A TEST OF AN ETIOLOGICAL MODEL: THE DEVELOPMENT OF DISORDERED EATING IN DIVISION-I UNIVERSITY FEMALE GYMNASTS AND SWIMMERS/DIVERS

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Certain sport environments may contribute to the development of disordered eating and those that heavily emphasize weight and/or body shape can be particularly damaging to an athlete’s body image, self-concept, and eating behaviors. In particular, female athletes in collegiate sports are at a greater risk for engaging in unhealthy behaviors because they face both societal pressures from Western culture to be thin, in addition to sport pressures that focus on performance and appearance. According to the American Medical Association almost half of American women are trying to lose weight, illustrating that societal pressures alone to be thin and attractive can influence the development of disordered eating. Athletes are exposed to the same sociocultural pressures as their nonathlete counterparts, and would be expected to have similar feelings about their bodies as women in general. Add subsequent pressures like team “weigh-ins,” coaches’ body comp preferences, judges’ critiques, revealing attire, and endurance/strength demands, and the stage is set for the development of disordered eating. In the current study, participants were 414 Division-I female gymnasts, swimmers/divers, and they completed self-report measures assessing sport pressures, body satisfaction and disordered eating behavior to test Petrie & Greenleaf’s etiological model. Results indicate that sport pressures do lead directly to dietary restraint, a precursor to disordered eating, and are not always mediated through internalization and body dissatisfaction. These findings suggest that decreasing and intervening with perceived sport pressures may lessen the risk of female athletes developing an eating disorder.
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CHAPTER 1

INTRODUCTION

Definitions, Prevalence and Purpose

Eating disorders are one of the most common psychological disorders experienced by girls and women (Stice & Shaw, 2002; Smolak & Murnen, 2001). Recent research has shown that 0.5% of females suffer from anorexia nervosa and 1-3% experience from bulimia nervosa (American Psychiatric Association, 2000). At any given time 10 % or more of late adolescent and adult women report symptoms of eating disorders and thus are considered subclinical or symptomatic (Mintz, O'Halloran, Mulholland, & Schneider (1997). Although these symptoms may not satisfy full diagnostic criteria, they often cause distress and impairment as well (Academy of Eating Disorders, 2009). For example, in a study of female undergraduates, Cohen and Petrie (2005) found that symptomatic women were more similar to, than different from, those who were classified as eating disordered. Specifically, these two groups of women scored similarly on measures of negative affect (i.e., anxiety, shame), negative thinking (i.e., catastrophizing), body image concerns, and internalization of societal ideals (i.e., importance of being physically fit); both groups had significantly higher levels of distress than the asymptomatic group on these measures.

Among women, athletes have long been considered a population at increased risk for the development of disordered eating attitudes and behaviors (Hausenblas & Carron, 1999; Smolak, Murnen & Ruble, 2000), and prevalence research supports this contention (e.g., Sanford-Martens et al., 2005). For example, in a large sample of female collegiate
athletes drawn from different geographical regions in the U.S. and representing 17 sports, 2% were classified as eating disordered, 25.5% as symptomatic, and 72.5% asymptomatic (Greenleaf, Petrie, Reel and Carter (2009). In a prevalence study that included diagnostic interviews, Sundgot-Borgen and Torstveit (2004) found rates of 0 to 2% (anorexia nervosa), 1.1 to 6% (bulimia nervosa), and approximately 8% (eating disorders, not otherwise specified) among elite female athletes; all rates were higher than found among a matched group of nonathletes. Like among nonathletes, (1) subclinical disturbances are more prevalent for female athletes than actual clinical eating disorders, (2) there are more similarities than differences on measures of sociocultural pressures, body image concerns, internalization, and negative affect between these two groups, and (3) subclinical and clinical female athletes have higher levels of disturbance across all psychosocial and disordered eating measures than those who are asymptomatic (Petrie, Greenleaf, Reel, & Carter, in press).

