**	.184	-.242	-.033
Riboflavin(B2)	-.458*	.830**	.432*	-.425*	-.290
Niacin(B3)	-.581**	.710**	.515**	-.359	-.296
Pyridoxine(B6)	-.473*	.677**	.714**	-.239	-.353
Cobalamin(B12)	-.276	.608**	.394*	-.112	-.046
Iron	-.526**	.795**	.421*	-.406*	-.394*
Zinc	-.338	.654**	.633**	-.168	-.207
Magnesium	-.583**	.631**	.497**	-.506**	-.405*
Potassium	-.402*	.317	.747**	-.123	-.284
Vitamin D	-.407*	.663**	.460*	-.305	-.192
Folate DFE	-.476*	-.144	.282	-.446*	-.403*
SPAS	1	.296	-.447*	.519*	.498*

Table 5-Continued

Variable	SPAS	EAT	Index of Deficit	BMI	Weight
EAT		1	-.236	-.126	.046
Index of Deficit			1	-.120	-.290
BMI				1	.785**

*p < 0.05; **p < 0.001

Dietary Intake Analyses

Additional analyses were conducted to examine the participants' caloric consumption and consumption of different nutrients. On average, athletes across teams consumed only 73.46% of the recommended caloric intake for their activity level, BMI, age, height and weight (SD=24.59). On average, participating track and field team members reported caloric intake of 65.62 % (SD=15.38) of the RDI, and softball team participants reported consuming 81.31% (SD=29.78) of the RDI (See Figure 1).

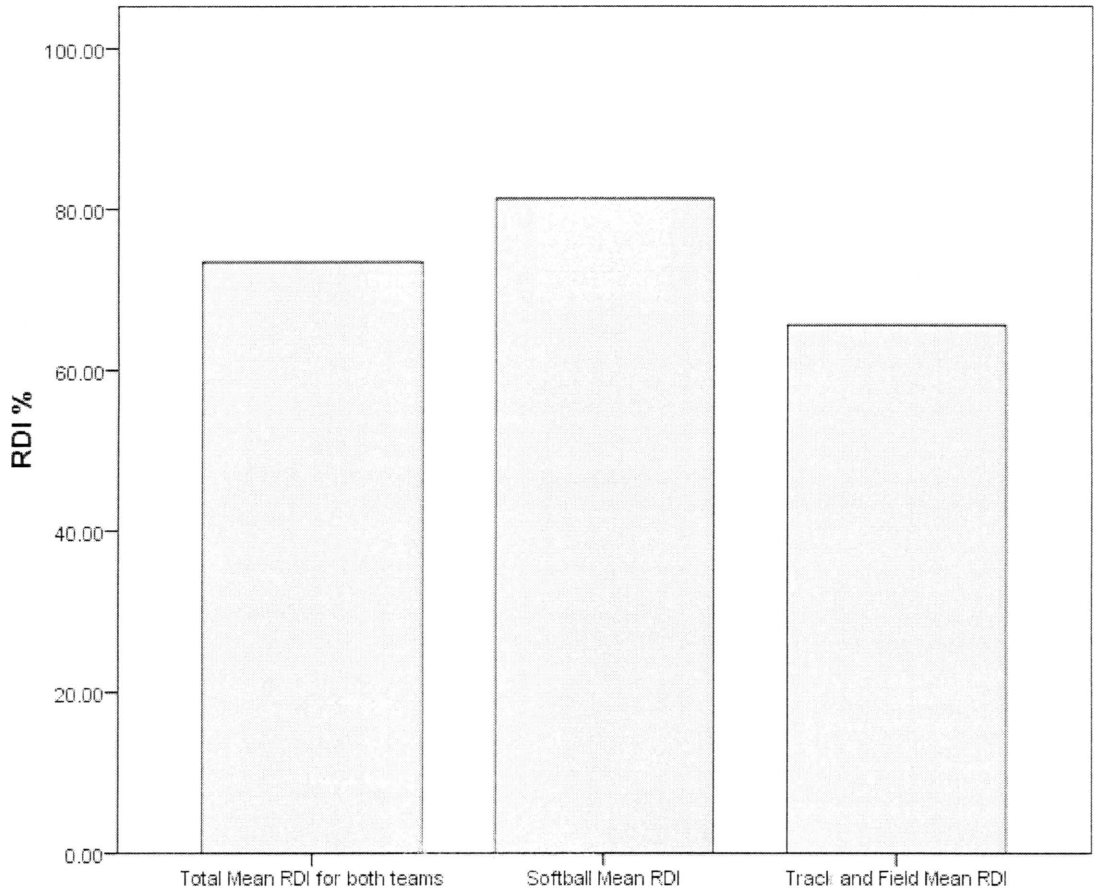

Figure 1

Comparison between Track and Field and Softball Team Participants' RDI Total Caloric Intake

Of track team participants, only one participant (7 %) reported 100% of RDI (100.57 %) and 2 participants (14.3 %) were above 80% of RDI. 6 participants (42.9 %) reported eating less than 60% of RDI. The lowest number for track team participants was 47.36%. Of softball team participants, 5 (35.7%) reported caloric intake over 100% of RDI; 3 participants (21.42%) reported intake above 70%; and 6 participants out of 14 (42.85 %) reported intake less than 60% of the RDI. The lowest RDI for softball team participants was 44.15%.

