

LONGITUDINAL EXAMINATION OF DISORDERED EATING CORRELATES IN
COLLEGIATE FEMALE GYMNASTS

By

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Abstract of Thesis Presented to the Graduate School
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The purpose of this study was to longitudinally examine the eating disorder correlates of body dissatisfaction, perfectionism, drive for thinness, and social physique anxiety of female gymnasts and nonathletes over a six-month period. Participants completed the Social Physique Anxiety Scale and the Body Dissatisfaction, Drive for Thinness, and Perfectionism subscales of the Eating Disorder Inventory-2 in September (preseason) and in March (competitive season). One hundred and eleven nonathletes and 102 gymnasts completed the Time 1 questionnaire. The Time 1 response rate for the nonathletes was 72% and the response rate for the gymnasts was 98%. For Time 2, 17 nonathletes completed the questionnaire for a response rate of 15%, and 79 gymnasts completed the Time 2 questionnaire for a response rate of 77%. I found that the gymnasts and nonathletes did not differ significantly on the eating disorder correlates at Time 1. Because of the poor response rate of the nonathletes for the Time 2 data collection, time differences were examined only for the gymnasts. I found no significant time differences

for the gymnasts for the eating disorder correlate measures. The attitudinal, behavioral, and psychological factors that may have explained the study findings were considered, and areas for future research were highlighted.

CHAPTER 1 INTRODUCTION

Background

The Diagnostic and Statistical Manual-IV (DSM-IV; American Psychological Association [APA], 1994) provides diagnostic criteria for the following four eating disorders: anorexia nervosa, bulimia nervosa, binge eating disorder, and eating disorders not otherwise specified. These eating disorders are associated with negative biological (e.g., amenorrhea), psychological (e.g., depression), and social effects (e.g., isolation; APA, 1994). Certain groups are more at risk for developing eating disorders than others. These groups include women, Caucasians, chronic dieters, models, and dancers (APA, 1994; Demarest & Allen, 2000; Nagel & Jones, 1992; Striegel-Moore, Silberstein, & Rodin, 1986).

Also, some researchers and clinicians consider athletes to be a high-risk group for developing an eating disorder (Hausenblas & Carron, 1999; Smolak, Murnen, & Ruble, 2000; Thompson & Sherman, 1999a). Furthermore, it has been suggested that subgroups of athletes may be at an increased risk for eating disorders (Garner, Rosen, & Barry, 1998; Stoutjesdyk & Jevne, 1993; Sundgot-Borgen, 1994). Athletes participating in aesthetic (e.g., gymnastics, figure skating), endurance (distance running, swimming), and weight-dependent sports (wrestling, rowing) may be more at risk than athletes participating in other types of sports (e.g., basketball, archery; Hausenblas & Carron, 1999). In particular, some clinicians and researchers report that athletes competing in the aesthetic sport of gymnastics may be at the greatest risk for developing an eating disorder

(Hausenblas & Carron, 1999). However, the research examining eating disorders and athletes in general and eating disorders and gymnasts in particular, is equivocal; thus further investigation into gymnastics and eating disorders is warranted.

This study extends the research on athletes and eating disorders by addressing some of the contradictory findings and methodological limitations. First, many researchers fail to include an appropriate control group in their studies (Smolak et al., 2000). A control sample that is matched for gender and age is necessary to attribute group differences to the grouping variables (Ashley et al., 1996). Thus, I recruited an age-matched nonathletic female control group.

Second, many studies examine athletes of different levels, however, differences among athletes of different levels have been found (Picard, 1999). For example, Division I athletes are different from Division III athletes in risk for disordered eating (Picard), and it cannot be assumed that elite athletes are comparable to athletes of other levels (Reel & Gill, 1996). Therefore, I examined athletes competing at one level (e.g., Division I collegiate gymnastics).

Third, the majority of research has examined eating disorders and athletes using cross-sectional designs. However, examining eating disorders over time is important. If athletes that are predispositioned to developing eating disorders gravitate towards certain types of sports then the disordered eating behavior should not vary throughout the year. However, if participation in certain sports causes disordered eating, then the time at which measures are taken is important. Thus, I examined eating disorder correlates longitudinally over a six-month period, assessing eating attitudes once during the preseason and once during the competitive season.

Fourth, there is little theoretical basis for the sport category breakdowns typically used by researchers, and arbitrarily placing sports in categories may not reveal useful or valid results (Hausenblas & Carron, 2002). Also, most classification systems do not take into account sport-specific demands. Therefore, I examined a large sample of athletes from a single sport (i.e., gymnastics) rather than multiple sports, thus eliminating sport classification problems (Hausenblas & Carron, 2002).

Significance of the Study

This study is significant for two reasons. First, it examines a large sample of athletes from a single sport. To have a large enough sample size for adequate power, the majority of the research to date combines athletes from many different sports into one group because it is often difficult to recruit enough athletes from one sport (Hausenblas & Carron, 2002). Second, this study is one of the first to examine disordered eating correlates over time. A longitudinal examination of disordered eating correlates in athletes is necessary to determine if sport participation results in eating disorder symptoms (Anderson, 1992; Hausenblas & Carron, 1999).

Purpose

The purpose of this study was to longitudinally examine the eating disorder correlates of body dissatisfaction, perfectionism, drive for thinness, and social physique anxiety of gymnasts and nonathletes over a six-month period. The first assessment was in October (gymnasts' preseason) and the second assessment was in March (gymnasts' competitive season).

Hypotheses

The following two hypotheses were proposed.

Hypothesis 1

It was hypothesized that gymnasts would have greater disordered eating symptoms during the competitive season than during the preseason (Dale & Landers, 1999). Gymnasts may experience pressures during the season leading them to experience more disordered eating symptoms than during the preseason. Such pressures include: making the lineup, qualifying to post-season competition, to have an aesthetically pleasing appearance for judges, and coaches' expectations (James & Collins, 1997; Scanlan, Stein, & Ravizza, 1991).

Hypothesis 2

Second, it was hypothesized that gymnasts would have greater disordered eating symptoms than controls during the competitive season, but they would not differ from controls during the preseason (Dale & Landers, 1999; Davis, 1992; Hausenblas & Carron, 1999; Smolak et al., 2000; Sundgot-Borgen, 1993). According to the hypothesis that sport participation leads to disordered eating, gymnasts should experience an increase in disordered eating symptoms when they become involved in their competitive season (Dale & Landers, 1999). It is also assumed that disordered eating symptoms will remain stable over time for women not participating in sport because they do not experience the competitive pressures that may lead to disordered eating symptoms.

CHAPTER 2 REVIEW OF LITERATURE

There are three purposes to this chapter. The first is to present information about the following four eating disorders described in the DSM-IV: anorexia nervosa, bulimia nervosa, binge eating disorder, and eating disorders not otherwise specified. The second purpose is to describe three popular eating disorder measures: The Eating Attitudes Test (Garner & Garfinkle, 1979), the Eating Disorder Inventory-2 (Garner, 1991; Garner, Olmstead, & Polivy, 1983), and The Bulimia Test-Revised (Smith & Thelen, 1984; Thelen, Farmer, Wonderlich, & Smith (1991)). The third purpose is to provide a review of the literature pertaining to three popular explanations linking athletes and eating disorders. The first explanation states that intra-individual characteristics can lead to eating disorders, the second proposes that an athlete's social influences can lead to eating disorders, and the third explanation proposes that participation in certain sports can lead to disordered eating (Hausenblas & Carron, 1999).

Eating Disorders Defined

Anorexia Nervosa

There are four criteria that must be present for a clinical diagnosis of anorexia nervosa (APA, 1994). First, there is a refusal to maintain body weight at or above a minimally normal weight (e.g., less than 85% of normal weight) for age and height. Second, there is an intense fear of gaining weight or becoming fat, even though underweight. Third, there is body-image disturbance. Body image is a person's attitude towards his or her body, and it has cognitive, behavioral, perceptual, affective, and

subjective components (Bane & McAuley, 1998). The final criterion is amenorrhea in postmenarcheal women. Amenorrhea is the absence of three or more consecutive menstrual periods (Highet, 1989).

There are two types of anorexia: binge-eating purging type and restricting-type. Binge-eating purging type anorexics engage in binge eating or purging behavior during an episode of anorexia, while restricting-type anorexics do not engage in this behavior (APA, 1994). Purging behaviors include self-induced vomiting, fasting, and misuse of laxatives, diuretics, and enemas.

It is estimated that 0.2% to 1.3% of the United States population suffers from anorexia nervosa, and 90% of the sufferers are women (APA, 1994). Caucasians are more at risk than ethnic minorities (Cash & Henry, 1995). Also, the more affluent are at greater risk for developing anorexia nervosa than those that are less affluent (Allaz, Bernstein, Rouget, Archinard, & Morabia, 1998). Adolescents and young adults are also a high-risk group (APA). Certain personality characteristics are risk factors for anorexia nervosa. These include a need for approval, conscientiousness, high personal expectations, perfectionism, obsessionality, insecurity, self-denial, and being deferential to others (Garfinkle & Garner, 1982; Strober, 1986).

Most medical complications of anorexia nervosa are a direct result of weight loss, and these complications often return to normal with weight restoration (Costin, 1999). Anorexics have brittle nails, thinning hair, and yellow-tinged skin due to dehydration, nutrient deficiencies, and poor liver function (Walsh, Wheat, & Freund, 2000). They also experience a fine downy growth of hair on the face, back, and arms, known as lanugo. This hair aids in insulation (Rock, 1999). More serious complications of anorexia affect

the cardiovascular system, the hematological system, the endocrine system, and the gastrointestinal system. It has been shown that the time for food to move out of the stomach and into the intestines is slowed in individuals with anorexia nervosa. This is why anorexics may complain of early satiety and abdominal pain (Walsh et al., 2000). They may also experience constipation because of slow food transit time, poor colon reflex, inadequate food intake, and being sedentary (Costin). The cardiovascular system is affected by severe weight loss by thinning heart fibers which results in diminished cardiac capacity. Anorexics also have a slowed heart rate and low blood pressure that can be dangerous in combination with an arrhythmia (Rock). Anorexia also affects the hematological system, and causes anemia and a low white blood cell count, called leukopenia. The effects of anorexia on the endocrine system are amenorrhea and osteoporosis (e.g., deterioration of bone density; Otis, Drinkwater, Johnson, Loucks, & Wilmore, 1997).

Anorexics face a variety of psychosocial consequences as well. Their appearance determines their self-worth, and they are never satisfied with their body shape (APA, 1994). Anorexics may also display depression, social withdrawal, feelings of ineffectiveness, irritability, insomnia, and decreased interest in sex (APA). Such individuals may also meet the DSM-IV criteria for major depressive disorder (APA). Anorexia is also associated with concerns about eating in public, the need to control one's environment, inflexible thinking, and restrained initiative and emotional expression (APA).

Bulimia Nervosa

The following criteria must be present for a clinical diagnosis of bulimia nervosa (APA, 1994). First, there must be recurrent episodes of binge eating. Binge eating is

characterized by eating, in a discreet period of time, an amount of food that is greater than what most people would eat under similar circumstances. There is also a lack of control over eating during the episode. Second, there is inappropriate compensatory behavior to prevent weight gain (e.g., self-induced vomiting, fasting, misuse of laxative, diuretics, enemas). Third, the binge eating and compensatory behaviors must occur at least twice a week for three months. Fourth, there is body-image disturbance. Fifth, the behavior does not occur exclusively during episodes of anorexia nervosa.

There are two types of bulimia nervosa: purging-type and nonpurging-type. Purging-type bulimics engage in either self-induced vomiting or the misuse of laxatives, diuretics, or enemas. Nonpurging-type bulimics use other compensatory behaviors such as fasting or excessive exercise, but they do not regularly engage in self-induced vomiting or the misuse of laxatives, diuretics, or enemas. It is estimated that between 1.0% and 3.0% of the United States population suffers from bulimia nervosa, and women are at greatest risk than men (APA, 1994). The risk factors for bulimia nervosa are similar to those of anorexia nervosa.

The majority of the physical complications resulting from bulimia nervosa are a result of purging (e.g., self-induced vomiting, laxative abuse, and diuretic abuse). For example, sialadenosis, an early complication from self-induced vomiting, is a swelling of the parotid gland near the area between the jawbone and the neck. This can be reduced with the cessation of vomiting (Costin, 1999). The acid from self-induced vomiting also erodes the enamel on teeth, causes inflammation of the gums, and increases the incidence of dental cavities. The esophagus is also damaged by acid in the stomach during vomiting, and it can rupture during forceful vomiting (Walsh et al., 2000). Self-induced

vomiting also causes the following two electrolyte disorders: hypokalemia (low potassium) and alkalosis (high blood alkaline level). If severe enough, either of these disorders can result in cardiac arrhythmia, seizures, and muscle spasms (Rock, 1999). Laxative abuse can result in abdominal discomfort, constipation, and problems with fecal retention. If laxative abuse is severe enough, a colonectomy may be necessary (Costin). Diuretic abuse can result in electrolyte imbalance similar to that of vomiting, and it can also cause the development of lower leg edema (Walsh et al.).

The psychological features associated with bulimia include increased depression, low self-esteem, increased anxiety, social withdrawal, and anger. About one third of bulimics also suffer from substance abuse or dependence (APA, 1994).

Binge Eating Disorder

There are five criteria for binge eating disorder (APA, 1994). First, there are recurrent episodes of binge eating. Similar to bulimia nervosa, binge eating is the eating of an amount of food that is greater than what most people would eat under similar circumstances in a discreet period of time. There is also a lack of control over eating during the episode, such as a feeling that one cannot stop eating or control how much is eaten. Second, the binge eating episodes must be associated with three or more of the following: a) eating more rapidly than normal; b) eating until feeling uncomfortably full; c) eating large amounts of food when not feeling physically hungry; d) eating alone because of being embarrassed by how much one is eating; and e) feelings of disgust, depression, or guilt after overeating. Third, there is marked distress regarding binge eating. Fourth, the binge eating occurs, on average, at least two days a week for six months. Finally, the binge eating is not associated with the regular use of inappropriate

compensatory behaviors, and it does not occur during the course of either anorexia nervosa or bulimia nervosa.