This differential prevalence rate between athletes and nonathletes may be due, in part, to the combined pressures athletes experience from general sociocultural ideals about appearance, beauty, and being thin and the unique pressures and demands from the sport environment to perform well and maintain a fit body appearance (Torsteveit, Rosenvinge, & Sundgot-Borgen, 2008). At times, female athletes may be subjected to weight-specifications, body shape expectations, “weigh-ins,” sport physique ideals, coaches’ standards, revealing attire, judges that determine performance outcomes, and teammate competitiveness, all of which can increase their vulnerability to unhealthy weight management behaviors and attitudes (Greenleaf, 2002; Petrie & Rogers, 2001; Petrie & Sherman, 1999; Reel & Gill, 1996; Ryujin, Breaux, & Marks, 1999; Swoap & Murphy; 1995; Sundgot-Borgen, 1993). Research has documented that athletes do experience such unique sport pressures (Berry & Howe, 2000; Blacker, Drake, Reed, Almeida, &
Raudenbush, 2007; Huon & Walton, 2000; Nordin, Harris & Cummings, 2003; Thompson & Sherman, 1999), though few studies have linked these experiences directly to disordered eating attitudes and behaviors. In particular, research with athletes has not examined sufficiently the influences psychosocial factors, including sport pressures, may have on the development of eating disorders or determined how these variables may interrelate to increase and/or maintain risk.

Petrie and Greenleaf (2007) addressed this limitation in the literature, proposing an etiological model for disordered eating specific to athletes and the sport environment. Based on existing sociocultural models (Stice, 2001; Striegel-Moore & Bulik, 2007) as well as research with athletes and nonathletes (Jacobi, Hayward, de Zwaan, Kraemer, & Agras 2004; Stice, 2002), this model proposed that both general and sport-specific psychosocial factors would contribute to the development of disordered eating in female athletes. In particular, Petrie and Greenleaf identified general societal pressures to be thin or achieve a societally determined body shape (e.g., thin-ideal), sport-specific pressures regarding weight, body shape and performance, internalization of societal beauty ideals, body dissatisfaction, negative affect, dietary restraint, modeled behaviors by peers, family and teammates, and binge eating and bulimia as the primary factors in their model.

As hypothesized in this model (see Figure 1), athletes are experience distinct, yet related, forms of sociocultural ideals/pressures regarding thinness, body size/shape, and beauty. Like their nonathlete counterparts, athletes are exposed to messages and pressures from family, friends, and the media concerning what is the ideal body, why it’s important to pursue the thin ideal, what constitutes beauty and attractiveness, and how women should be in relationships and behave in relation to food and their bodies. These general messages and pressures are thought to
be ubiquitous in U.S. society and a pernicious part of girls’ and women’s socialization (e.g., Brownell, 1991; Cashel, Cunningham, Landeros, Coakley & Muhammad, 2003; Heinberg, Thompson, & Stormer, 1995; Stice & Shaw; 2004). Athletes also receive messages and pressures from teammates, coaches, and other sport personnel (e.g., judges) regarding their weight, eating patterns, body size/shape, and performance. These sport-specific pressures, like the general sociocultural ones, can be pervasive and deleterious. Although considerably more research has been conducted regarding the effects of general sociocultural pressures (e.g., Cashel et al., 2003; Stice, 2002), sport-specific pressures also have been linked to disordered eating attitudes and behaviors (Petrie et al., in press; Reel & Gill, 1996). More specifically, qualitative studies have found that female athletes who receive disparaging and critical comments about their bodies or instructions to lose weight from coaches have significantly more problems with body image concerns and disordered eating behaviors than those who have not been told such things (Kerr, Berman & De Souza, 2006; Muscat & Long, 2008; Rosen & Hough, 1988). For both factors, more extensive exposure to pressures regarding weight, body, attractiveness, and performance are hypothesized to lead athletes to internalize these ideals.

When female athletes internalize societal and/or sport-specific expectations and images and make appearance central to their self-evaluation, they are at increased risk for experiencing body image concerns. Specifically, appearance-conscious athletes compare themselves, their behaviors, their appearance, and their bodies against these internalized standards and, because few women (even athletes) can approximate the societal beauty ideal (Brownell, 1991), most will become dissatisfied with their bodies. That is, female athletes compare their current body size and shape and their self-determined level of attractiveness against the societal and sport-specific standards they have internalized. When they fall short of these internalized ideals, they blame
themselves for their shortcomings and experience dissatisfaction with their appearance, particularly the size and shape of their bodies. In a study of female collegiate athletes, Petrie (1996) found that the greater the difference between actual and ideal body weights, the more dissatisfaction the female athletes reported having in relation to their body size and shape. Among nonathletes, there is a strong causal link between internalization and body dissatisfaction (Stice, 2002). As a result of this internalization and self-evaluative process, most women (including athletes) indicate they are dissatisfied with the size and shape of their bodies (Ertel, 2008; Garner, 1997; Holm-Denoma, Scaringi, Gordon, Van Orden, & Joiner, 2009).