More detailed dietary analyses of the track and field and softball teams are summarized in Tables 6, 7, and 8. Both groups of athletes exceeded the amount of recommended protein intake (15-20% of the total caloric intake). Softball athletes also exceeded the recommended amount of fat intake (30-35% of the total RDI); therefore, they consumed larger amounts of calories from fat. *T*-tests only revealed one significant difference between the teams on intake of any of the particular nutrients, although great variability of nutrient intake within the teams might have affected the outcomes of this comparison. The only significant difference was noticed in Vitamin C consumption, with track and field athletes consuming significantly more Vitamin C than softball athletes ($t(26) = 2.287$, $p = 031$). There were no other statistically significant differences in nutrient intake between the teams due to great variability within each team.

Table 6

Summary of Nutritional Analysis for the Softball Team Participants

Softball	Mean % RDI	SD
Protein	138.05	54.54
Carbohydrates	71.17	22.32
Fats	108.19	56.34
Calcium	64.43	38.19
Vitamin C	66.90	28.67
Thiamine(B1)	100.88	57.97
Riboflavin(B2)	111.85	54.60
Niacin(B3)	99.08	37.70
Pyridoxine(B6)	110.28	50.53
Cobalamin(B12)	99.15	65.27
Iron	73.95	21.11
Zinc	85.97	47.06
Magnesium	49.41	21.51
Potassium	43.04	26.14
Vitamin D	37.66	33.16
Folate, DFE	77.38	43.48

Table 7

Summary of Nutrient Analysis for Track and Field Team Participants

Track and Field	Mean % RDI	SD
Protein	161.87	38.91
Carbohydrates	62.21	17.42
Fat	77.11	26.18
Calcium	74.46	33.53
Vitamin C	107.64	60.18
Thiamine(B1)	104.21	43.09
Riboflavin(B2)	140.24	60.24
Niacin(B3)	110.15	44.29
Pyridoxine(B6)	105.46	49.74
Cobalamin(B12)	108.52	72.75
Iron	92.41	27.78
Zinc	90.60	25.57
Magnesium	66.16	21.76
Potassium	39.86	14.76
Vitamin D	40.79	35.07
Folate DFE	101.82	39.61

Table 8

Summary of Comparison of Mean % of RDI between Softball and Track and Field Team Participants

Nutrient	Track and Field (Mean% RDI)	Softball (Mean %RDI)	Total (Mean %RDI)
Protein	161.87	138.05	149.96
Carbohydrates	62.21	71.17	66.69
Fat	77.11	108.19	92.65
Calcium	74.46	64.43	69.45
Vitamin C	107.64	66.90	87.27
Thiamine(B1)	104.21	100.88	102.54
Riboflavin(B2)	140.24	111.85	126.05
Niacin(B3)	110.15	99.08	104.62
Pyridoxine(B6)	105.46	110.28	107.87
Cobalamin(B12)	108.52	99.15	103.84
Iron	92.41	73.95	83.18
Zinc	90.60	85.97	88.28
Magnesium	66.16	49.41	57.78
Potassium	39.86	43.04	41.45
Vitamin D	40.79	37.66	39.23
Folate DFE	101.82	77.38	89.59

Ethnicity and Nutrient Intake

Additional analyses of ethnicity and nutrient intake were conducted to explore potential relationships between these variables. Breakdown of RDI by ethnicity is summarized in Table 9. Caucasian women consumed the least amount of RDI- 69.69% (SD= 24.01), and the Asian American athlete consumed the most- 98.02% of the total RDI. The results might not be a very accurate representation of RDI intake for this particular ethnic group as there was only one Asian American athlete.

Table 9

Summary of Total Caloric Intake by Ethnicity

Ethnicity	RDI %	SD
Caucasian	69.69	24.01
African American	71.93	17.44
Asian American	98.02	0
Hispanic/Latina	89.77	40.77
Other	80.60	30.22

Note: RDI= Recommended Daily Intake

Ethnicity and Psychosocial Measures Analyses

Additional analyses of ethnicity, social physique anxiety, and eating attitudes were conducted to explore potential relationships between these variables. Mean scores on each survey for each ethnic group are illustrated in Table 10. *T*-tests did not reveal significant differences between ethnic groups in this sample in scores on psychosocial

measures like SPAS and EAT. African American athletes reported the lowest mean SPAS score (M= 19.5, SD= 4.94) whereas Hispanic/Latina athletes reported the highest mean score of 31.5 (SD= 9.19).On the EAT, the Asian American athlete reported a score of 4.00 which was the lowest among mean scores of other ethnic groups. Caucasian athletes reported the highest mean score on the EAT (M= 10.85, SD= 6.14).