It is estimated that 0.7% to 4.0% of the United States population suffers from binge eating disorder, with women being 1.5 times more likely to suffer from this disorder than men (APA, 1994). Individuals with binge eating disorder experience dietary disinhibition, excessive concern with body shape and thinness, and difficulty interpreting sensations related to hunger and satiety (Dingemans, Bruna, & van Furth, 2002). Individuals with binge eating disorder often experience varying degrees of obesity (APA). Obese individuals with binge eating disorder experience lower self-esteem and greater depressive symptomatology than obese people without binge eating disorder, and they are more likely to have become overweight at a younger age and to have made more failed weight-loss attempts (Dingemans et al., 2002). The shame associated with binge eating and resulting weight gain can lead to negative self-evaluation and depressive symptoms (Dingemans et al.).

Eating Disorders Not Otherwise Specified (EDNOS)

The category of eating disorders not otherwise specified is used to diagnose syndromes that resemble anorexia nervosa or bulimia nervosa, but are either missing an essential feature or the symptoms are not of the required frequency (APA, 1994). Although these individuals do not meet the full diagnostic criteria for either anorexia nervosa or bulimia nervosa, they often experience the same physiological and psychological disturbances as those suffering from anorexia nervosa or bulimia nervosa (APA). Descriptions of the EDNOS categories are listed in Table 1-1.

Table 1-1. Eating Disorders Not Otherwise Specified Categories.

Category	Description of Disorder
Subthreshold bulimia	All other criteria for bulimia nervosa are met except that episodes are less frequent than twice per week or of a duration of less than three months
Nonbinging bulimia	All other criteria for bulimia nervosa are met except that no binge eating is evident. Instead, inappropriate compensatory behavior occurs after eating small or normal amounts of food
Menstruating anorexia	All other criteria for anorexia nervosa are met except that regular menses occurs
Normal weight anorexia	All other criteria for anorexia nervosa are met except that weight is not 15% less than that expected for age and height

Measurement of Eating Disorders

A number of self-report questionnaires have been developed to assess eating disorder symptoms in clinical and nonclinical populations. The most commonly used measures are the Eating Attitudes Test (Garner & Garfinkle, 1979), the Eating Disorder Inventory-2 (Garner, 1991; Garner et al., 1983), and the Bulimia Test-Revised (Smith & Thelen, 1984; Thelen et al., 1991). These measures are often applied to athlete populations (Hausenblas & Carron 1999; Petrie, 1993; Smolak et al., 2000). The Eating Attitudes Test is used to assess anorexic symptomatology, and the Eating Disorder Inventory assesses cognitions and behaviors associated with eating disorders. Finally, the Bulimia Test is used to assess bulimic symptomatology. Each of these tests is described in more detail below.

Eating Attitudes Test (EAT)

Garner and Garfinkle (1979) developed the Eating Attitudes Test-40, which contains 40 items, to examine attitudes and beliefs associated with anorexia nervosa.

Garner, Olmstead, Bohr, and Garfinkle (1982) revised the scale through factor analysis to create the Eating Attitudes Test-26. The revised version eliminated 14 redundant items while maintaining a high correlation ($r = .98$) with the original version. The shortened version allows for easier administration than the long version. A cut-off score of 20 for the Eating Attitudes Test-26 and 30 for the Eating Attitudes Test-40 is used to differentiate eating disorder prone individuals from nondisordered eaters.

Although the Eating Attitudes Test is frequently used, there are several scale limitations. First, the distinct cut-off fails to account for a continuum of eating concerns. For example, a person scoring one point below the cut-off is considered the same as someone scoring at the bottom of the nondisordered range (Mintz, O'Holloran, Mulholland, & Schneifer, 1997). Second, although the Eating Attitudes Test differentiates anorexic individuals from a nonclinical sample, it does not distinguish between anorexics and bulimics (Williamson, Anderson, Jackman, & Jackson, 1995). Third, the Eating Attitudes Test often incorrectly classifies eating disordered and normal individuals (Williamson et al., 1995). Although this measure identifies attitudes and beliefs associated with anorexia, it does not address some of the eating disorder behaviors that are diagnostic criteria. Thus, the Eating Attitudes Test cannot be used to make an eating disorder diagnosis (Schlundt & Johnson, 1990). Finally, the psychometric properties of the scale have been questioned, especially when used with men (Hausenblas, 1998).

Eating Disorder Inventory (EDI)

The most widely used measure for eating disorder research is the Eating Disorder Inventory (Garner, 1991; Garner et al., 1983). This multidimensional scale has two versions, the 64-item Eating Disorder Inventory (Garner et al.) and the 91-item Eating

Disorder Inventory-2 (Garner). The original Eating Disorder Inventory contains eight subscales that assess attitudinal, behavioral, and psychological correlates of eating disorders. The Drive for Thinness, Bulimia, and Body Dissatisfaction subscales examine behaviors and attitudes towards eating, body shape, and weight. The Ineffectiveness, Perfectionism, Interpersonal Distrust, Interoceptive Awareness, and Maturity Fears subscales measure general psychological characteristics relevant to individuals with eating disorders. Researchers often use only a few of the subscales to tailor their measures to what they are examining (Garner).

The Eating Disorder Inventory has been validated in clinical and nonclinical samples. The inventory distinguishes between eating disordered and nondisordered individuals (Williamson et al., 1995). The multidimensional nature of the scale accounts for a wide range of symptoms, including cognitions and behaviors associated with eating disorders. Although some of the DSM-IV diagnostic criteria for eating disorders are addressed (e.g., body image disturbance and fear of weight gain), this measure cannot be used to diagnose eating disorders. It may, however, serve as an effective screening tool (Williamson et al.).

In addition to the original eight subscales, the Eating Disorder Inventory-2 contains three provisional subscales: Asceticism, Impulse Regulation, and Social Insecurity. These provisional constructs are not as well validated; however, they have adequate internal consistency and add to the attitudinal and behavioral profile for eating disordered individuals. The Eating Disorder Inventory-2 provides predictive validity similar to the Eating Disorder Inventory.

The Bulimia Test

Smith and Thelen (1984) developed the Bulimia Test to measure thoughts, feelings, and behaviors associated with bulimia nervosa. The items were derived from the DSM-III diagnostic criteria for bulimia nervosa. Thelen, Farmer, Wonderlich, and Smith (1991) updated this scale to create the Bulimia Test-Revised. This revised version is based on the DSM-III-R diagnostic criteria, but also diagnoses bulimic individuals according to the DSM-IV criteria (Thelen, Mintz, & Bowman, 1996). The Bulimia Test-Revised effectively discriminates bulimic and nonclinical samples. However, this scale cannot be used to assess other types of eating disorders. The Bulimia Test-Revised has adequate internal consistency ($r = .97$) and high test-retest reliability ($r = .95$; Thelen et al., 1991). Williamson et al. (1995), however, reported an unstable factor structure and a high false-negative rate for this instrument.

Athletes and Eating Disorders

There are three popular explanations linking athletes and eating disorders (Hausenblas & Carron, 1999). The first explanation is that intra-individual characteristics that are evident in eating disorder patients (e.g., social physique anxiety, perfectionism, and body image disturbance) are also characteristics evident in athletes; thus placing certain individuals at high risk for disordered eating. The second explanation is that social influences inherent in sport (e.g., coaches, family, team members) may lead athletes to develop eating disorders. The third explanation is that participation in certain sports (e.g., aesthetic sports) may lead to disordered eating because of the sport-specific pressures the athletes face. Each of these explanations will be described in more detail below.

Intra-Individual Characteristics

One possible explanation linking athletes and eating disorders proposes that athletes who have characteristics evident in eating disorder patients (e.g., social physique anxiety, perfectionism, and body image disturbance) may be predisposed to develop an eating disorder (Hausenblas & Carron, 1999). Some of the strongest support for this explanation has been found for the following general characteristics: perfectionism, body image, and anxiety about the physique (Garner, Rosen, & Barry, 1998; Thompson & Sherman, 1999b).

Perfectionism

Perfectionism has consistently been linked to the development of disordered eating in clinical populations (Garner, 1983). For example, anorexic patients have high levels of perfectionism (Garner). Similarly, Halmi et al. (2000) found that anorexics had higher perfectionism scores than a healthy comparison group. Tyrka, Waldron, Graber, and Brooks-Gunn (2002) found that perfectionism was a strong predictor of anorexic syndromes in young adults. Similar results have been found with athletic populations (Fulkerson, Keel, Leon, & Dorr, 1999; Thompson & Sherman, 1999b). For example, Fulkerson et al. found that female athletes who had high perfectionism scores also had higher drive for thinness scores and had trouble discerning bodily states, all of which are characteristics of people with eating disorders.

Recent research has found that perfectionism is multidimensional in nature with adaptive and maladaptive dimensions, often referred to as normal or positive and neurotic or negative (Davis, 1997; Haase, Prapavessis, & Owens, 2002; Terry-Short, Owens, Slade, & Dewey, 1995). Adaptive perfectionism is associated with high strivings and feelings of achievement while maladaptive perfectionism is associated with impossibly

high personal standards and an intense need to avoid failure (Davis). Terry-Short et al. (1995) found that eating disordered individuals had high positive and negative perfectionism scores, while athletes reported low levels of negative perfectionism and high levels of positive perfectionism similar to that of the eating disordered individuals. Haase et al. (2002) found a positive correlation between negative perfectionism and social physique anxiety among elite athletes, while positive perfectionism was unrelated to social physique anxiety. Female athletes with higher social physique anxiety scores and higher levels of negative perfectionism report greater disturbed eating attitudes (Haase et al.). These results indicate that athletes that have high levels of perfectionism, specifically negative perfectionism, may be more at risk for disordered eating than those athletes with lower levels of perfectionism.

Body-image disturbance

Body-image disturbance is a diagnostic criterion for eating disorders (APA, 1994). Research with athletes has also found support that body image disturbance is positively related to eating disorders (Berry & Howe, 2000; Hausenblas & Symons Downs, 2001). For example, Berry and Howe found that body-image disturbance was positively correlated with and predicted eating disorder symptoms in female athletes. Williamson et al. (1995) found similar results in that body image was a strong primary predictor for eating disorder symptoms among female athletes.

In a meta-analytic review, Hausenblas and Symons Downs (2001) found that athletes have a more positive body image than nonathletes. Furthermore when examining across sport types, aesthetic, endurance, and weight-dependent sports did not differ in body image. Also, college athletes have a more positive body image than club or recreational athletes (Hausenblas & Symons Downs). Although the meta-analysis

examined body image and sport, it did not investigate the relationship between body image and eating disorders. It appears that although body image disturbance is positively related to disordered eating symptoms, athletes tend to have better body image than nonathletes. Perhaps sport improves body image for those athletes who are not psychologically predisposed to have body-image disturbance.

Social physique anxiety

The anxiety one feels at the thought of having her physique evaluated socially is called social physique anxiety (Hart, Leary, & Rejeski, 1989). Although social physique anxiety and pathological eating are independent constructs, the two could be related due to their close parallels (Haase et al., 2002). Social physique anxiety is positively correlated with disordered eating (Cox, Lantz, & Mayhew, 1997) and negative perfectionism (Haase et al.). Athletes and nonathletes often have similarly high levels of social physique anxiety (Cox et al., 1997).

Haase and Prapavessis (1998) examined the relationship between social physique anxiety and disordered eating attitudes in a university population. They found that social physique anxiety and abnormal eating attitudes were positively correlated. They also found that as social physique anxiety scores increased and BMI scores decreased, participants reported less healthy eating attitudes. The same was true for eating attitudes when social physique anxiety scores decreased and BMI increased (Haase & Prapavessis).

Social physique anxiety has also been examined in athletic populations. Krane et al. (2001) examined the social physique anxiety levels of athletes with different types of uniforms: baggy, revealing, or mixed and exercisers. There was no difference in social physique anxiety among the different uniform types and exercisers. However, body

dissatisfaction and drive for thinness were the strongest predictors for social physique anxiety for both exercisers and athletes (Krane et al.). Similarly, Cox et al. (1997) found that social physique anxiety was the major predictor of disordered eating behavior, and the combination of social physique anxiety, % body fat, and gender accounted for about one third of the variance in eating behavior. However, they found no differences in social physique anxiety between athletes and nonathletes (Cox et al.).

Finally, a study by Hausenblas and Mack (1999) found that divers reported lower social physique anxiety scores than the athletic control group (i.e., lacrosse, volleyball, & soccer) and nonathletes. They also found no differences among the groups in regards to disordered eating correlates. The results of this study indicate that neither sports in general nor participation in one particular sport lead to social physique anxiety or disordered eating.

It appears that social physique anxiety is positively related to other disordered eating correlates. Also, athletes who have high levels of social physique anxiety appear to be more at risk for disordered eating symptoms than athletes who have lower levels of social physique anxiety.

Social Influences

A second explanation linking athletes and eating disorders proposes that it is the influence of an athlete's social setting that can lead them to develop disordered eating. Coaches, peers, family, and a judged environment have all been shown to have a significant effect on disordered eating symptoms. For example, Zucker et al. (2001) found that participants in judged sports had a greater drive for thinness and a higher trend for eating disorder diagnosis than participants in refereed sports or nonathletes, indicating that a subjective evaluation environment may be a potential risk factor for disordered

eating. Also, Berry and Howe (2000) found that restrained eating was predicted by societal pressure from coaches and peers. Similarly, Rosen and Hough (1988) found that 75% of female gymnasts who were told by their coaches that they were overweight began using unhealthy weight control methods. Williamson et al. (1995) found that social pressure for thinness from coaches and peers, mediated by over concern with body size, was a risk factor for developing disordered eating symptoms. Sundgot-Borgen (1994) found that a significant number of athletes reported that due to the recommendations of a coach, they were dieting to improve performance. Griffin and Harris (1996) found that the majority of coaches studied had negative attitudes towards overweight people, lacked knowledge about healthy weight loss methods, and determined if an athlete needed to lose weight mainly through visual observations rather than objective measures. This indicates that a coach's subjective evaluation of an athlete's body could result in unhealthy dieting. In a study that examined gymnasts, Fender-Scarr (1999) found that negative comments from the coach concerning the gymnast's appearance were positively correlated with eating disorder symptoms. She also found that pressure from the family to do well in the sport was positively correlated with disordered eating (Fender-Scarr). Similarly, Byely, Archibald, Graber, and Brooks-Gunn (2000) found that in nonathletic populations, mothers who perceived their daughters as heavy acted on these perceptions and negatively influenced the body image and dieting habits of their daughters.