Body dissatisfaction is viewed as a primary precursor of disordered eating, though Stice and his colleagues (Stice, 2001; Stice, Mazotti, Weibel & Agras, 2000) have argued that its effects are indirect, occurring through two distinct, but related pathways – affect regulation and dietary restraint. Concerning affect regulation, Stice (2001) has suggested that women experience negative emotions, such as anger, sadness, guilt, embarrassment, frustration and even shame, in conjunction with their body dissatisfaction. In response to these negative emotions, women may turn to food as a way to comfort themselves and cope. Yet, when the women eat in response to such emotional cues, they often end up feeling worse about themselves, which only perpetuates the cycle. In the restraint pathway, Stice (2001) proposed that women severely restrict their food intake as a means to change their body’s size and shape and thus more closely approximate the societal beauty ideal. Although dieting may have some positive effects with respect to initial weight loss, over time it is likely to lead to such caloric deficits that women’s physiology will overwhelm their cognitive restraint and they will binge eat. That is, these women will become so hungry, that they can no longer inhibit their desire to eat and, in those instances, will consume large amounts of food in a seemingly uncontrolled manner. When such binges
occur, these women may feel like failures, become disgusted with themselves, and then recommitment to restricting their food intake. Regardless of the pathway, both negative affect and dietary restraint can set up a cycle of bingeing, followed by negative emotion (e.g., guilt, shame), a recommitment to restrict, more bingeing, and for some, other forms of purging, such as vomiting. Such a cycle can lead to bulimic symptoms because binging and purging are the immediate precursors of bulimia nervosa.

In addition to negative affect and dietary restraint, being exposed directly to other’s behaviors, such as dieting, excessive exercising, and purging, has been hypothesized as a precursor to disordered eating (Stice; 2002). Petrie & Greenleaf (2007) proposed that viewing significant other’s (e.g., family, friends, teammates) behaviors regarding food and body may increase the likelihood of social conformity and lead women to engage in similar disordered eating behaviors. Thus, athletes who see teammates restrict their food intake, exercise excessively in addition to normal training regimens, disparage their bodies, or purge (e.g., vomit) to rid themselves of food, may feel internal pressure to conform and engage in similar behaviors. They may do so to earn the approval or respect of the athletes who are engaging in those behaviors or to attain the rewards/benefits (e.g., better athletic performances, starting position on team, compliments about how one looks) that they believe these athletes are receiving from coaches, sport judges, or other sport personnel. Direct modeling of body image and eating disturbances by peers and family members has been shown to encourage internalization of the thin-ideal body (Stice, 1998), and related to the development of eating disorders (Stice, 2002).

The Petrie and Greenleaf (2007) model offers a mechanism for understanding how general and sport-specific sociocultural pressures interact to increase athletes’ risk for
developing disordered eating attitudes and behaviors. Unfortunately, no study to date has tested this model in whole or even in part, so little is known about the extent to which these variables interact as hypothesized to explain eating disorders among female athletes. Thus, the purpose of this study was to examine the Petrie and Greenleaf model in its entirety in a large, diverse sample of female collegiate swimmers/divers and gymnasts. These two sports were targeted because they represent lean-body, aesthetic sports that are highly vulnerable to the development of disordered eating (Beals & Manore, 2000; Petrie, 1996; Picard, 1999; Smolak et al., 2000; Zucker et al., 1996). In addition, national governing bodies for these sports are interested in learning more about appropriate and effective interventions, and the results of research on etiological models can form the foundation for such programming. In particular, a large sample was collected so the athletes could be matched and divided into groups – an initial exploratory sample that would be used to examine the initial model and a confirmatory sample against which the refined model could be validated. Specifically, it was hypothesized that (a) Sport-specific and general social pressures would be related to higher levels of internalization, 2) Internalization would be related to higher levels of body dissatisfaction, 3) Body dissatisfaction would be related to greater negative affect and more dietary restraint, and 4) Negative affect, dietary restraint and modeled behaviors would be associated with higher levels of disordered eating symptomatology.
CHAPTER 2