Table 10

Summary of Mean Scores on EAT and SPAS between Different Ethnic Groups

DV	Caucasian	African American	Asian American	Hispanic/Latina	Other
EAT scores	10.85 (SD= 6.14)	8.50 (SD= .70)	4.00 (SD=0)	8.00 (SD= 1.41)	7.00 (SD= 1.00)
SPAS scores	29.90 (SD= 7.98)	19.5 (SD= 4.94)	29.00 (SD=0)	31.5 (SD= 9.19)	23.33 (SD= 4.61)

DV = Dependent variable.

Ethnicity and BMI and Weight Measures

Additional analyses of ethnicity, BMI, and weight were conducted to explore potential relationships between these variables. Ethnic background of the participants, BMI and weight reports for the entire sample and for each team separately are summarized in the Table 11. *T*-tests revealed that there were no significant differences between ethnic groups in this sample in measures of BMI and weight. Caucasian women

reported the highest mean weight (M=147.05, SD= 24 56). Hispanic/Latina athletes reported the lowest mean weight of 122.50 (SD= 10.60). Athletes from "Other" category reported the highest mean BMI value of 23.59 (SD= 4.10), and the Asian American athlete reported a BMI of 21.79. There was only one Asian American athlete; therefore, the results of the BMI and weight measures might be influenced by the small number of athletes in this particular ethnic group.

Table 11

Summary of Ethnic Background by Sport, BMI, and Weight for Both Teams

	Ethnicity				
	Caucasian	African American	Asian American	Hispanic/Latina	Other
Track	10 (71.4%)	1 (7.1%)	0	1 (7.1%)	2 (14.3%)
Softball	10 (71.4%)	1 (7.1%)	1 (7.1%)	1 (7.1%)	1 (7.1%)
Total	20(71.4%)	2 (7.1%)	1 (3.6%)	2 (7.1%)	3 (10.7%)
BMI	23.20 (SD=3.32)	23.57 (SD= 5.02)	21.79	22.75 (SD= 1.44)	23.59 (SD= 4.10)
Weight	147.05 (SD= 24.56)	138.00 (SD=35.35)	135	122.50 (SD= 10.60)	131.00 (SD= 18.52)

CHAPTER 4

DISCUSSION

The main focus of this study was to determine whether type of sport and amount of emphasis on body shape were related to social physique anxiety, eating attitudes, and dietary intake of members of two different collegiate sports teams at Texas State. Two reliable and valid measures were used to assess athletes' levels of social physique anxiety and eating attitudes, and also three-day diet records were used to measure nutritional intake and identify athletes' psychological and behavioral patterns related to sport participation and eating.

Hypothesis 1 was contradicted by softball athletes reporting a higher mean score on the SPAS, and therefore indicating higher social physique anxiety, although there was no statistically significant difference between the teams. Also, this study shows that higher weight, BMI, and greater index of deficit are associated with higher social physique anxiety and fear of negative evaluation across teams. There are several ways to interpret this finding; it could be that athletes with higher body mass are engaging in healthy dieting to manage their weight, or it could indicate these athletes are engaging in abnormal eating behaviors to create a favorable impression (Haase & Prapavessis, 1998). These results of increased self-presentational concerns can be related to the influence of

an objectification mentality in the Western culture that increases women's self-consciousness and anxiety related to negative evaluation and therefore may trigger different mental health issues (Fredrickson & Roberts. 1997). Also, athletes indicated a fair degree of social physique anxiety and dieting behaviors, and their dietary intake was lower than recommended for both teams; these findings are indicative of the fact that athletes are using food as a means of manipulation of their weight and appearance.

Hypothesis 2 was not supported; although track and field athletes had higher mean scores on the EAT than softball team participants, the differences between the groups weren't statistically significant, which means this difference could have occurred simply due to chance. If the pattern would persist in future research with a larger sample, then the hypothesis would have been supported.

Regarding Hypothesis 3, detailed nutrient analyses indicated that both groups of athletes in general had lower than recommended caloric intake with track and field participants reporting lower mean dietary intake than softball participants (the difference was marginally significant). Results took into consideration activity levels for participants of both teams. That is an alarming fact needing immediate attention from the coaches and athletes as well. These results were likely affected by the limited number of participants, time of the season, and also self-report nature of the measures; had these conditions not been in place at the time of this study, the results might have been able to demonstrate more definite and significant trends in eating attitudes and behaviors in female college athletes.

Hypothesis 4 was supported as results of MANOVA indicated significant effects on the dependent variables (social physique anxiety, indexes of deficit, and eating

attitudes) resulting from the manipulation of the independent variable (pressure for a thin and fit body type, which is expected to depend on the type of sport with track and field athletes having more pressure for such a body type compared to softball athletes). Therefore, the fourth hypothesis was supported by the findings of this study. The data indicated that despite the fact that there were no significant individual effects of type of sport on any of the dependent variables, there is a general trend suggesting that type of sport has a significant effect on eating attitudes, social physique anxiety and also eating behaviors of female college athletes and that female athletes in this particular sample can be considered to be "at risk" for being susceptible to psychological pressures for thinness and ideal body image (Black, 1991). This is consistent with previous research indicating that female athletes in general are more conscious about their weight and physique then men due to external pressures.