Sport Participation

In an attempt to determine if sport participation leads to disordered eating, researchers have often examined if athletes are at greater risk for developing eating disorders than nonathletes. This research, however, is equivocal. That is, some studies have found that athletes are at greater risk than nonathletes (Davis, 1992; Hausenblas &

Carron, 1999; Smolak et al., 2000; Sundgot-Borgen, 1993), some have found athletes are less at risk (DiBartolo & Shaffer, 2002; Hausenblas & Symons Downs, 2001; Kirk, Singh, & Getz, 2001; Kurtzman, Yager, Landsverk, Wiesmeier & Bodurka, 1989; Petrie, 1996; Snyder & Kivlin, 1975; Wilkins, Boland, & Albinson, 1991; Zucker, Womble, Williamson, & Perrin, 2001), and some have found no difference between the two groups (Ashley, Smith, Robinson, & Richardson, 1996; Fulkerson et al., 1999; Hausenblas & Carron, 1999; Krane et al., 2001; Taub & Blinde, 1994; Warren, Stanton, & Blessing, 1990). Examples of each of these groups are provided below.

Studies finding no group differences for eating disorders

Warren, Stanton, and Blessing (1990) found no differences between Division I collegiate athletes and nonathletic controls on the Eating Disorder Inventory subscales or on the Eating Attitudes Test. Ashley et al. found similar results in that athletes involved in lean sports, other sports and controls did not differ with regard to scores on the Eating Disorder Inventory-2 subscales. Similarly, Taub and Blinde (1994) found that high school female athletes, nonathletes, and performance squad members did not have differing disordered eating patterns or pathogenic weight control usage. Fulkerson et al. (1999) found no difference in level of risk between high school athletes and nonathletes for developing eating disorders. Specifically, no significant differences were found between the two groups for the Bulimia, Drive for Thinness, Body Dissatisfaction, and Perfectionism subscales of the Eating Disorder Inventory. Krane et al. (2001) found similar results. Their study compared exercisers and athletes with different types of uniforms (revealing, baggy, and mixed). No differences between the groups were found in body dissatisfaction, drive for thinness, bulimia, and social physique anxiety. Harris and Greco (1990) found that collegiate gymnasts used pathological weight control

measures less often than previously studied samples, and their scores on the Eating Disorder Inventory did not differ from norms for adolescent girls. Finally, a meta-analysis found that female athletes and nonathletes did not differ on drive for thinness, which is the cardinal feature of an eating disorder (Hausenblas & Carron, 1999).

Studies finding athletes at less risk for eating disorders

One study found that of the several subgroups examined, athletes reported the lowest frequency of bulimic and anorexic symptomatology (Kurtzman et al., 1989). Athletes also reported the highest desired weights and had the lowest ineffectiveness scores of all the groups (Kurtzman et al.). Zucker, Womble, Williamson, and Perrin (2001) found that participants in refereed sports reported lower drive for thinness scores than participants in judged sports and nonathletes. Participants in refereed sports also had less concern about body size and shape than participants in judged sports and nonathletes (Zucker et al., 2001). Similarly, in another study, female nonathletes had higher scores on the Eating Attitudes Test than female athletes (Kirk et al., 2001). Petrie (1996) found that nonathletes had greater body dissatisfaction than athletes, and had higher perceived ineffectiveness scores. Athletes were found to be more satisfied with their bodies, and to feel more worthwhile, effective, and in control of their lives (Petrie). In a study comparing male and female athletes and nonathletes, the athletic sample had significantly lower levels of pathological eating behaviors and attitudes (Wilkins et al., 1991). The same study found that athletes were less likely to perceive themselves as overweight, less likely to rely on dieting, to exhibit higher self-esteem and to have a more positive body image (Wilkins et al.). Athletes have also reported less body-image disturbance and fewer eating disorder symptoms than nonathletes (DiBartolo & Shaffer, 2002; Fulkerson et al., 1999; Snyder & Kivlin, 1975).

A meta-analysis examining the body image of athletes and nonathletes found that although the effect size was small, athletes tended to have a more positive body image than controls (Hausenblas & Symons Downs, 2001). Aesthetic, ball game, and endurance sports did not differ from each other. When compared to the control group, college athletes had more positive body image than club/recreational athletes (Hausenblas & Symons Downs).

Studies finding athletes at greater risk for eating disorders

Some studies have found that athletes are at greater risk for developing eating disorders than nonathletes. For example, Davis (1992) found that high performance athletes had a greater degree of abnormal dieting behavior and greater concern with body weight than nonathletes. She also found that even though more athletes than nonathletes were underweight, the athletes were dissatisfied with their bodies, were dieting, and wanted to be thinner than the nonathletes did. Finally, she found that excessive weight preoccupation was most common in gymnasts and synchronized swimmers. Sundgot-Borgen (1993) found that although there was no significant difference between athletes and nonathletes classified as at risk for eating disorders, when interviewed, significantly more athletes than nonathletes were found to have an eating disorder. More specifically, athletes participating in sports in which leanness was considered important were more likely to develop eating disorders than both nonathletes and athletes competing in sports in which leanness was considered less important.

In a meta-analysis examining female athletes and eating problems, Smolak, Murnen, and Ruble (2000) found that athletes were more at risk for developing eating disorders than nonathletes were, although the effect was small. They also found that certain groups of athletes were at greater risk than nonathletes, including: college women,

elite athletes, lean sport athletes, and elite lean sport athletes (Smolak et al., 2000). In another meta-analysis, Hausenblas and Carron (1999) showed that female athletes self-reported more bulimic and anorexic symptomatology than nonathletes, and that female athletes participating in aesthetic sports were at the greatest risk for developing eating disorders.

Comparison of sport type

Comparing athletes and nonathletes has not provided clear results, as seen in the equivocality of the research investigating the relationship between eating disorders and athletes. A major difficulty researchers face is having enough athletes from a single sport to achieve sufficient power. Because of this, different sports are often grouped together based on similar characteristics. One common classification system compares sports in which a specific weight is demanded or thinness and appearance are emphasized (lean sports) with sports in which thinness and appearance are not overly important (nonlean sports; Petrie, 1996). Lean sports include diving, cross-country running, gymnastics, wrestling, and figure skating. Nonlean sports include volleyball, softball, track and field, tennis, and fencing. Researchers have found a tendency for women involved in lean sports to be at greater risk for developing an eating disorder than women in nonlean sports (Petrie; Picard, 1999; Smolak et al., 2000). For example, Petrie found that female lean sport athletes were more concerned with dieting and more preoccupied with their weight than both nonlean sport athletes and nonathletes. Also more specifically, Picard found that female lean sport athletes reported significantly higher scores on the Eating Attitudes Test than nonlean sport athletes and nonathletic controls. Lean sport athletes also indicated all the signs and symptoms of eating disorder patients including self-discipline, control, and denial (Picard, 1999). Similarly, Smolak and colleagues (2000) in

a meta-analytic review found that cheerleaders and dancers were at greater risk than nonlean sport athletes, while swimmers and gymnasts were not. In fact, in this study, gymnasts were slightly less at risk than other lean sport athletes. Because the sport specific demands vary among lean sports, more specific research categories are necessary when examining eating disorders and athletes.

Some researchers (Davison, Earnest, & Birch, 2002; Hausenblas & Carron, 1999; Sundgot-Borgen & Larsen, 1993) have used a six-category breakdown of sports.

Aesthetic sports are those in which appearance plays a role in determining performance excellence, such as gymnastics, figure skating, and diving. Endurance sports, such as swimming and cross-country running, are distance sports in which body size affects performance. Ball game sports use a ball in play, and include basketball, soccer, and baseball. Weight-dependent sports are those in which specific weight limits or categories are used; for example, wrestling or lightweight rowing. Physical strength is the main component of power sports, which include shot put, sprinting, and power lifting. Technical sports are those in which skill, rather than physical ability is necessary; for example, shooting or billiards (Hausenblas & Carron).

Much research has investigated the prevalence of disordered eating in aesthetic sports, of which gymnastics is part. For example, Stoutjesdyk and Jevne (1993) examined high performance athletes participating in aesthetic, weight-dependent, and nonweight-dependent sports, and they found that athletes in aesthetic and weight-dependent sports scored higher on the Eating Attitudes Test than the athletes in nonweight-dependent sports did. Sundgot-Borgen (1993) found that athletes in aesthetic, weight dependent, and endurance sports had the highest frequency of pathogenic weight control methods.

Davison and colleagues (2002) found that female athletes involved in aesthetic sports had higher weight concern at age five and seven than athletes in other types of sports.

Aesthetic sport athletes have also been found to be more weight preoccupied than other athletes (Petrie, 1996). Research has also found that athletes participating in aesthetic sports have a higher prevalence of eating disorders than athletes participating in other sports (Sundgot-Borgen, 1994) and have higher scores on eating disorder inventories than other types of sports (Beals & Manore, 2002). For example, in a meta-analysis, Hausenblas and Carron (1999) found that women participating in aesthetic sports self-reported more anorexic symptomatology and had a higher drive for thinness than women participating in other sport types. That is, aesthetic sport athletes were at greater risk for developing eating disorders than athletes in other sports.

Gymnastics

Research examining eating pathologies with gymnastics is equivocal. For example, Rosen and Hough (1988) studied 42 gymnasts, and they found that all the gymnasts were dieting and over half had used at least one form of pathogenic weight-control (e.g., self-induced vomiting, laxatives, etc.). Petrie (1993) found that of the 215 gymnasts surveyed, 58% met the criteria for an intermediate disordered eating category and only 22% of the gymnasts had normal eating behaviors. O'Connor and colleagues (1995) found that more gymnasts than athletic controls reported an absence of a menstrual period for three or more months, which is a possible indicator of amenorrhea. However, Smolak et al. (2000), in a review of the literature, found that gymnasts were no different than nonathletes with respect to eating problems. Similarly, Harris and Greco (1990) found that the Eating Disorder Inventory scores for collegiate gymnasts were not significantly different than norms for adolescent girls. In summary, it appears that

overall, gymnasts may be at high risk for developing disordered eating, however, the research examining whether or not they are at greater risk than athletes participating in other types of sports is dated and inconsistent. Thus, further research examining eating disorders in gymnasts is warranted.

Research Limitations

There are several limitations to the literature linking athletes and eating disorders that reduce the generalizability of the results and the potential for comparison across studies. First, a limitation is the failure to include an appropriate control group (Smolak et al., 2000). A control sample that is matched for gender and age is necessary to attribute group differences to the grouping variables (Ashley et al., 1996). Without a control group there is no point of reference to compare the results of the testing group with. Second, there is a lack of standardized eating disorder measures used. Eating disorder scales measure different aspects of the disorders, so an accurate comparison of symptomatology between studies using different measures is difficult (Hausenblas & Carron, 1999). A third limitation is combining different levels of sport. For example, it cannot be assumed that elite athletes are comparable to athletes of other levels (Picard, 1999; Reel & Gill, 1996). Elite athletes' training regimens, coaching situations, competition experiences, etc. may be different from those of athletes of different levels (Smolak et al., 2000). For example, Picard found that Division I and Division III collegiate athletes were significantly different from each other, and Division I athletes were at greater risk for eating disorders than Division III athletes. Arbitrarily comparing different levels with no supporting research provides confounding results.

Fourth, the sport classification systems used to group sport-types together lack consistency in both terminology and category criteria. This makes comparisons among

categories from separate studies difficult (Hausenblas & Carron, 2002). There is also little theoretical basis for the category breakdowns, and arbitrarily placing sports in categories may not reveal useful or valid results (Hausenblas & Carron). Also, most classification systems do not take into account sport-specific demands. For example, figure skating and wrestling are often placed in the same category because of the importance both sports place on thinness. However, wrestlers try to “make weight” while figure skaters try to look appealing. To overcome the limitations of the sport classification systems, Hausenblas and Carron recommended examining large samples of individual sports as opposed to combining small samples of multiple sports. They note however, that it is a challenge for researchers to have a large enough sample size of a single sport.

A fifth limitation of the literature is that few researchers have examined differences in eating disorder symptomatology longitudinally (Hausenblas & Carron, 1999). If athletes that are predisposed to developing eating disorders gravitate towards certain types of sports then the disordered eating behavior should not vary throughout the year. However, if participation in certain sports causes disordered eating, then the time at which measures are taken is important. For example, disordered eating may increase from the off-season to the competitive season because athletes may feel more pressure to be thin and win, especially before competitions.

Only one study has investigated eating behaviors in athletes longitudinally. Dale and Landers (1999) examined the eating behaviors of junior high and high school wrestlers during the season versus the off-season. The disordered eating behavior was examined once during the season and once during the off-season. No differences were

found in the number of in-season wrestlers and nonwrestlers classified as “at risk” for bulimia. However, the in-season wrestlers had significantly higher Drive For Thinness scores than the nonwrestlers. Also, during the in-season the wrestlers reported higher Drive for Thinness than during the off-season. These results indicate that wrestlers were at risk for an eating disorder during the in-season, but were no different than controls during the off-season. It is possible that the wrestling season is a risk factor for the development of disordered eating symptoms, and if this is true, the same could be possible for the competitive seasons of other sports.