METHOD

Participants

Participants were 414 NCAA, Division-I, female collegiate gymnasts (n = 280; 20 programs), and swimmers and divers (n = 134; 6 programs) drawn from 26 different universities that were located within all regions of the U.S. The average age of the student-athletes was 19.14 years (SD = 1.86). In terms of year in school, 129 (31.2%) were freshman, 120 (29%) sophomores, 99 (23.9%) juniors, and 66 (16%) seniors. The student-athletes represented a high level of performance in their respective sports, including 64 (15.5%) who competed at the elite level, 290 (70%) at the Junior Olympic/Level 10, and 60 (14.5%) at the Junior Olympic/Level 9 or below. Two hundred sixty-nine (65%) received an athletic scholarship from their university. Regarding race/ethnicity, 341 (82.4%) were Caucasian, 20 (4.8%) Hispanic, 20 (4.8%) Asian-American, 16 (3.9%) African-American, and 1 (.2%) American Indian; 12 (2.9%) designated themselves as Other. Over half of the athletes reported living with teammates either in the dorms 125 (30.2%) or in apartments 147 (35.5%); 123 (29.7%) living without teammates, and fewer than 4.5% (19) lived at home. Their average reported GPA was 3.35 on a 4-point scale. Eighty-eight percent (365) of the athletes had participated in their sport for over 10 years. Two hundred thirty-two (55.6%) athletes were injured in the past year; of these, 14 stated their injury was due to their being “too heavy.”

The athletes’ average actual body mass index (BMI) was 22.54 kg/m² (SD = 2.04), where as their ideal BMI was 21.7 kg/m² (SD = 1.68). According to the Center of Disease Control Guidelines (2009), 7 (1.6%) of the athletes were underweight (BMI < 18.5), and 48 (11.6%) were overweight (BMI > 25); 359 (86.7%) fell within the normal weight range. Just over half of
the athletes (n = 239; 57.7%) reported being satisfied with their bodies, whereas 175 (42.3%) indicated that they were dissatisfied. For those who reported being dissatisfied, 96% said that their dissatisfaction was due to their being “overweight.” When the student-athletes were asked what they were doing about their weight, 225 (54.3%) reported that they were “trying to lose weight,” 5 (1.2%) were “trying to gain weight”, 123 (29.7%) were “trying to stay the same weight,” and 59 (14.3%) were “doing nothing with their weight.” Fifty-nine percent of the athletes (n = 244) reported that their team did not conduct regular “weigh-ins;” while the remaining 41% (n = 170) did. Of those who underwent regular “weigh-ins,” 139 (81%) said that they were weighed “in private by an athletic trainer.” In addition, over 65% (n = 273) of the student-athletes indicated that they received guidance about how to manage their weight through a nutritionist or their coaches. Ninety-nine percent of the athletes (n = 410) had menstruated at least once in the past year, and over 80% (n = 336) indicated that they experienced regular periods (8-12 times per yr) during this time frame. Ten (2.4%) athletes reported that they had been previously diagnosed with an eating disorder and 16 (3.8%) of the women currently felt that they might have an eating disorder, but were unsure.

**Instruments**

*Sport weight pressures.* Modified from Reel and Gill (1996), the 20-item Weight Pressures Scale (WPS) assesses the pressures female athletes experience in their sport environment to diet, change their body size/shape, and/or achieve a certain physical look for their performances. On each item, participants rate how often they experience each pressure on a 6-point Likert, ranging from, 1, *never*, to 6, *always*. Based on exploratory factor analysis (EFA) with principle factors extraction and squared multiple correlations as the communality estimate, a two-factor solution was obtained using the full sample from this study. The two factors were:
(1) Appearance (5 items; pressure by teammates, peers, and spectators to have a thin appearance), and (2) Weight (6 items; pressure by coaches/sport to lose weight). Total scores for each factor were the average of the items; higher scores indicate more pressure. In the current study, Cronbach's alphas were .86 (Appearance) and .90 (Weight) for both Samples A and B.