Regarding the components of the Female Athlete Triad as described earlier, the results of this study have detected dieting tendencies among athletes; therefore, this may be an example of the initial stage of the Female Athlete Triad reflected in restricted caloric intake, poor nutrition combined with intensive training, and micronutrient deficiencies (Furia, 1999; Thompson & Gabriel, 2004; Stafford, 2005; Nattiv, Loucks, Manore, Sanborn, Sundgot-Borgen, & Warren, 2007). None of the participating athletes reported disturbed menstrual periods. And their calcium intake was within the normal recommended amount. This can be an indication for preventative measures because the amount of damage to the athlete's body isn't affecting other bodily functions yet, but there is no need to let it unfold without intervention.

Regarding additional analyses of the data by ethnicity and nutrient intake, there were no significant differences between ethnic groups due to unequal representation. The majority of the sample were Caucasian women, therefore it is not surprising that they scored the highest on the EAT and SPAS and also had the highest weight. Although the differences weren't statistically significant, the fact that African American women on average had the lowest scores on the Social Physique Anxiety questionnaire suggests that findings from even this small sample are consistent with the literature suggesting that African American women tend to have the least concerns and dissatisfaction with their bodies (Hulley, Currie, Njenga, & Hill, 2007).

Since the additional analyses on nutrient intake among athletes didn't show inadequate micronutrient intake except for deficits in vitamin D and potassium, this finding was consistent with the literature that disordered eating might not be necessarily associated with deficits in micronutrient intake, or individual disordered eating could still go undetected due to imbalance in macronutrient intake or alcohol consumption. Disordered eating patterns can take various forms and not have a uniform expected effect on nutrient intake of athletes (Hinton & Beck, 2005).

Limitations

Due to failure to find evidence for support of three of the hypotheses, possible interpretations of the results can be attributed to the limitations for this particular project. The most significant limitation is the small number of participants which was also reflected in limited ethnic diversity of this particular sample (for example, having only one person representing Asian American ethnic background). The limited number of recruited athletes was potentially affected by the fact that due to lack of resources,

participants were not offered any incentive other than personalized detailed dietary intake analyses and recommendations. Findings may not be able to be generalized to the entire population of female college athletes. Although the main focus of this project was to assess the psychosocial aspects and dietary habits of female college athletes since they are considered to be the high-risk population for developing clinical or subclinical eating disorders, gaining an insight into the culture of the sport with male and female participants would contribute to greater generalizability of the findings (Abood & Black, 2000; Lockhart Gould, 2003; Becker, Smith, & Ciao, 2006). Self-report measures might potentially be affected by social desirability or lack of insight that there is a problem, which is characteristic of the clinical population with eating disorders. Under-reporting may become a serious factor affecting the significance of findings in this study due to the secretive nature of disordered eating and fear of consequences of disclosure. Self-report measures that were used such as three-day dietary intake history might not be completely accurate because it represents a fairly short span of span time and athletes may not always report everything they ate or be truthful. Also, self-report of height and weight might not have been accurate or truthful as well. Since height and weight measures were reported by athletes and not directly measured by the primary investigator, the computed BMI measure might not be an accurate representation of individual body mass. Also, this measure is known for not taking into account athlete's muscle mass; thus, it might be misleading and inaccurate. Therefore, we might not be able to get a clear picture of this sample's true eating habits. Common life events (such as emergency family situations, illness, late night studying, increased stress from demands for academic performance, and travel) might significantly influence dietary intake and not be representative of an

individual's normal eating routine. Not having a control group of non-athletes is also a limitation since there is no point of reference and control for the sport environment. Eating patterns while being "in-season" might significantly differ from eating patterns while being "off-season". Athletes in the track and field team are internally divided into "in-season" and "off-season" since the cross country team is part of track and they are competing both in the fall and spring. The softball team is "in-season" as well. The combination of instruments used in this study to assess the degree of disordered eating behaviors and attitudes in college female athletes might not be the most effective at identifying true disordered eating trends. The lack of strong correlation among the three measures suggests either slight differences in constructs that each variable is measuring or lack of connection for assessing a particular degree of disordered eating behaviors and attitudes in female college athletes.

Future Research

More detailed and continuous study of athletes' habits and attitudes is necessary for development of a specific intervention targeting all the areas of deficit or alarming preoccupation with a particular aspect of disordered eating and the mentality that accompanies it. When it comes to eating behaviors, since the individual is the one controlling the intake according to his/her beliefs, attitudes towards eating often predict subsequent behaviors. Therefore, it is important to study attitudes and also knowledge of optimal dietary practices for athletes in any kind of sport. At this point, some initial steps can be taken in an effort to educate athletes about optimal eating patterns and food choices to make in ambiguous situations when time or resources are limited. Incentives can potentially include individual detailed diet analyses combined with more feasible