Finally, a significant problem researchers face when using self-report measures is the accuracy and honesty of the participant’s responses. Several researchers have identified this as a problem when using measures of disordered eating (O’Connor et al., 1995; Sundgot-Borgen, 1993; Wilmore, 1991). Although women have been shown to lie on self-report measures of disordered eating, they tend to underreport symptoms rather than over report eating disorder symptoms (Berry et al., 2000; Johnson et al., 1999; Wilmore). This is problematic because it makes it very difficult to get an accurate representation of the prevalence and severity of disordered eating among female populations. To maximize honest responses, participants should be informed that: a) their responses are anonymous, b) no identifying information will be requested of them, c) their coaches, trainers, etc. will not have access to their responses (Johnson et al.; Wilmore).

In general, sport participation for women is positive. However, there appear to be certain types of sports or sport environments in which disordered eating symptoms may be prevalent. Women participating in lean, aesthetic, weight dependent, and endurance

sports appear to be at greater risk for developing disordered eating symptoms than other types of sports. Whether or not athletes participating in the sport of gymnastics are at greater risk than other lean sports has yet to be determined due to the equivocal research. This study seeks to add to the literature by eliminating some of the methodological concerns of previous research.

CHAPTER 3 METHOD

Participants

Participants were 102 female Division I collegiate gymnasts and 111 female collegiate nonathletic controls. Only Division I programs were selected to control for the moderating effect of competitive level on eating disorder symptoms in athletes (Picard, 1999). The gymnasts were uninjured actively competitive members of their team, while the nonathletic controls were recruited from physical activity courses and were not members of a competitive athletic team.

Measures

Demographic Questionnaire for Athletes

The Demographic Questionnaire for Athletes assessed the following information: age, height, current weight, ideal weight, race, year in school, socioeconomic status, the number of hours per week they trained in the gym, the number of hours per week they spent training outside the gym, and the number of years they had participated in gymnastics (see Appendix A). The athletes also indicated what type of scholarship they had, what events they usually competed on, and their level of competition before and during their competitive collegiate experience. The Time 2 questionnaire also included questions assessing the gymnasts' injury history throughout the season (See Appendix B). Content validity was established in two ways. First, this questionnaire was compared to demographic questionnaires used in previous studies on eating disorders and athletes.

Second, three health sciences experts examined the questionnaire for comprehension and readability.

Demographic Questionnaire for Nonathletes

The Demographic Questionnaire for Nonathletes was the same for Time 1 and Time 2 and assessed the following information: age, height, current weight, ideal weight, race, year in school, and socioeconomic status (see Appendix C). Nonathletes indicated whether they were currently either members of a varsity athletic team or a competitive athletic team. If they answered yes to either of these questions, they then indicated what team they were on. Nonathletes also indicated if they had ever been members of a competitive athletic team. If they answered yes, they indicated what team they had been on, the dates of participation, and the highest level of competition. Those who indicated they were current members of a competitive sport team were not included in the analysis. The identical protocol for the Athlete Questionnaire was used to establish content validity for the Nonathlete Questionnaire.

Drive for Thinness Subscale

The Drive for Thinness subscale of the Eating Disorder Inventory-2 (Garner, 1991) assesses extreme concern with dieting and fear of weight gain, which are the cardinal features of an eating disorder (see Appendix D). Each item is answered on a six-point Likert scale anchored at each end by never (1) and always (6). Scores are determined by summing the items composing this subscale. A higher score is indicative of increased disordered eating symptomatology, and a score of 14 or greater indicates that the individual is at high risk for an eating disorder (Garner). Items include, “I feel extremely guilty after overeating” and “I am preoccupied with the desire to be thinner”. The Drive For Thinness subscale has adequate reliability and validity (Garner).

Body Dissatisfaction Subscale

The Body Dissatisfaction Subscale of the Eating Disorder Inventory-2 (Garner, 1991) assesses dissatisfaction with the size and shape of specific body parts (e.g., hips, buttocks; see Appendix E). This subscale includes statements such as “I think that my thighs are just the right size” and “I feel satisfied with the shape of my body”. Each item is answered on a six point Likert scale anchored at each end by never (1) and always (6). Scores are determined by summing the items composing the subscale. A higher score indicates high body dissatisfaction (Garner). This subscale has adequate reliability and validity (Garner).

Perfectionism Subscale

The Perfectionism Subscale of the Eating Disorder Inventory-2 (Garner, 1991) assesses the extent to which one believes his or her achievements must be superior and the belief that others expect superior achievement (see Appendix F). Items include statements such as, “I hate being less than the best at things” and “I feel that I must do things perfectly or not do them at all”. Each item is answered on a six-point Likert scale anchored at each end by never (1) and always (6). Scores are determined by summing the items composing the subscale. A higher score indicates high perfectionistic tendencies (Garner). The reliability and validity of the Perfectionism subscale is adequate (Garner).

Social Physique Anxiety Scale

The Social Physique Anxiety Scale is a nine-item self-report instrument (Martin, Rejeski, Leary, McAuley & Bane, 1997) that measures self-presentational anxiety related to the physique (see Appendix G; Hart, Leary & Rejeski, 1989). Participants indicate the degree to which statements like “Unattractive features of my physique/ figure make me nervous in this social setting” and “I wish I wasn’t so uptight about my physique/ figure”

are characteristic of them. Each item is answered on a five-point Likert scale anchored at each end by “not at all characteristic (1)” and “extremely characteristic (6)”. A total score is determined by summing the responses. A high score is indicative of high social physique anxiety. This validity and reliability of the Social Physique Anxiety Scale is adequate (Martin et al., 1997).

Procedure

Data Collection

Athletes

Athletes were recruited from seven United States universities (See Appendix H). The researcher contacted 30 Division I gymnastics coaches, seven of whom agreed to participate, and explained the rationale and protocol for the study. Coaches were informed that the study examined how athletes’ self-perceptions and nutritional attitudes changed over the season, and that the participants would be asked to spend 10-15 minutes completing a questionnaire packet at the following two times: October 2002 and March 2003. The packet included the Demographic Questionnaire For Athletes, the Drive for Thinness Subscale, the Body Dissatisfaction Subscale, the Perfectionism Subscale, and the Social Physique Anxiety Scale, which were all contained in an envelope that could be sealed. There were two methods of data collection: 1) direct administration or 2) mail administration.

Athletes who completed the study via direct administration were given the Informed Consent (see Appendix I) and the questionnaire packet either individually or in small groups. Before being given the packet, each participant signed the consent form. To be able to match the participants’ first set of data with their second set, participants were assigned a code number based on their birth date and the last four digits of their social

security number. No other identifying information was requested. Participants placed their completed questionnaires in the envelope and sealed it before returning it to the researcher.

For those athletes who completed the study by mail, the researcher sent packets, including instructions (See Appendix J) to a team contact (not a coach). The contact person administered the packets in the same manner as described previously. That is, the informed consent forms were signed and collected before giving out the questionnaires. The mail-based questionnaire packets came in envelopes as well. Participants were instructed to place the completed questionnaires in the envelopes, seal them, and return them to the contact person. The contact person mailed the signed consent forms, the sealed completed questionnaires, and any unused questionnaires back to the researcher in self-addressed stamped envelopes that were provided.

Data collection was undertaken during the following two times: once during the preseason between October 20 and November 1, 2002 and once during the competitive season between March 7 and March 21, 2003. Collecting the data during the specified two weeks ensured that all data were collected at similar points during the season. All data collection procedures were intended to ensure the confidentiality and anonymity of all participants. Participants were informed that coaches, parents, and teammates would not have access to their information.

Nonathletes

The nonathletes were recruited from physical activity courses at the University of Florida. Students were given course extra credit for participating. Class instructors administered consent forms and questionnaire packets to their classes. The packet included the Demographic Questionnaire For Nonathletes, the Drive for Thinness

Subscale, the Body Dissatisfaction Subscale, the Perfectionism Subscale, and the Social Physique Anxiety Scale. Data collection procedures were identical to the direct administration procedures used for athletes, including the assignment of a numeric code. Participants were asked to provide their e-mail address on the consent form, which was kept separate from the questionnaires, in order for the researcher to contact them for the second questionnaire administration. Data for nonathletes were collected during the same time periods as the athletes. The first time was between October 20 and November 1, 2002 and the second time was between March 7 and March 21, 2003.

Techniques to Increase Response Rate

According to Ransdell (1996) there are four strategies that researchers should use to increase participant's response rate. These strategies are: 1) to increase perceived personalization; 2) to gain commitment towards the purpose of the study; 3) to build trust in the researcher; and 4) to follow up initial contact (Ransdell, 1996). In order to increase perceived personalization by the participants I followed Ransdell's (1996) suggestions and used stamps rather than bulk mailing, ink signature on consent forms as opposed to Xeroxed signature, I included a cover letter to each contact person, and I sent "thank-you" emails to all athletic contacts and nonathletic participants. In order to gain participants' commitment to the study I notified coaches of the study before they agreed to participate, I set cut-off dates for the return of all questionnaires, and I made certain that the questionnaire was brief. To inspire trust in the researcher, I made it clear that the study is sponsored by the university by including the IRB approval number on the consent forms, and I included my advisor's contact information as well as my own. Finally I followed up with all participants using email reminders as needed.

I also employed specific data collection techniques to improve the honesty of responses. All participants were assured that even though the study was longitudinal, the only way they would be identified would be by a number. I also emphasized confidentiality by informing participants that coaches, parents, trainers, and teammates would not have access to their responses. In most cases, questionnaires were completed and then immediately sealed in an envelope to be returned to the researcher.

Data Analysis

Prior to examination of the hypotheses, the internal consistency reliability and descriptive statistics of the study measures were determined.

Drive For Thinness, Body Dissatisfaction, and Perfectionism Subscales

A power analysis indicated that 60 participants per level were needed to achieve a moderate effect size for the analysis (Cohen, 1992). A 2(group: gymnast, nonathlete) x 2(time: preseason, in-season) repeated measures multivariate analysis of variance (i.e., MANOVA) was conducted for the dependent variables Drive For Thinness, Body Dissatisfaction, and Perfectionism subscales (Garner, 1991). The independent variables were group (gymnast, nonathlete) and time (preseason, in-season). Prior to conducting this analysis, the data were examined to ensure they met the appropriate statistical assumptions. The assumptions for repeated measures MANOVA are: 1) data must be randomly sampled and independent, 2) each group must be normally distributed, 3) variance for each dependent variable must be homogeneous, 4) no outliers exist in the data set, and 5) sphericity (i.e., the variances of differences between any two measurements within a subject are constant; Grimm & Yarnold, 1995). The first assumption is an experimental design error, and it was not violated. If violations did

occur for assumptions two, three, four, or five, then appropriate techniques were used to control for this.

Social Physique Anxiety Scale

A 2(group: gymnast, nonathlete) x 2(time: preseason, in-season) repeated measures analysis of variance (i.e., ANOVA) was conducted for the Social Physique Anxiety Scale. The independent variables for this study were group (gymnast, nonathlete) and time (preseason, in-season). The dependent variable was the social physique anxiety score. Prior to conducting the analysis, the data were examined to ensure they met the appropriate statistical assumptions. The assumptions for repeated measures ANOVA are: 1) observations are independent, 2) the population is normally distributed, 3) covariances are equivalent, 4) variance is homogeneous, and 5) sphericity (i.e., the variances of differences between any two measurements within a subject are constant; Grimm & Yarnold, 1995). The first assumption is an experimental design error, and it was not violated. If violations did occur for assumptions two, three, four, and five, appropriate techniques to control for this were used.

CHAPTER 4 RESULTS

Response Rate

There were two methods of data collection: direct administration and mail administration. All of the nonathletes ($N = 111$) completed the questionnaires via direct administration. In comparison, 15 (15%) gymnasts completed the questionnaires via direct administration and 87 (85%) gymnasts completed the questionnaires via mail administration.

In regard to the response rate for Time 1, 155 questionnaires were distributed to the nonathletes and 104 questionnaires were distributed to the gymnasts. One hundred and eleven nonathletes and 102 gymnasts completed the Time 1 questionnaire. Thus, the response rate for the nonathletes was 72% (i.e., 111/155) and the response rate for the gymnasts was 98% (i.e., 102/104). For Time 2, 17 nonathletes completed the questionnaire for a response rate of 15% (i.e., 17/111), and 79 gymnasts completed the Time 2 questionnaire for a response rate of 77% (i.e., 79/102). The 77% response rate for the gymnasts was largely due to one school of 18 gymnasts failing to return their Time 2 questionnaires. Implications of the low response rate for the nonathletes will be discussed in Chapter 5. Because of the low response rate of the nonathletes, only the gymnasts who completed both the Time 1 and Time 2 questionnaires were included in the repeated measures analysis. Therefore, the second purpose of the study, examining group differences in disordered eating correlates, could not be analyzed because there were not enough nonathletes to conduct the analysis with sufficient power (Cohen, 1992).

Participant Demographics

One-way analysis of variance (ANOVA) on the Time 1 data revealed that the gymnasts ($M = 23.22$, $SD = 1.75$) and nonathletes ($M = 22.96$, $SD = 4.05$) did not differ significantly for BMI [$F(1, 210) = .36$, $p = .55$, $\eta^2 = .002$]. The nonathletes ($M = 20.06$, $SD = 1.50$) were significantly older [$F(1, 212) = 6.87$, $p < .01$, $\eta^2 = .03$] than the gymnasts ($M = 19.57$, $SD = 1.22$). For the total sample, the most common race was Caucasian (77.6%), followed by Asian (6.5%), Hispanic (6.1%), and African-American (5.6%). Most gymnasts were Caucasian (84.3%) followed by African-American (5.9%), Asian (3.9%), and Hispanic (2.0%). Most nonathletes were Caucasian (71.4%), followed by Hispanic (9.8%), Asian (8.9%) and African-American (5.4%). A Pearson Chi-square test indicated that the two groups did not significantly differ for ethnicity [$\chi^2(5) = 8.71$, $p = .12$].