incentives like a gift card or small monetary incentive that will motivate athletes to participate in a study and ensure larger number of recruited individuals. Feedback for coaches about dietary attitudes and practices of their athletes is definitely a valuable incentive because that way better rapport between coaches and athletes can be built through the interactions related to athlete's health, and also concerns and questions can be addressed to help the coaches and athletes to agree on an optimal plan for enhancing performance and staying healthy. Organizing educational meetings or workshops for athletes in collaboration with dietitians at this university could help athletes learn more about adequate nutrition for their sport and schedule. Implementing interventions on multiple levels should be the ultimate goal for any researcher in order to establish and improve the connection between the research and real-life contexts. Intervention may include education, raising awareness, screening for any problems related to inadequate dietary intake or problematic attitudes towards food. With the help of professors and interns from the dietary services department, workshops, hands-on menu planning and cooking classes could be organized to help athletes understand and learn better ways of choosing and preparing foods for their individual well-being. These types of interventions can benefit not only healthy athletes but also athletes at risk for developing a clinically significant problem with food.

For athletes who have been screened for and clinically diagnosed with an eating disorder or strong tendencies towards disordered eating attitudes and behaviors have been discovered, more serious measures should be taken. Depending on individual preferences, family and friends can be alerted and educated about how to help an individual with this type of a disorder. No harsh penalties or jeopardizing acts should

ever be enacted from the Athletic Department, except for not letting an athlete compete until a healthier condition is reached and maintained. A multi-focal approach should be assumed while trying to help an athlete get better. Working with a nutritionist, a therapist, and a physician, an individual should be able to get educated on healthy ways of taking care of his/her body and also explore and challenge any cognitive issues preventing a healthier condition from being reached. Athletic trainers and coaches should be educated about symptoms and tendencies of disordered eating, psychological problems related to eating and body image, and the Female Athlete Triad components to be monitored and recognized as soon as possible. A caring, safe, and non-judgmental atmosphere should be maintained and helping the athlete be more comfortable with approaching his/her eating disorder is important for both the coach and the athlete and should be treated as a medical rather than personal issue that can be fixed and without assigning blame.

Future research can be directed at more continuous and long-term monitoring of athletes' habits and dietary intake and considering all the external influences on these habits in order to gain a better insight into the nature of eating habits in any particular sport. Also, it would be interesting to monitor athletes' exposure to the media and assess individual value on looking like the celebrities portrayed in the media who may possess the thin ideal body type. This would allow correlation of media exposure with the actual eating attitudes and behaviors to show the strength of the relationship between media exposure and attitudes and behaviors of female college athletes. Evaluation of self-esteem can also be added to future research designs. Since the mentality of disordered eating, affected by the external media, athletic and academic pressures is such a complicated issue, it could be useful to evaluate how individuals' self-esteem relates to eating

attitudes, behaviors, and social physique anxiety. Including assessment of coaches' attitudes toward and knowledge of eating disorders and healthy eating behaviors will help future studies to control for this variable as well.

Eating disorders, eating attitudes, and perceptions of appearance of female college athletes are topics that have great potential for future exploration and intervention. The seriousness of the effects of eating disorders on college athletes is a motivational factor for more action to be taken in the direction of education and design of new appealing treatment and intervention strategies to keep athletes healthy and maintain their focus on friendly competition and promotion of athleticism, as opposed to a one-sided mentality of winning at all costs while doing great damage to athletes' bodies and self-destruction in the name of victory.

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APPENDIX A

CONSENT FORM

Title of Study: Social Physique Anxiety, Eating Attitudes and Behaviors in Female College Athletes

Purposes of the study. You are invited to participate in a research study being conducted by Yana Kruglikova (yk1014@txstate.edu) to fulfill the requirements for a master's thesis in Health Psychology at Texas State University. The purpose of this study is to learn more about social physique anxiety (a subtype of social anxiety involving self-consciousness about one's body, and is believed to be a type of negative emotional response to concern about being judged by others), eating attitudes and dietary habits of female college track and field and softball athletes. Past research indicates that these issues may be particularly relevant for female athletes. You have been chosen to participate because you are a female collegiate athlete member of either the track and field or softball team.

Procedures.

If you agree to participate in this study, the following will occur:

1. You agree to provide your email address in order to be contacted as a reminder to turn in the packet of questionnaires. The email will not be used in any other way except to send a mass reminder to the group to return questionnaire packets. The email will be sent two weeks after the questionnaires are distributed and will be in blinded form so others will not see your email address. The primary investigator, Yana Kruglikova, is the only person who will have access to this information. A reminder email will only be sent once. Then, all the information with each participant's email address will be destroyed.
2. You will be given and asked to complete an individual survey packet which will take approximately 35 minutes to complete. The packet will consist of general information about you, the Social Physique Anxiety Scale (SPAS) and the Eating Attitudes Test (EAT). You are <u>not</u> obligated to answer all of the questions if you choose not to. SPAS consists of 12 questions which take about 10-15 minutes to complete. EAT includes 40 questions which take about 10-15 minutes to complete. You will have two weeks to complete all the surveys included in the packet. After the deadline you will either have to mail the completed packet to the primary investigator through campus mail, or drop it off at the Department of Psychology office. If you fail to return the packet by the designated

date, you will be sent a mass reminder email. After another week no more notifications will be sent and the data collection period will be over.

3. You will be asked to record your dietary intake and physical activity for three days.

4. Your height and weight will be measured at the beginning of the study.

Risks and Discomforts of Participation in this Study. Potential psychological risks of this study might include mild discomfort associated with answering questions about the sensitive subjects of social physique anxiety and eating attitudes. It is not possible to assess these constructs of interest in any other way. You do not have to continue completing the surveys if you feel discomfort at any point. You may also skip any questions you feel uncomfortable answering without any penalty and continue with the survey if you wish to do so. If you feel that you need further help or counseling on issues related to your eating attitudes and social physique anxiety, you can find help by contacting the Texas State University Counseling Center at 24-hr Crisis Hotline 1-877-466-0660 (Toll Free) or for emergency after business hours contact 512-245-2890. Also, the Hays County Crisis Hotline can be contacted at 512-396-3939.

Benefits. This study may directly benefit your knowledge of your dietary nutrient intake. The information given back to you may be used for planning and enhancing your optimal athletic performance. The information about the overall deficits and nutrient intake issues for your specific team may be focused on in lectures and intervention programs.

Costs/Incentives. Participation in this study will not cost you any money. Detailed analysis of dietary intake including nutrient content, energy intake, and daily recommended norms will be provided for each participating athlete at the end of the study. Dietary intake will be analyzed with the help of Food Processor SQL program (Version 10.3, 2008, ESHA Research) in collaboration with the Nutrition and Foods Program at Texas State. With the help of this software it would be possible to identify food and energy values in comparison with the USDA National Nutrient Database for Standard Reference, Release 16 (Fischer, et al., 2005).

Questions/Contact Persons. For more information about this research contact Yana Kruglikova at (319)230-8084 or yk1014@txstate.edu, or her supervisor, Dr. Kelly Haskard, at (512) 245-8710 or kh36@txstate.edu. Pertinent questions about the research, research participants' rights, and/or research-related injuries to participants should be directed to the IRB chair, Dr. Jon Lasser at (512)245-3431or lasser@txstate.edu, or to Ms. Becky Northcut, Compliance Specialist (512-245-2102). Summary of the findings will be provided to participants upon completion of the study if requested from Yana Kruglikova.

Confidentiality. All information about you obtained as a result of your participation in this research will be kept confidential. The only form of identification asked will be each participant's preferred email address in order to send a one-time mass email reminder at

the end of the 2 week period given to complete the questionnaire packet. The signed consent forms with each individual's email address will be safely kept in a locked file cabinet in the Psychology Department lab room 312 A for the time of data collection (3 weeks) and will be immediately destroyed after the email reminder has been sent to all the participants. Primary investigator, Yana Kruglikova, and her supervisor, Dr. Kelly Haskard, will be personally responsible for keeping the consent forms stored, secured, and then destroyed. During the survey completion, each participant will be assigned an experiment ID by which the data will be categorized and the results can be matched for analysis. All the surveys inside the packet will have experiment ID written on them in case some forms get misplaced. There will be no documents linking a participant's email address and experiment ID number so the data analysis will be anonymous. No outside individuals except for the primary investigator, Yana Kruglikova and her supervisor Dr. Kelly Haskard, will have access to the data.

Voluntary Participation. Your participation in this study is completely voluntary. You do not have to participate, and you may withdraw your consent to participate in this study at any time without prejudice or jeopardy to your standing with the University or Athletic Department. You may choose to not answer any question(s) for any reason without any further penalties or consequences.

If requested, summary of the findings will be provided to you as a participant upon completion of the study. Contact primary investigator, Yana Kruglikova at yk1014@txstate.edu to request the results of the study after April 30, 2009.

Statement of Consent. I have read the above information. I willingly consent to participate in this research. I willingly agree to share my preferred email address for the purpose of a one-time mass email reminder. I understand that confidentiality of my information will be maintained. I can terminate my participation at any time. Upon signing this form, I will receive a copy for my personal records.

*Your preferred email address*_____

_____ _____
Signature of Participant Date

_____ _____
Signature of Investigator Date

APPENDIX B

ATHLETE INFORMATION FORM

EXPERIMENT ID NUMBER _____

SPORT TEAM_____EVENT_____

CURRENTLY IN SEASON_____ CURRENTLY OFF SEASON_____

COLLEGE RANK:

FRESHMAN ___ SOPHOMORE____ JUNIOR_____ SENIOR ____ OTHER ____

AGE_____

Height_____ Weight _____

ETHNIC BACKGROUND:

CAUCASIAN_____ AFRICAN AMERICAN_____ASIAN AMERICAN____

HISPANIC/LATINO_____ NATIVE AMERICAN_____

OTHER_____

DO YOU HAVE ANY HEALTH PROBLEMS/CONDITIONS REQUIRING SPECIAL TREATMENT?

NO_____YES_____

IF YES, PLEASE DESCRIBE_____

IF YES, DO YOU TAKE ANY MEDICATION FOR YOUR HEALTH CONDITION?