The most common year in school reported for the total sample was junior (28.0%), followed by sophomore (25.7%), senior (25.2%), and freshman (20.6%). Most gymnasts were juniors (30.4%), followed by freshmen (26.5%), sophomores (22.5%), and seniors (20.6%). Most nonathletes were seniors (29.5%), followed by sophomores (28.6%), juniors (25.9%), and freshmen (15.2%). A Pearson chi-square test revealed that the gymnasts and the nonathletes did not differ significantly for year in school [$\chi^2(4) = 7.03$, $p = .13$].

Gymnast Demographics

For the sport demographics of the gymnasts, most gymnasts had an athletic scholarship (73.1%), while 15.4% were walk-ons, 2.6% had an academic scholarship, and 9.0% did not report their scholarship status. For socioeconomic status, most gymnasts were upper middle class (79.5%), followed by lower middle class (14.1%), and upper

class (3.8%). The highest level of competition before attending college for most gymnasts was Level 10 (62.8%; the highest competitive level before Elite) followed by Elite (28.2%), Level 9 (5.1%), and Level 8 (1.3%), while 2.6% did not report their highest level of competition. During the current season, 29.5% of the gymnasts competed on vault, 29.5% competed on uneven bars, 33.3% competed on balance beam, 30.8% competed on floor exercise, and 25.6% competed in the all-around (i.e., all four events). Nine percent ($n = 7$) of the gymnasts did not compete due to an injury; therefore these seven gymnasts were excluded from the repeated measures analysis because they did not take part in the competitive season.

Reliability of the Study Measures

Reliability of the Eating Disorder Inventory-2 subscales and the Social Physique Anxiety Scale were established by calculating a coefficient of internal consistency (alpha; Cronbach, 1951) for each measure for the Time 1 and Time 2 assessments. Alpha increases as the number of variables increases; therefore, there is no set limit for an acceptable alpha value. George and Mallery (2001), however, recommended the guidelines presented in Table 4-1 to interpret the reliability of a measure.

Table 4-1. Guidelines to Interpret the Reliability of a Measure

Alpha Vaules	Interpretation
> .9	Excellent
> .8	Good
> .7	Acceptable
> .6	Questionable
> .5	Poor
< .5	Unacceptable

Table 4-2 presents Cronbach's alpha scores for the Eating Disorder Inventory-2 subscales and the Social Physique Anxiety Scale for Time 1 and Time 2 for the gymnasts who completed both assessments and the total sample. The reliabilities for these measures were acceptable to excellent (range = 0.71 to 0.92).

Table 4-2. Internal Consistency (Cronbach's Alpha) Estimates for the Study Measures

Study Measures	Gymnasts		Total Sample	
	Time 1 (<i>N</i> = 72)	Time 2 (<i>N</i> = 72)	Time 1 (<i>N</i> = 213)	Time 2 (<i>N</i> = 96)
Eating Disorder Inventory-2 Subscales				
Drive for Thinness	0.89	0.92	0.90	0.92
Body Dissatisfaction	0.85	0.89	0.84	0.88
Perfectionism	0.71	0.80	0.74	0.79
Social Physique Anxiety Scale	0.91	0.92	0.90	0.92

Group Differences for Participants Who Completed Time 1 Only and Those Who Completed Time 1 and Time 2

A one-way ANOVA was undertaken to examine the differences for social physique anxiety between those participants who completed the Time 1 questionnaire only ($n = 117$) and those who completed both the Time 1 and Time 2 questionnaires ($n = 96$). No significant Social Physique Anxiety Scale score group differences were found [$F(1, 211) = 1.28, p = .26, \eta^2 = .01$]. A one-way MANOVA was undertaken to examine if differences for body dissatisfaction, drive for thinness, and perfectionism existed between those participants who completed the Time 1 questionnaire only ($n = 117$) and those who completed both the Time 1 and Time 2 questionnaires ($n = 96$). The Box's test was not significant thus, homogeneity of variance-covariance was met [$F(6, 261714.1) = .88, p =$

.51]. Therefore, Wilks' Lambda test statistic was used to interpret the MANOVA results. No significant group differences were found [Wilks' Lambda = .99, $F(3, 203) = .47$, $p = .70$, $\eta^2 = .01$]. Mean and standard deviation scores for participants who completed the Time 1 only and Time 1 and Time 2 assessments are presented in Table 4-3.

Table 4-3. Mean (M) and Standard Deviation (SD) Scores for Participants Who Completed Time 1 Only and Those Who Completed Time 1 and Time 2.

	Time 1 Only	Time 1 and Time 2
Study Measures	$n = 117$	$n = 96$
	$M (SD)$	$M (SD)$
Eating Disorder Inventory-2 Subscales		
Body Dissatisfaction	8.54 (6.44)	9.49 (6.42)
Drive for Thinness	5.28 (5.83)	6.09 (5.81)
Perfectionism	6.95 (4.22)	6.85 (4.03)
Social Physique Anxiety	24.20 (7.29)	25.40 (8.04)

Mail Administration and Direct Administration Differences of Gymnasts

Differences between the gymnasts who completed the study via direct administration ($n = 15$) and those who completed it via mail ($n = 87$) were examined on the study variables (i.e., social physique anxiety, body dissatisfaction, drive for thinness, and perfectionism) for the Time 1 and Time 2 assessments. A one-way ANOVA revealed no significant administration differences for Time 1 for social physique anxiety scores [$F(1, 98) = .10$, $p = .75$, $\eta^2 < .01$] but did reveal a significant administration difference for Time 2 [$F(1,72) = 4.62$, $p = .04$, $\eta^2 = .06$]. A one-way MANOVA was undertaken to examine administration differences for body dissatisfaction, drive for thinness, and perfectionism scores for Time 1. The Box's test was not significant thus, homogeneity of

variance-covariance was met [$F(6, 2507.55) = .28, p = .95$]. Therefore, Wilks' Lambda test statistic was used to interpret the MANOVA results. No significant administration differences were found [Wilks' Lambda = .99, (3, 95) = .34, $p = .80, \eta^2 = .01$]. A one-way MANOVA was also undertaken to examine administration differences for body dissatisfaction, drive for thinness, and perfectionism scores for Time 2. The Box's test was not significant thus, homogeneity of variance-covariance was met [$F(6, 1792.57) = 1.11, p = .35$]. Therefore, Wilks' Lambda test statistic was used to interpret the MANOVA results. No significant administration differences were found [Wilks' Lambda = .95, (3, 66) = 1.22, $p = .31, \eta^2 = .05$]. Mean and standard deviation scores for the direct and mail administration are presented in Table 4-4.

Table 4-4. Mean (M) and Standard Deviation (SD) Scores for Gymnasts Who Completed the Study Via Mail and Direct Administration.

Study Measures	Time 1		Time 2	
	Direct Administration	Mail-Based	Direct Administration	Mail-Based
	$n = 14$	$n = 85$	$n = 12$	$n = 61$
	$M (SD)$	$M (SD)$	$M (SD)$	$M (SD)$
Eating Disorder Inventory-2 Subscales				
Body Dissatisfaction	9.62 (6.60)	8.22 (6.27)	11.18 (8.21)	7.75 (6.80)
Drive for Thinness	5.31 (5.42)	5.35 (5.73)	5.45 (5.05)	5.03 (5.84)
Perfectionism	6.69 (3.73)	7.01 (4.16)	6.36 (3.75)	7.15 (4.57)
Social Physique Anxiety Scale	25.71 (6.37)	25.01 (7.94)	29.25 (6.03)	23.77 (8.39)

Comparison of Time Differences

The primary purpose of this study was to examine if disordered eating correlates differed for gymnasts between preseason and competitive season. A repeated measures ANOVA indicated no significant time effect for social physique anxiety [$F(1,65) = 1.95,$

$p = .17, \eta^2 = .03$]. A repeated MANOVA was conducted to examine the time differences for body dissatisfaction, drive for thinness, and perfectionism. No significant results were found [Wilks' Lambda = .93, $F(3, 60) = 1.43, p = .24, \eta^2 = .07$]. Means and standard deviations for these study measures are presented in Table 4-5.

Comparison of Group Differences

The secondary purpose of this study was to examine the group differences in disordered eating correlates of gymnasts and nonathletes. Due to the low response rate of the nonathletes for Time 2, only Time 1 responses were analyzed.

A one-way ANOVA revealed that the gymnasts and nonathletes did not differ on social physique anxiety scores [$F(1, 211) = .26, p = .61, \eta^2 < .01$]. A one-way MANOVA was conducted to examine the group differences for body dissatisfaction, drive for thinness, and perfectionism. The Box's test was not significant thus, homogeneity of variance-covariance was met [$F(6, 300718.0) = .81, p = .56$]. Therefore, Wilks' Lambda test statistic was used to interpret the MANOVA results. No significant group differences were found on the Eating Disorder Inventory-2 subscales [Wilks' Lambda = .99, $F(3, 203) = .65, p = .59, \eta^2 = .01$] (See Table 4-5).

Table 4-5. Mean (M) and Standard Deviation (SD) Scores.

Study Measures	Gymnasts		Nonathletes	
	Time 1 <i>N</i> = 72 <i>M</i> (<i>SD</i>)	Time 2 <i>n</i> = 66 <i>M</i> (<i>SD</i>)	Time 1 <i>N</i> = 111 <i>M</i> (<i>SD</i>)	Time 2 <i>n</i> = 17 <i>M</i> (<i>SD</i>)
Eating Disorder Inventory-2 Subscales				
Body Dissatisfaction	9.09 (6.49)	8.18 (7.00)	9.58 (6.55)	11.35 (5.80)
Drive for Thinness	6.03 (5.99)	5.32 (5.94)	6.04 (5.95)	7.29 (6.71)
Perfectionism	6.88 (4.12)	7.20 (4.54)	7.41 (7.48)	7.37 (4.44)
Social Physique Anxiety Scale	25.37 (8.12)	24.54 (8.29)	24.48 (7.57)	27.94(8.98)

CHAPTER 5 DISCUSSION

Overview

The purpose of this study was to longitudinally examine eating disorder correlates (e.g., body dissatisfaction, perfectionism, drive for thinness, and social physique anxiety) of gymnasts and nonathletes over a six-month period. The first hypothesis stated that gymnasts would have greater disordered eating symptoms during the competitive season than during the preseason (Dale & Landers, 1999). The results of this study did not support this hypothesis. The second hypothesis stated that the gymnasts would have greater disordered eating symptoms than controls during the competitive season, but they would not differ from controls during the preseason (Dale & Landers; Davis, 1992; Hausenblas & Carron, 1999; Smolak et al., 2000; Sundgot-Borgen, 1993). Due to the low response rate of nonathletes, however, this hypothesis could not be completely analyzed, and only the preseason responses were compared between the athletes and nonathletes. In support of the null hypothesis, I found that the athletes and nonathletes did not differ significantly on the Eating Disorder Inventory-2 subscales or the Social Physique Anxiety Scale. Implications of these results and future research directions are presented below.

Response Rate

Although Ransdell's (1996) suggestions for maximizing response rate in questionnaire research were followed (e.g., increase perceived personalization, gain commitment towards the study, build trust in the capabilities of the researcher, follow-up

initial contact), it was difficult to retain nonathletes from Time 1 to Time 2. The response rate was 72% at Time 1 and 15% at Time 2 for the nonathletes, and the response rate was 98% at Time 1 and 77% at Time 2 for the gymnasts. It is important to note that the primary reason for the lower Time 2 response rate for the gymnasts was that one team ($n = 18$) failed to return their questionnaires, and the contact person was unresponsive to two follow up emails.

There are three possible reasons for the low response rate for the nonathletes compared to the gymnasts. First, I was unable to have a nonathlete contact person for Time 2. Second, participants were asked to come to my office to complete the Time 2 questionnaire. Finally, I was unable to offer any incentives for Time 2 participants.

Not having a contact person for the nonathletes for Time 2 was problematic. For Time 1, class instructors served as the contact person and distributed and collected the questionnaires and then returned them to me. For Time 2, however, data collection took place during the second semester and the participants were no longer enrolled in the classes from which they were recruited. Therefore, I did not have a contact person, and I had to contact each of the participants individually. The students were contacted three times by email. I sent the first email during the last week of the semester to inform the students that they would be asked to come to my office to complete the Time 2 questionnaire during the second semester in March. About 40 students replied and were willing to complete the second questionnaire.

I sent the second email about two weeks before the second data collection would take place. In this email I reminded the students who I was, what the study was about, and where they had been recruited. I also gave a schedule of dates and times they could

choose from to sign up to complete the questionnaire. The schedule was a block of two weeks, and the students could come in any time that I was not either in class or teaching (about three to four hours per day) between 7:30 a.m. and 5:00 p.m. About 35 participants responded to the email. I sent the third email about one week after the second. This email contained the same information as the previous one, but I also asked anyone who had not already responded to please do so because I needed more participants. Only two people responded.

In comparison, the data collection procedures for the gymnasts were simple, and they were the same for Time 1 and Time 2, which resulted in a high response rate. The contact person for each team was responsible for distributing, collecting, and mailing the questionnaires to me. The teams were free to complete the questionnaires when it was convenient for them and a prepaid return envelope was included. These procedures had the following two advantages: a) they minimized the number of people I had to be in contact with (i.e., one contact person vs. each gymnast), and b) they were convenient for the athletes by not requiring a lot of time or effort.

A second problem with retaining the nonathletes for the Time 2 data collection was that the participants were asked to come to my office to complete the questionnaire. Other data collection options were considered, (i.e., online questionnaire, mail questionnaire) but based on faculty recommendations, I kept the data collection format as close to the original as possible so as not to bias the collection procedures. Although I sent out three email reminders to the participants, most did not respond, and only 17 actually completed the questionnaire.

A third issue was that many of the instructors gave students extra credit for completing the Time 1 questionnaire, which was not an incentive for Time 2. The extra credit encouraged the nonathletes to participate in the Time 1 assessment. For Time 2, however, students were unable to earn extra credit, as they were no longer registered for the classes from which they were first recruited. I was also unable to offer any incentives for the participants. This lack of reward, combined with the fact that the participants were asked to come to my office may have prevented the students from being interested in participating in the Time 2 data collection. In hindsight, it would have been helpful to recruit participants from classes that met for an entire year rather than one semester. It would have also been helpful to be able to offer some incentives for participants (e.g., money, prizes, gift certificates). Also, having participant's phone numbers would have allowed me a more direct, personal way to contact them.