NO_____ YES_____

IF YES, WHAT KIND? _____

APPENDIX C

DIETARY INTAKE ASSESSMENT

Food Diary: DAY_____ DATE_____

MEAL Foods (list)	AMOUNT EATEN	HOW PREPARED	WHERE EATEN (work, home, etc.)
Breakfast:			
Snack:			
Lunch:			
Dinner:			
Snack:			

Food supplements Can/Day: _____ Name:

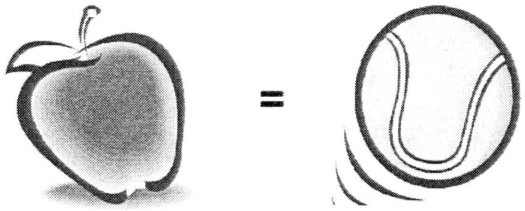
_____

Vitamin/Mineral Supplement:

_____

Portion Sizes

Estimating portion size is not easy. In fact, we all have our own individual idea of what a portion size is. To keep accurate food records, portion sizes have to be standardized. This requires practice. Once you know what a correct portion size is and looks like you will be able to keep better, more accurate food records.



One Medium Apple = Tennis Ball

Over time, our sense of portion size can change. That means we constantly need to check ourselves. Pull out your scale or household measures often. Is what you thought was one ounce actually just one ounce?

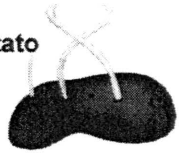
1 oz of Cheese

=

4 Stacked Dice

Eat off the same plate at home. Studies have shown that people will eat more if they are served more. Keeping your plate size constant can help control portion sizes.

1 Baked Potato



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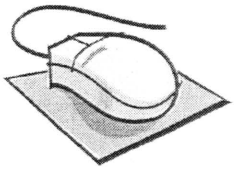


Computer Mouse

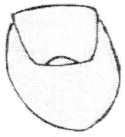
Watch the fast food. One study found that portion of french fries served from fast food restaurants was 15 – 50% more than the company stated the serving size was.

1 Teaspoon

=

1 Penny

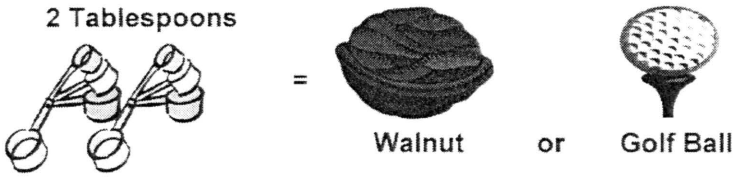
or



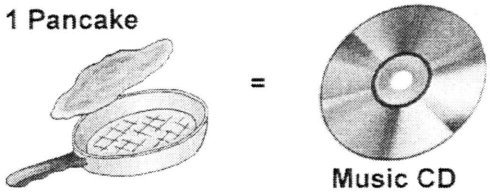
Tip of Your Thumb

University of Utah, Metabolic Clinic
May 2004

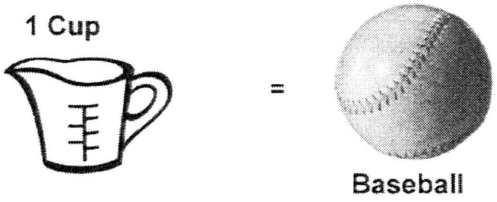
Keep your eye sharp by rechecking yourself with a scale or measuring cups. Note how much space ¼ cup takes on your plate. Note how much space ½ cup takes on your plate.



Some foods "shrink" or lose volume after they have been cooked. Others, like noodles, actually increase in size after cooking. To be exact, measure foods in the same manner as the Food Label or package instructs.



Remember practice makes perfect. Don't give up. Accurate portion sizes will lend to more accurate food records and better dietary management!



Quick Reference Guide

½ cup Fruit, Cooked Cereal, or Pasta	=	small fist or ½ a baseball
1 tortilla	=	small (7 inch) plate
½ bagel	=	small soft drink lid
1 teaspoon Margarine or Butter	=	thumb tip
2 tablespoons Butter	=	golf ball
1 small baked potato	=	computer mouse
1 pancake or waffle	=	music CD
1 medium apple or orange	=	tennis ball
4 small cookies (like vanilla wafers)	=	four checkers
1 ounce cheese	=	4 dice or a domino
1 tablespoon salad dressing	=	ping-pong ball
2-inch slice of melon	=	width of 3 fingers
1 cup	=	1 baseball

APPENDIX D

EATING ATTITUDES TEST
(Garner & Garfinkel, 1979)

Please read the statements carefully and chose the answer which applies best to each of the numbered statements.

Consider responses for each question on 1-5 scale and mark the answer sheet accordingly:

A- 5- Always
B- 4- Often
C- 3- Sometimes
D- 2- Rarely
E- 1- Never

All of the results will be *strictly* confidential. Most of the questions directly relate to food or eating, although other types of questions have been included. Please answer each question carefully. Thank you.

1. I like eating with other people.

2. I prepare foods for others but do not eat what I cook.

3. I become anxious prior to eating.

4. I am terrified about being overweight.

5. I avoid eating when I am hungry.

6. I find myself preoccupied with food.

7. I have gone on eating binges where I feel that I may not be able to stop.

8. I cut my food into small pieces.

9. I am aware of the calorie content of foods that I eat.

10. I particularly avoid foods with high carbohydrate content (e.g. bread, potatoes, rice, etc.)

11. I feel bloated after meals.
12. I feel that others would prefer if I ate more.
13. I vomit after I have eaten.
14. I feel extremely guilty after eating.
15. I am preoccupied with a desire to be thinner.
16. I exercise strenuously to burn off calories.
17. I weigh myself several times a day.
18. I like my clothes to fit tightly.
19. I enjoy eating meat.
20. I wake up early in the morning.
21. I eat the same foods day after day.
22. I think about burning up calories when I exercise.
23. I have regular menstrual periods.
24. Other people think I am too thin.
25. I am preoccupied with the thought of having fat on my body.
26. I take longer than others to eat my meals.
27. I enjoy eating at restaurants.
28. I take laxatives.
29. I avoid foods with sugar in them.
30. I eat diet foods.
31. I feel that food controls my life.
32. I display self control around food.

33. I feel that others pressure me to eat.

34. I give too much time and thought to food.

35. I suffer from constipation.

36. I feel uncomfortable after eating sweets.

37. I engage in dieting behavior.

38. I like my stomach to be empty.

39. I enjoy trying new rich foods.

40. I have the impulse to vomit after meals.

APPENDIX E

SOCIAL PHYSIQUE ANXIETY (SPAS)

(Hart, Leary, & Rejeski, 1989)

For each item, please indicate the degree to which the statement is characteristic or true of you on a 5-point scale:
Not at all- 1-A
Slightly- 2- B
Moderately- 3- C
Very- 4-D
Extremely- 5-E

41. I am comfortable with the appearance of my physique/figure

(A) Not at all (B) Slightly (C) Moderately (D) Very (E) Extremely

42. I would never worry about wearing clothes that might make me look too thin or overweight

(A) Not at all (B) Slightly (C) Moderately (D) Very (E) Extremely

43. I wish I wasn't so uptight about my physique/figure

(A) Not at all (B) Slightly (C) Moderately (D) Very (E) Extremely

44. There are times when I am bothered by thoughts that other people are evaluating my weight or muscular development negatively

(A) Not at all (B) Slightly (C) Moderately (D) Very (E) Extremely

45. When I look in the mirror I feel good about my physique/figure

(A) Not at all (B) Slightly (C) Moderately (D) Very (E) Extremely

46. Unattractive features of my physique make me nervous in certain social settings

(A) Not at all (B) Slightly (C) Moderately (D) Very (E) Extremely

47. In the presence of others, I feel apprehensive about my physique/figure

(A) Not at all (B) Slightly (C) Moderately (D) Very (E) Extremely

48. I am comfortable with how fit my body appears to others

(A) Not at all (B) Slightly (C) Moderately (D) Very (E) Extremely

49. It would make me uncomfortable to know others were evaluating my physique/figure

(A) Not at all (B) Slightly (C) Moderately (D) Very (E) Extremely

50. When it comes to displaying my physique/figure to others, I am a shy person

(A) Not at all (B) Slightly (C) Moderately (D) Very (E) Extremely

51. I usually feel relaxed when it is obvious that others are looking at my physique/figure

(A) Not at all (B) Slightly (C) Moderately (D) Very (E) Extremely

52. When in a bathing suit, I often feel nervous about the shape of my body

(A) Not at all (B) Slightly (C) Moderately (D) Very (E) Extremely

VITA

Yana Alexandrovna Kruglikova was born in Taraz, Kazakhstan, on November 25, 1985, the daughter of Kruglikov Alexander Nikolayevich and Kruglikova Marina Vladimirovna. After completing Ust-Kamenogorsk gymnasium # 38 in Ust-Kamenogorsk, Kazakhstan, in 2002, she entered and completed Harlan Community High School as a foreign exchange student, in Harlan, Iowa, in 2003. She entered University of Northern Iowa in 2003, where she received her degree of Bachelor of Arts in psychology in May 2007. During the summer of 2007 she was involved in a continuous research project on the topic of physiological responses of students to pet exposure and implications of this study for pet therapy. This research was published in North American Journal of Psychology December of 2008. In August of 2007 she entered the Graduate College of Texas State University-San Marcos. She will graduate with her Master of Arts degree in Health Psychology in May 2009. Her master's thesis, which she has presented at a graduate symposium at Texas State University-San Marcos and All-University Conference on the Advancement of Women in Higher Education at Texas Tech University. The title of the thesis is "Social Physique Anxiety, Eating Attitudes, and Nutrition Behaviors in Female Collegiate Athletes." During her graduate studies at Texas State she was involved in physician-patient interaction research and began contributing to the manuscript for publishing headed by her supervising professor Dr. Kelly Haskard Zolnierek.

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This thesis was typed by Yana Alexandrovna Kruglikova.