Study Findings

Group Differences

There was a possibility that women with disordered eating problems would choose not to participate in Time 2 (O'Connor et al., 1995). Therefore, I compared the body dissatisfaction, drive for thinness, perfectionism, and social physique anxiety scores of those participants who completed both questionnaires to those who completed only the first questionnaire. No differences between the two groups were found, thus indicating that participants chose not to complete the second questionnaire due to a reason other than body disturbance or disordered eating.

Although group differences between gymnasts and nonathletes over time could not be compared due to the low response rate of the nonathletes, group differences for Time 1 were examined. Results indicated that gymnasts and nonathletes did not differ for

any of the study measures (i.e., body dissatisfaction, drive for thinness, perfectionism, social physique anxiety). These results do not support research that found athletes to be more at risk for disordered eating than nonathletes (Davis, 1992; Hausenblas & Carron, 1999; Smolak et al., 2000; Sundgot-Borgen, 1993). Additionally, the results of this study do not support research that found athletes to be less at risk for developing disordered eating (DiBartolo & Shaffer, 2002; Hausenblas & Symons Downs, 2001; Kirk et al., 2001; Kurtzman et al., 1989; Petrie, 1996; Snyder & Kivlin, 1975; Wilkins et al., 1991; Zucker et al., 2001).

The results of this study do support a large body of literature, however, that has found that athletes and nonathletes are no different for eating disorder risk (Ashley et al., 1996; Fulkerson et al., 1999; Hausenblas & Carron, 1999; Krane et al., 2001; Taub & Blinde, 1994; Warren et al., 1990). This study also supports the findings of Harris and Greco (1990), and Smolak et al. (2000) who found that gymnasts were no different than adolescent girls and nonathletes for eating disorder symptoms. Most of the research that found gymnasts to be a high-risk group for eating disorders was done before 1995, when USA Gymnastics began its proactive approach to dealing with eating disorders (O'Connor et al., 1995; Petrie, 1993; Rosen & Hough, 1988; USA Gymnastics, 1995). USA Gymnastics' effort in promoting eating disorder prevention over the past several years may be effective and resulting in healthier athletes. In contrast to previous research, participation in the aesthetic sport of gymnastics at the Division I level may not be a risk factor for disordered eating.

Time Differences for Gymnasts

I compared the differences in disordered eating symptoms of the gymnasts from preseason to competitive season. Based on Dale and Landers (1999) study of wrestlers, I

hypothesized that the gymnasts would have greater disordered eating symptoms during the competitive season than during the preseason. The results of this study did not support this hypothesis. That is, there were no significant time differences for body dissatisfaction, drive for thinness, perfectionism, or social physique anxiety for the gymnasts. It is important to note, however, that although these results were not significant, body dissatisfaction, drive for thinness, and social physique anxiety scores decreased from preseason to competitive season. These contradictory findings to Dale and Landers can perhaps be attributed to the differing demands of wrestling and gymnastics. Wrestlers are conscious of their weight during the competitive season because weight is directly tied to success. That is, if a wrestler does not make weight for his weight class, he does not compete (Dale & Landers). Due to the weight classification system of wrestling, athletes know what they must weight to compete. If they are even one ounce over their weight class limit, they must lose the weight to compete. This constant concern with specific weight during the competitive season is likely to be positively related to disordered eating correlates (Dale & Landers). When the wrestlers are no longer required to make weight (i.e., postseason, off season), most of them lose their weight preoccupation (Dale & Landers).

Gymnastics is different from wrestling in that there are no weight specifications for competitors, but rather there is an implied ideal physique. Gymnasts perceive that having a similar physique to former and existing champions will increase their chances of success (USA Gymnastics, 1995). Evidence has shown that smaller, lighter gymnasts tend to receive higher scores (Claessens, Lefevre, Beunen, & Malina, 1999), and that a lower BMI is related to better gymnastics performance until the BMI falls into an

unhealthy range (Sherman, Thompson, & Rose, 1996). Gymnasts may try to lose weight to attain the implied ideal shape or weight desired for competition. There may be no differences in gymnasts' disordered eating correlates over the course of the season because gymnasts are either continuously trying to attain the ideal physique and consistently score high on disordered eating correlates, or they have attained the ideal physique and are satisfied with their bodies and consistently score low on disordered eating correlates. The athletic season may not be a factor for gymnasts' disordered eating correlates, but the attempt to attain the ideal gymnastics physique may be a factor.

Although the findings of this study contradict those of Dale and Landers (1999), they support the explanation that athletes who have characteristics evident in eating disorder patients (e.g., perfectionism, drive for thinness, body dissatisfaction) may be predisposed to develop an eating disorder (Hausenblas & Carron, 1999). If this explanation is correct, disordered eating correlates would remain the same over time and the athletic season would have no impact on disordered eating scores. The results of this study support this explanation, as there were no significant changes in disordered eating correlates from preseason to competitive season.

Limitations

There are several study limitations that must be mentioned. First limitation the response rate of the nonathletes was poor. That is, only 15% of the nonathletes completed both the Time 1 and Time 2 questionnaires, thus eliminating the control group for the repeated measures analysis because there was not sufficient power to conduct the analysis (Cohen, 1992). Not having a control group is problematic because there is no point of reference to compare the results of the testing group.

A second limitation to this study was that it relied on self-report measures and no objective measure of disordered eating symptoms was used. Several researchers have found that women are not always honest when completing disordered eating questionnaires, and tend to underreport their symptoms (O'Connor et al., 1995; Sundgot-Borgen, 1993; Wilmore, 1991). To maximize honest responses, participants in this study were informed that their responses were anonymous, and that their coaches, trainers, parents, and teammates would not have access to their responses. To help check the honesty of participant's responses, including a social desirability measure would have been beneficial.

A third limitation was the use of different data collection methods. Direct administration and mail-based methods were used. Although it is desirable to use the same method for all data collection, the logistics involved with this study made this difficult. Because the gymnasts participating in this study were at schools from all over the country, it was impossible for me to directly administer the questionnaire to them. In the future, creating an online questionnaire at the onset of the study would be a convenient and private way to use the same procedure to collect data from a large sample across a vast geographic region.

Future Directions

This study was one of the first to investigate disordered eating correlates with athletes over time, and was the first to do so with gymnasts. The results of this study indicate that further research in this area is needed. First, more longitudinal studies are needed to investigate how athletes' eating attitudes and behaviors change over time. Researchers should examine disordered eating correlates in athletes over the course of an entire year (i.e., preseason, competitive season, postseason, and off-season) to determine

if sport participation plays a role in the development of disordered eating. This would enable researchers to identify points in the season, if any, when athletes may be susceptible to developing dangerous eating behaviors.

Second, longitudinal studies investigating childhood and adolescence are necessary to determine if people with certain intra-individual characteristics (e.g., perfectionism, body dissatisfaction) are predisposed to developing eating disorders. These longitudinal studies should examine the role that an athlete's societal influences, particularly those of the family and those involved in the athletic environment (e.g., coaches, teammates, judges), play in the development of disordered eating over time.

Third, the fact that this study found gymnasts to be different from wrestlers further supports Hausenblas and Carron's (2002) recommendation that researchers examine sports individually rather than group different sports together. Future research should continue to do so with other sports, particularly those proposed to be high-risk sports (e.g., aesthetic, weight-dependent, endurance; Hausenblas & Carron, 1999). This study illustrates that the sport-specific demands vary from sport to sport; so combining sports together does not provide an accurate picture of how the sporting environment affects athletes' disordered eating correlates. Researchers should also examine individual sports over time. This would allow researchers to track the development of disordered eating attitudes and behaviors within the context of the specific sporting environment, and as athletes progress to higher levels of sport.

Finally, future research involving gymnasts should examine different levels of gymnastics including gymnasts at both the elite and collegiate levels (Picard, 1999). For instance, Division I athletes have to earn and keep their athletic scholarships, while

Division II and III athletes do not experience this pressure. This study examined Division I collegiate gymnasts, but unlike other collegiate athletes, gymnasts are at their peak around age 16, before they enter college (Sands, Hoffman, & Nattiv, 2002; USA Gymnastics, 1995). Some collegiate gymnasts consider themselves “washed up” or “over the hill” by the time they reach the collegiate level (Jarrett, 2001). Therefore, it is important to examine gymnasts of different levels, particularly because collegiate gymnastics differs from elite level gymnastics (Jarrett, 2002). The rules, scoring system, and training regimen of collegiate gymnasts are different from those of an elite level gymnast. For example, the NCAA only allows collegiate teams to practice 20 hours per week, while most elite level gymnasts train between 25-45 hours per week (Ryan, 1995). Also, the main focus for collegiate gymnasts is school, while elite gymnasts focus mainly on gymnastics (Ryan, 1995).

Conclusions

This study examined the disordered eating correlates in collegiate gymnastics (proposed to be a high risk group; Petrie, 1993) over the course of a season, and initially compared them to a group of nonathletes. Contrary to previous research, which found that women participating in lean, aesthetic, weight dependent, and endurance sports to be at greater risk for developing disordered eating symptoms than other types of sports (Hausenblas & Carron, 1999), as well as nonathletes, this study found no difference between gymnasts and nonathletes. That is, gymnasts and nonathletes were no different from each other in body dissatisfaction, drive for thinness, perfectionism, or social physique anxiety (Ashley et al., 1996; Fulkerson et al., 1999; Krane et al., 2001; Taub & Blinde, 1994; Warren et al., 1990). Also, gymnasts’ body dissatisfaction, drive for thinness, perfectionism, and social physique anxiety did not differ from the preseason to

the competitive season. Participation in Division I gymnastics may not be a risk factor for disordered eating disordered eating. Due to the serious negative effects of disordered eating, further research is needed examining eating disorders and athletes using longitudinal designs.

APPENDIX A
DEMOGRAPHIC QUESTIONNAIRE FOR ATHLETES

Birthdate (mm/dd/yyyy) and last 4 digits of your SS #_ _ _ _ _

1. Age: _____ Height (ft./inches): _____
2. Current Weight (pounds): _____ Ideal Weight (What you would like to weigh): _____
3. How many hours per week do you train in the gym? _____
4. How many hours per week do you train outside the gym? (i.e., weight room, jogging, etc.) _____
5. Number of years participating in gymnastics? _____
6. Indicate your race/ethnicity: (circle one)
Caucasian/ White Asian Hispanic African-American/ Black
American Indian Other
7. Year in school: (circle one)
Freshman Sophomore Junior Senior Grad Other
8. Your family socio-economic status:
Upper class Upper/middle class Lower/middle class Lower class
9. What type of scholarship do you have? (circle all that apply):
Athletic Academic Walk-on Full Partial None Other
10. Please indicate the events on which you usually compete (Circle all that apply):
Vault Uneven Bars Balance Beam Floor Exercise All-Around
11. What was your highest level of competition in gymnastics before becoming a collegiate gymnast? (i.e. Level 10, elite, national team member, etc.)

12. What was your highest level of competition in gymnastics as a collegiate gymnast? (i.e. Regionals, NCAA Championships, etc.)

APPENDIX B
INJURY QUESTIONNAIRE FOR GYMNASTS

Part D Instructions: Please answer the following questions regarding your injury history during the current gymnastics season.

1. Have you had any injuries this season? (Check one) Yes No

If you answered "Yes" please answer the following questions.

2. Please give a brief description of the injury(s)

3. Did your injury prevent you from participating in team practice for any amount of time? Yes No

If you answered "Yes" please indicate about how long you were unable to participate.
 Days OR Weeks

4. Did your injury(s) prevent you from competing in meets? Yes No

If you answered "Yes" please indicate how many meets you missed due to injury.

5. If you were still able to participate while injured, how did the injury(s) affect your participation? Please check all that apply.

- Had to limit amount of practice time
 - Did alternative workout (e.g., strength, conditioning, etc.)
 - Water down level of difficulty in routines
 - Limited events in practice/competition
 - Other
-

APPENDIX C
DEMOGRAPHIC QUESTIONNAIRE FOR NONATHLETES

Birthdate (mm/dd/yyyy) and last 4 digits of your SS # _ _ _ _ _

1. Age: _____ Height (ft./inches): _____
2. Current Weight (pounds): _____ Ideal Weight (What you would like to weigh): _____
3. Indicate your race/ethnicity (Check one):
 Caucasian/ White Asian Hispanic African-American/ Black
 American Indian Other
4. Year in school (Check one):
 Freshman Sophomore Junior Senior Grad Other
5. Your family economic status (Check one):
 Upper class Upper/middle class Lower/middle class Lower class
6. Are you a current member of any varsity athletic team? (Check one): Yes No
If you checked "Yes" please describe _____
7. Are you a current member of a competitive athletic team? (Check one):
 Yes No
If you checked "Yes" please describe: _____
8. Have you ever been a member of a competitive athletic team? (Check one):
 Yes No
If you checked "Yes" please list the sport and approximate dates of participation for your **most recent** athletic team membership.
Sport _____ Date _____

APPENDIX D
DRIVE FOR THINNESS SUBSCALE

Instructions: Using the scale provided below, please complete the following questions as honestly as possible. For each item, decide if the item is true about you.

Never(1) Rarely(2) Sometimes(3) Often(4) Usually(5) Always(6)

1. I eat sweets and carbohydrates without feeling nervous. 1 2 3 4 5 6
2. I think about dieting. 1 2 3 4 5 6
3. I feel extremely guilty after overeating. 1 2 3 4 5 6
4. I exaggerate or magnify the importance of weight. 1 2 3 4 5 6
5. If I gain a pound, I worry that I will keep gaining. 1 2 3 4 5 6
6. I am terrified about gaining weight. 1 2 3 4 5 6
7. I am preoccupied with the desire to be thinner. 1 2 3 4 5 6

APPENDIX E
BODY DISSATISFACTION SUBSCALE

Instructions: Using the scale provided below, please complete the following questions as honestly as possible. For each item, decide if the item is true about you.

- | | Never(1) | Rarely(2) | Sometimes(3) | Often(4) | Usually(5) | Always(6) |
|----|---|------------------|---------------------|-----------------|-------------------|------------------|
| 1. | I think my buttocks are too large. | 1 | 2 | 3 | 4 | 5 6 |
| 2. | I think that my hips are just the right size. | 1 | 2 | 3 | 4 | 5 6 |
| 3. | I think that my thighs are just the right size. | 1 | 2 | 3 | 4 | 5 6 |
| 4. | I think my hips are too big. | 1 | 2 | 3 | 4 | 5 6 |
| 5. | I think that my stomach is too big. | 1 | 2 | 3 | 4 | 5 6 |
| 6. | I think that my thighs are too large. | 1 | 2 | 3 | 4 | 5 6 |
| 7. | I like the shape of my buttocks. | 1 | 2 | 3 | 4 | 5 6 |
| 8. | I think that my stomach is just the right size. | 1 | 2 | 3 | 4 | 5 6 |
| 9. | I feel satisfied with the shape of my body. | 1 | 2 | 3 | 4 | 5 6 |

APPENDIX F
PERFECTIONISM SUBSCALE

Instructions: Using the scale provided below, please complete the following questions as honestly as possible. For each item, decide if the item is true about you.

- | | Never(1) | Rarely(2) | Sometimes(3) | Often(4) | Usually(5) | Always(6) |
|--|-----------------|------------------|---------------------|-----------------|-------------------|------------------|
| 1. I hate being less than the best at things. | 1 | 2 | 3 | 4 | 5 | 6 |
| 2. Only outstanding performance is good enough in my family. | | | | | 1 | 2 3 4 5 6 |
| 3. As a child, I tried very hard to avoid disappointing my parents and teachers. | 1 | 2 | 3 | 4 | 5 | 6 |
| 4. I have extremely high goals. | | 1 | 2 | 3 | 4 | 5 6 |
| 5. My parents have expected excellence of me. | | | | 1 | 2 3 | 4 5 6 |
| 6. I feel that I must do things perfectly or not do them at all. | 1 | 2 | 3 | 4 | 5 | 6 |

APPENDIX G
SOCIAL PHYSIQUE ANXIETY SCALE

Instructions: A number of statements which people have used to describe themselves are given below. Please read each statement carefully. Indicate the degree to which the statement is characteristic or true of how you feel right now, at this moment in time using the scale provided below. Please place your answer in the blank space provided after each question.

1 = not at all characteristic
2 = slightly characteristic
3 = moderately characteristic
4 = very characteristic
5 = extremely characteristic

1. I wish I wasn't so uptight about my physique/ figure. _____
2. I am bothered by thoughts that other people are evaluating my weight or muscular development negatively. _____
3. Unattractive features of my physique/ figure make me nervous in this social setting. _____
4. In the presence of others, I feel apprehensive about my physique/ figure. _____
5. I am comfortable with how fit my body appears to others. _____
6. It makes me uncomfortable to know others are evaluating my physique/ figure. _____
7. When it comes to displaying my physique/ figure to others, I am a shy person. _____
8. I usually feel relaxed when it is obvious that others are looking at my physique/ figure. _____
9. When in exercise clothes, I often feel nervous about the shape of my body. _____

APPENDIX H
SCHOOLS CONTACTED FOR PARTICIPATION

School	Initial Response	Outcome
Arizona State University	No Response	N/A
Auburn University	Yes	Data collected
Brigham Young University	No Response	N/A
George Washington University	No Response	N/A
Illinois State University	Yes	Data collected
Iowa State University	Yes	Unable to follow up
James Madison University	Yes	Data collected
Louisiana State University	No Response	N/A
Michigan State University	No	N/A
North Carolina State University	No Response	N/A
Penn State University	No	N/A
Temple University	Yes	Unable to follow up
Towson University	No Response	N/A
University of Alabama	No	N/A
University of Arizona	No Response	N/A
University of Arkansas	No	N/A
University of California- Los Angeles	No Response	N/A
University of Denver	Yes	Data collected
University of Florida	Yes	Data collected
University of Georgia	Yes	Data collected
University of Illinois- Champaign	Yes	Unable to follow up
University of Illinois- Chicago	No Response	N/A
University of Iowa	No Response	N/A
University of Kentucky	No Response	N/A
University of Maryland	Yes	Data collected
University of Michigan	No	N/A
University of North Carolina- Chapel Hill	No	N/A
University of Rhode Island	No Response	N/A
University of Utah	No Response	N/A
University of West Virginia	No Response	N/A

APPENDIX I
LETTER TO COACHES

Dear Coach,

I am a graduate student in the department of Exercise and Sport Sciences at the University of Florida, working under the supervision of Dr. Heather Hausenblas. As both a coach and a former gymnast, I have been involved with the sport of gymnastics for most of my life. Consequently, I have chosen to study the nutritional attitudes and self-perceptions of gymnasts for my Masters thesis. I am having gymnasts from all over the country complete surveys for my study, and I was hoping to make arrangements for your team to participate. Those that wish to participate will be asked to complete two anonymous surveys over the course of the year. One will be in October, and one will be in March. They will take approximately 10 minutes to complete and will not take time away from practice, as the athletes will complete them on their own time. If you choose to participate, please provide the name and either phone number or e-mail address of a trainer or manager for the team whom I can use as a contact person to distribute and collect the surveys.

If you could let me know by Friday, October 4 whether or not you would be willing to participate, I would greatly appreciate it. Feel free to contact me if you have any questions. Thank you very much for your help.

Sincerely,

Jessica

APPENDIX J
INFORMED CONSENT

To: Volunteers for the Changes in Self-perceptions and Nutritional Attitudes Study

From: Dr. Heather Hausenblas and Jessica Halvorsen

RE: Informed Consent

The purpose of this statement is to summarize the study we are conducting and to explain what we are asking you to do. Every participant will be assigned a code number and will not be identified by name, but rather by the code. Your identity will be kept confidential to the extent provided by law. All data will be treated in strict confidence and will be locked in a filing cabinet in the Exercise Psychology Laboratory in Room 145, Florida Gym.

Dr. Hausenblas is an Assistant Professor in Exercise Psychology and Jessica Halvorsen is a Master's student in Sport and Exercise Psychology at the University of Florida. We are interested in examining how the nutritional attitudes and self-perceptions of athletes and non-athletes change over time. This study will take place twice, and the second time will take place approximately 4-5 months after the first time. Both times you will be asked to complete several questionnaires that will take approximately 10 minutes to complete. These questionnaires will include items regarding body image, nutritional attitudes, and self-perceptions. If at any time you do not wish to continue with the study, you are free to discontinue your involvement without consequence. There are no risks involved with participating in the study. The benefits associated with the study are a better understanding of how self-perceptions and nutritional attitudes change over time.

Your participation is voluntary, but it is hoped that you will take part in this study. Without the cooperation of volunteers, projects like this would not be possible. Please feel free to ask any questions you may have at this time. If you have any additional questions or concerns during the course of the study, please contact Dr. Hausenblas (392-0584 ext. 1292) or Jessica Halvorsen (392-0580 ext. 1368). If you have any questions or concerns about your rights as a research participant, you may contact the University of Florida Institutional Review Board at Box 112250, University of Florida, Gainesville, FL 32611-2250, or call (352) 392-0433.

If you have no further questions at this time, and if you agree to volunteer to become involved in this study, please read the following statement and sign your name in the signature blank.

I have read the procedure described above. I voluntarily agree to participate in the study, and I have received a copy of this description.

Participant's signature: _____

Date: _____

Principal Investigator's Signature:

APPENDIX K
INSTRUCTIONS FOR CONTACT PERSON

Dear Contact Person,

Thank you for your help with my thesis study! I appreciate your time and assistance. Here are directions for distributing and collecting the questionnaires. Please look them over and let me know if you have questions.

Questionnaires need to be completed any time between **October 20, 2002 and November 1, 2002**. They take approximately 10 minutes to complete, so the end of practice may be the most appropriate time to give them out. You will need to hand out the consent forms, collect them back, hand out the questionnaires, collect them back, and then mail everything back to me. I have provided pre-addressed prepaid envelopes for you to use to send everything back to me. Here are more detailed instructions:

1. **Distribute the Informed Consent forms.** The consent form explains the purpose and rationale of the study and provides contact information for my advisor, the University of Florida Institutional Review Board, and me. It is very important that everyone who completes a questionnaire has signed an informed consent form. After you pass them out, please reiterate the following points:
 - a. Participation is voluntary
 - b. They may leave blank any questions that they do not want to answer
 - c. They may stop at any time, or turn in a blank questionnaire
 - d. Their names will **only** be on the consent forms, which are kept entirely separate from the questionnaires.
2. **Collect the consent forms back** and place them into the envelope to be mailed back to me.
3. **Distribute envelopes that contain the questionnaires.** Each person will have her own envelope containing a questionnaire. (The envelopes are addressed to my advisor and are prepaid, but please do not put the envelopes themselves in the mail, as there is currently no money on that account.) Please explain the following points:
 - a. Ask everyone to write their code number in the spaces provided on the top of their questionnaire. The number is 12 digits long, and it is their birth date (mm/dd/yyyy) followed by the last 4 digits of their social security number. This number will be used **ONLY** to keep the first and second sets of questionnaires matched up.
 - b. Please instruct gymnasts to put their completed questionnaire back into their envelope and seal it.

4. **Collect sealed envelopes** back and place in envelope to be mailed back to me.
5. **Some final thoughts:**
 - a. Please express my gratitude to everyone for their help and participation!
 - b. If you could, please send me a quick email once you have put the return envelopes in the mail just to let me know.
 - c. This process will be repeated again in March.

Thank you again for all your help, and please let me know if you have any questions or if I can be of further assistance.

Sincerely,

Jessica

LIST OF REFERENCES

- Allaz, A.F., Bernstein, M., Rouget, P., Archinard, M., & Morabia, A. (1998). Body weight preoccupation in middle-age and ageing women: A general population survey. *International Journal of Eating Disorders, 23*(3), 287-294.
- American Psychological Association. (1994). *Diagnostic and statistical manual of mental disorders*. (4th ed.) Washington DC: Author.
- Anderson, A.A. (1992). Eating disorders in males: A special case? In K.D. Brownell, J. Rodin, & J.H. Wilmore (Eds.), *Eating, body weight, and performance in athletes: Disorders of modern society* (pp. 172-190). Malvern, PA: Lea & Febiger.
- Ashley, C.D., Smith, J.F., Robinson, J.B., & Richardson, M.T. (1996). Disordered eating in female collegiate athletes and collegiate females in an advanced program of study: A preliminary investigation. *International Journal of Sport Nutrition, 6*, 391-401.
- Bane, S., & McAuley, E. (1998). Body image and exercise. In J.L. Duda (Ed.), *Advances in sport and exercise psychology measurement* (pp. 311-324). Morgantown, WV: Fitness Information Technology.
- Beals, K.A., & Manore, M.M. (2002). Disorders of the female athlete triad among collegiate athletes. *International Journal of Sport Nutrition, 12*, 281-293.
- Berry, T.R., & Howe, B.L. (2000). Risk factors for disordered eating in female university athletes. *Journal of Sport Behavior, 23*(3), 207-218.
- Byely, L., Archibald, A.B., Graber, J., Brooks-Gunn, J. (2000). A prospective study of familial and social influences on girls' body image and dieting. *International Journal of Eating Disorders, 28*, 155-164.
- Cash, T.F., & Henry, P.E. (1995). Women's body images: The results of a national survey in the U.S.A. *Sex Roles, 33*(1-2), 19-28.
- Claessens, A.L., Lefevre, J., Beunen, G., & Malina, R.M. (1999). The contribution of anthropometric characteristics to performance scores in elite female gymnasts. *Journal of Sports Medicine and Physical Fitness, 39*(4), 355-360.
- Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*, 155-159.

- Costin, C. (1999). *The eating disorder sourcebook: A comprehensive guide to the causes, treatments, and prevention of eating disorders* (2nd ed.). Lincolnwood, Illinois: Lowell House.
- Cox, L.M., Lantz, C.D., & Mayhew, J.L. (1997). The role of social physique anxiety and other variables in predicting eating behaviors in college students. *International Journal of Sport Nutrition*, 7, 310-317.
- Cronbach, L.J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16, 297-334.
- Dale, K.S., & Landers, D.M. (1999). Weight control in wrestling: Eating disorders or disordered eating? *Medicine and Science in Sports and Exercise*, 1382-1389.
- Davis, C. (1992). Body image, dieting behaviors and personality factors: A study of high-performance athletes. *International Journal of Sport Psychology*, 23, 179-192.
- Davis, C. (1997). Normal and neurotic perfectionism in eating disorders: An interactive model. *International Journal of Eating Disorders*, 22, 421-426.
- Davison, K., Earnest, M., & Birch, L. (2002). Participation in aesthetic sports and girls' weight concerns at ages 5 and 7 years. *International Journal of Eating Disorders*, 31, 312-317.
- Demarest, J., & Allen, R. (2000). Body image: Gender, ethnic, and age differences. *Journal of Social Psychology*, 140(4), 465-472.
- DiBartolo, P.M., Shaffer, C. (2002). A comparison of female college athletes and nonathletes: Eating disorder symptomatology and psychological well-being. *Journal of Sport and Exercise Psychology*, 24(1), 33-41.
- Dingemans, A.E., Bruna, M.J., & van Furth, E.F. (2002). Binge eating disorder: A review. *International Journal of Obesity*, 26, 299-307.
- Fender-Scarr, L. K. (1999). An investigation of athlete, coach, and family variables in relationship to eating pathology in adolescent female gymnasts. *Dissertation Abstracts International Section A: Humanities & Social Sciences*, 59(10-A), 3743. (UMI No. mt010)
- Fulkerson, J.A., Keel, P.K., Leon, G.R., & Dorr, T. (1999). Eating disordered behaviors and personality characteristics of high school athletes and non athletes. *International Journal of Eating Disorders*, 26(1), 73-79.
- Garfinkle, P.E., & Garner, D.M. (1982). *Anorexia nervosa: A multidimensional perspective*. New York: Brunner-Mazel.
- Garner, D.M. (1991). *Eating Disorder Inventory-2. Professional manual*. Odessa, FL: Psychological Assessment Resources.

- Garner, D.M., & Garfinkle, P.E. (1979). The Eating Attitudes Test: An index of the symptoms of anorexia nervosa. *Psychological Medicine*, 9, 273-279.
- Garner, D.M., Olmstead, M.P., Bohr, Y., & Garfinkle, P.E. (1982). The Eating Attitudes Test: Psychometric features and clinical correlates. *Psychological Medicine*, 12, 871-878.
- Garner, D.M., Olmstead, M.P., & Polivy, J. (1983). Development and validation of a multidimensional eating disorder inventory for anorexia nervosa and bulimia. *International Journal of Eating Disorders*, 2, 1534-1545.
- Garner, D.M., Rosen, L., & Barry, D. (1998). Eating disorders among athletes: Research and recommendations. *Child and Adolescent Psychiatric Clinics of North America*, 7(4), 839-857.
- George, D. & Mallery, P. (2001). *SPSS for Windows step by step: A simple guide and reference 1010 update* (3rd ed.). Boston, MA: Allyn and Bacon.
- Griffin, J. & Harris, M. B. (1996). Coaches' attitudes, knowledge, experiences, and recommendations regarding weight control. *The Sport Psychologist*, 10, 180-194.
- Grimm, L.G., & Yarnold, P.R. (Eds.). (1995). *Reading and understanding multivariate statistics*. Washington, D.C., American Psychological Association.
- Haase, A.M., & Prapavessis, H. (1998). Social physique anxiety and eating attitudes: Moderating effects of body mass and gender. *Psychology, Health, & Medicine*, 3(2), 201-210
- Haase, A.M., Prapavessis, H., & Owens, R.G. (2002). Perfectionism, social physique anxiety and disordered eating: A comparison of male and female elite athletes. *Psychology of Sport and Exercise*, 3, 209-222.
- Halmi, K., Sunday, S., Strober, M., Kaplan, A., Woodside, D.B., Fichter, M., et al. (2000). Perfectionism in anorexia nervosa: variation by clinical subtype, obsessionality, and pathological eating behaviors. *American Journal of Psychiatry*, 157, 1799-1805.
- Harris, M.B., & Greco, D. (1990). Weight control and weight concern in competitive female gymnasts. *Journal of Sport and Exercise Psychology*, 12(4), 427-433.
- Hart, E.A., Leary, M.R., & Rejeski, W.J. (1989). The measurement of social physique anxiety. *Journal of Sport and Exercise Psychology*, 11, 94-104.
- Hausenblas, H.A. (1998). *Eating disorders and athletes*. Unpublished doctoral dissertation, The University of Western Ontario, London, Ontario, Canada.
- Hausenblas, H.A., & Carron, A.V. (1999). Eating disorder indices and athletes: An integration. *Journal of Sport and Exercise Psychology*, 21, 230-258.

- Hausenblas, H.A., & Carron, A.V. (2002). Assessing eating disorder symptoms in sport groups: A critique with recommendations for future research. *International Sports Journal, winter*, 65-74.
- Hausenblas, H.A., & Mack, D.E. (1999). Social physique anxiety and eating disorder correlates among female athletic and nonathletic populations. *Journal of Sport Behavior, 22(4)*, 502-513.
- Hausenblas, H.A., & Symons Downs, D. (2001). Comparison of body image between athletes and non athletes: A meta-analytic review. *Journal of Applied Sport Psychology, 13(3)*, 323-33.
- Hight, R. (1989). Athletic amenorrhoea: An update on aetiology, complications, and management. *Sports Medicine, 7(2)*, 82-108.
- James, B., & Collins, D. (1997). Self-presentational sources of competitive stress during performance. *Journal of Sport & Exercise Psychology, 19(1)*, 17-35.
- Jarrett, C. (2001). The road to a college scholarship. *USA Gymnastics Magazine, 30(2)*, 14.
- Jarrett, C. (2002). Club v. college gymnastics. Available from *USA Gymnastics*, Pan American Plaza, 201 South Capital Avenue, Indianapolis, IN 46225
- Johnson, C., Powers, P., & Dick, R. (1999). Athletes and eating disorders: The National Collegiate Athletic Association study. *International Journal of Eating Disorders, 26*, 179-188.
- Kirk, G., Singh, K., & Getz, H. (2001). Risk of eating disorders among female college athletes and nonathletes. *Journal of College Counseling, 4(2)*, 122-132.
- Krane, V., Stiles-Shipley, J.A., Waldron, J., & Michalenok, J. (2001). Relationship among body satisfaction, social physique anxiety, and eating behaviors in female athletes and exercisers. *Journal of Sport Behavior, 24(3)*, 247-265.
- Kurtzman, F.D., Yager, J., Landsverk, J, Weismeier, E., & Bodurka, D.C. (1989). Eating disorders among selected female student populations at UCLA. *Journal of the American Dietetic Association, 89*, 45-53.
- Martin, K.A., Rejeski, W.J., Leary, M.R., AcAuley, E., & Bane, S. (1997). Is the social physique anxiety scale really multidimensional? Conceptual and statistical arguments for a unidimensional model. *Journal of Sport and Exercise Psychology, 19*, 359-367.
- Mintz, L.B., O'Holloran, M.S., Mulholland, A.M., & Schneider, P.A. (1997). Questionnaire for eating disorder diagnosis: Reliability and validity of operationalizing DSM-IV into a self-report format. *Journal of Counseling Psychology, 44*, 63-79.

- Nagel, K.L., & Jones, K.H. (1992). Sociological factors in the development of eating disorders. *Adolescence*, 27, 107-112.
- O'Connor, P.J., Lewis, R.D., & Kirchner, E.M. (1995). Eating disorder symptoms in female college gymnasts. *Medicine and Science in Sports and Exercise*, 27, 550-555.
- Otis, C.L., Drinkwater, B., Johnson, M., Loucks, A., & Wilmore. (1997). Position stand: The female athlete triad. *Medicine and Science in Sport and Exercise*, 29(5), i-ix.
- Petire, T.A. (1996). Differences between male and female college lean sport athletes, nonlean sport athletes, and nonathletes on behavioral and psychological indices of eating disorders. *Journal of Applied Sport Psychology*, 8, 218-230.
- Petrie, T.A. (1993). Disordered eating in female collegiate gymnasts: Prevalence and personality/ attitudinal correlates. *Journal of Sport and Exercise Psychology*, 15, 424-436.
- Picard, C. (1999). The level of competition as a factor for the development of eating disorders in female collegiate athletes. *Journal of Youth and Adolescence*, 28(5), 583-594.
- Ransdell, L. (1996). Maximizing response rate in questionnaire research. *American Journal of Health Behavior*, 20(2), 50-56.
- Reel, J.J., & Gill, D.L. (1996). Psychosocial factors related to eating disorders among high school and college female cheerleaders. *The Sport Psychologist*, 10(2), 195-206.
- Rock, C.L. (1999). Nutritional and medical assessment and management of eating disorders. *Nutrition in Clinical Care*, 2, 332-343.
- Rosen, L.W., and Hough, D.O. (1988). Pathogenic weight-control behaviors in female college gymnasts. *Physician and Sportsmedicine*, 16, 141-146.
- Ryan, J. (1995). *Little girls in pretty boxes: The making and breaking of elite gymnasts and figure skaters*. New York, NY: Warner Books Edition.
- Sands, W.A., Hofman, M.G., Nattiv, A. (2002). Menstruation, disordered eating behavior, and stature: A comparison of female gymnasts and their mothers. *International Sports Journal*, winter, 1-13.
- Scanlan, T.K., Stein, G.L., & Ravizza, K. (1991). An in-depth study of former elite figure skaters: III. Sources of stress. *Journal of Sport & Exercise Psychology*, 13(2), 103-120.
- Schlundt, D.G., & Johnson, W.G. (1990). *Eating disorders: Assessment and treatment*. Needham Heights, MA: Allyn & Bacon.

- Sherman, R.T., Thompson, R.A., & Rose, J.S. (1996). Body Mass Index and athletic performance in elite female gymnasts. *Journal of Sport Behavior, 19*(4), 338-346.
- Smith, M.C., & Thelen, M.H. (1984). Development and validation of a test for bulimia. *Journal of Consulting & Clinical Psychology, 52*(5), 863-872.
- Smolak, L., Murnen, S.K., & Ruble, A.E. (2000). Female athletes and eating problems: A meta-analysis. *International Journal of Eating Disorders, 27*(4), 371-380.
- Snyder, E.E. & Kivlin, J.E. (1975). Women athletes and aspects of psychological well-being and body image. *Research Quarterly, 46*(2), 191-199.
- Stoutjesdyk, D., & Jevne, R. (1993). Eating disorders among high performance athletes. *Journal of Youth and Adolescence, 22*, 271-278.
- Striegel-Moore, R.H., Silberstein, L.R., & Rodin, J. (1986). Toward an understanding of risk factors for bulimia. *American Psychologist, 41*, 246-263.
- Strober, M. (1986). Anorexia nervosa: History and psychological concepts. In K.D. Brownell & J.P. Foreyt (Eds.), *Handbook of eating disorders: Physiology, psychology, and treatment of obesity, anorexia, and bulimia* (pp.231-246). New York: Basic Books.
- Sundgot-Borgen, J. (1993). Prevalence of eating disorders in elite female athletes. *International Journal of Sport Nutrition, 3*, 29-40.
- Sundgot-Borgen, J. (1994). Risk and trigger factors for the development of eating disorders in female elite athletes. *Medicine and Science in Sports and Exercise, 26*, 414-419.
- Sundgot-Borgen, J., & Larsen, S. (1993). Pathogenic weight-control methods and self-reported eating disorders in female elite athletes and controls. *Scandinavian Journal of Medicine and Science in Sports, 3*, 150-155.
- Taub, D.E., & Blinde, E.M. (1994). Disordered eating and weight control among adolescent female athletes and performance squad members. *Journal of Adolescent Research, 9*(4), 483-497.
- Terry-Short, L.A., Owens, R.G., Slade, P.D., & Dewey, M.E. (1995). Positive and negative perfectionism. *Personality and Individual Differences, 18*(5), 663-668.
- Thelen, M.H., Farmer, J., Wonderlich, S., & Smith, M. (1991). A revision of the Bulimia Test: The BULIT-R. *Psychological Assessment, 3*(1), 119-124.
- Thelen, M.H., Mintz, L.B., & Bowman, J.S. (1996). The Bulimia Test-Revised: Validation with DSM-IV criteria for bulimia nervosa. *Psychological Assessment, 8*, 219-221.

- Thompson, R. & Sherman, R.T. (1999a). Athletes, athletic performance, and eating disorders: Healthier alternatives. *Journal of Social Issues, 55*(2), 317-337.
- Thompson, R. & Sherman, R.T. (1999b). "Good athlete" traits and characteristics of anorexia nervosa: Are they similar? *Eating Disorders: The Journal of Treatment and Prevention, 7*(3), 181-190.
- Tyrka, A.R., Waldron, I., Graber, J.A., & Brooks-Gunn, J. (2002). Prospective predictors of the onset of anorexic and bulimic syndromes. *International Journal of Eating Disorders, 32*, 282-290.
- USA Gymnastics. (1995). Task force on USA Gymnastics response to the female athlete triad. Available from *USA Gymnastics*, Pan American Plaza, 201 South Capital Avenue, Indianapolis, IN 46225.
- Walsh, J.M., Wheat, M.E., & Freund, K. (2000). Detection, evaluation, and treatment of eating disorders: The role of the primary care physician. *Journal of General Internal Medicine, 15*, 577-590.
- Warren, B.J., Stanton, A.L., & Blessing, D.L. (1990). Disordered eating patterns in competitive female athletes. *International Journal of Eating Disorders, 9*(5), 565-569.
- Wilkins, J.A., Boland, F.J., & Albinson, J. (1991). A comparison of male and female university athletes and nonathletes on eating disorder indices: Are athletes protected? *Journal of Sport Behavior, 14*(2), 129-143.
- Williamson, D.A., Anderson, D.A., Jackman, L.P., & Jackson, S.R. (1995). Assessment of eating disordered thoughts, feelings, and behaviors. *Handbook of assessment methods for eating behavior and weight-related problems: Measures, theory, and research*. Thousand Oaks, CA: Sage.
- Williamson, D.A., Netemeyer, R.G., Jackman, L.P., Anderson, D.A., Funsch, C.L., & Rabalais, J.Y. (1995). Structural equation modeling of risk factors for development of eating disorder symptoms in female athletes. *International Journal of Eating Disorders, 17*(4), 387-393.
- Wilmore, J.H. (1991). Eating and weight disorders in the female athlete. *International Journal of Sport Nutrition, 1*, 104-117.
- Wood, A., Waller, G., & Gowers, S. (1994). Predictors of eating psychopathology in adolescent girls. *European Eating Disorders Review, 2*, 6-13.
- Zucker, N.L., Womble, L.G., Williamson, D.A., & Perrin, L.A. (2001). Protective factors for eating disorders in female college athletes. *Eating Disorders: The Journal of Treatment and Prevention, 7*(3), 207-218.

BIOGRAPHICAL SKETCH

Originally from New Jersey, I obtained a B.S. in psychology from James Madison University and a M.S. in Exercise and Sport Sciences from the University of Florida. My academic concentration was in sport and exercise psychology and my research interests include exercise adherence, as well as eating attitudes and behaviors of female athletic populations. Specifically, I am interested in developing and promoting healthy sport environments for young female athletes.

I have been an instructor for college-level conditioning, tennis, and gymnastics. I have also worked as a gymnastics coach for both the developmental and high school levels.