**General sociocultural pressures.** Based on the work of Stice and his colleagues (Stice & Agras, 1998; Stice, Ziemba, Margolis & Flick, 1996), the 35-item Perceived Sociocultural Pressures Scale (PSPS) assesses the amount of pressure individuals experience in seven different areas, including: (1) to have a thin body, (2) to lose weight, (3) to exercise, (4) to be more attractive, (5) to have the perfect body, (6) to diet, and (7) to change one’s appearance. Within each area, individuals rate the pressure they perceive from five different sources – family, female friends, teammates, romantic/dating partners, and the media – using a 5-point Likert scale, that ranges from 1, never, to 5, always. Total scores were calculated for each area (e.g., lose weight) by averaging across the ratings from the different sources; higher scores indicate more perceived pressure in that area. Cronbach’s alphas from the current study were .81 (Thin Body), .78 to .81 (Lose Weight), .81 (Exercise), .84 to .88 (Attractive), .85 to .86 (Perfect Body), .82 to .86 (Diet), and .85 (Appearance). Two-week test-retest reliability coefficients have ranged from .75 to .96 in a sample of female undergraduates (Stice & Agras, 1998). Stice and colleagues (Stice, 2001; Stice, 1994; Stice, Shaw & Nemeroff, 1998) have provided extensive information regarding the validity of the original scale on which this one was based.

**Internalization.** The 9-item Internalization-General scale from the Sociocultural Attitudes Towards Appearance Scale-3 (SATAQ-3; Thompson, van den Berg, Roehrig, Guarda & Heinberg, 2004) assesses the extent to which individuals have internalized general societal messages about beauty, attractiveness, and body size/shape. For each item, individuals rate their
agreement using a 5-point Likert scale that ranges from 1, *completely disagree* to 5, *completely agree*. For this study, the 9 items were parceled into two internalization measures using the odd and even items. Total scores are the average of each measure; higher scores indicate greater internalization. Cronbach’s alphas from the current study were .88 to .90 (Parcel 1) and .91 to .92 (Parcel 2). Extensive data concerning the scale’s validity has been provided (Stice, 2001; Stice & Agras, 1998; Thompson et al., 2004).

*Body satisfaction.* The 7-item Body Factor from the Body Parts Satisfaction Scale-Revised (BPSS-R; Petrie, Tripp, & Harvey, 2002) assesses satisfaction with one’s body size and shape by focusing on specific body parts that are typically associated with dissatisfaction in women (e.g., hips, thighs). For each item, individuals rate their level of satisfaction using a 6-point Likert scale, ranging from 1, *extremely dissatisfied,* to 6, *extremely satisfied.* Total score is the mean; higher scores indicate more satisfaction. Petrie et al. reported internal consistency (Cronbach’s alpha) of .90 in a sample of female undergraduates; alphas from the current study were .88 to .89. Petrie et al. also provided extensive information concerning the scale’s validity. In addition to the body factor, the one item overall satisfaction question from the BPSS-R was included. This question is rated on the same scale and assesses one’s satisfaction with “overall body size and shape.”

The 10-item Body Shape Questionnaire-Revised (BSQ-10-R; Mazzeo, 1999) assesses preoccupation with body size and shape. Each item is rated on a 6-point Likert scale ranging from 1, *never,* to 6, *always.* Total score is the mean; higher scores indicate increased preoccupation. Internal consistency (Cronbach’s alpha) was .96 in a sample of female undergraduates (Mazzeo). Cronbach’s alphas from the current study were .96 to .97. Mazzeo found that the BSQ-10-R correlated significantly with the Eating Attitudes Test (*r* = .74; Mazzeo,
1999) and the BULIT-R ($r = .77$; Thelen, Mintz, & Vander 1996) and provided other data concerning the scale’s validity.

**Dietary restraint.** The 9-item Dietary Intent Scale (DIS; Stice, 1998) measures restrained eating patterns and dieting behaviors. Participants rate each dietary behavior using a 5-point Likert scale ranging from 1, *never*, to 5, *always*. Total score is the mean; higher scores indicated more restraint. The DIS is internally consistent (Cronbach’s alpha = .94) and has been shown to be reliable over time (1-month test-retest = .92) in a sample of female undergraduates (Stice, 1998). Cronbach’s alpha from the current sample was .90 to .91. Regarding validity, research has shown that the DIS correlated with the Dutch Retrained Eating Scale ($r = .92$; Van Strien, Frijters, Van Staveren, Defares & Deurenberg, 1986), a behavioral measure of fat consumption ($r = -.32$), and body dissatisfaction ($r = .48$) (Stice & Shaw, 1994).

The 10-item Dutch Restrained Eating Scale (DRES; Van Strien et al., 1986) assesses behavioral restraint around food intake. For each dieting behavior, participants rate their frequency of use on a 5-point Likert scale, ranging from 1, *never*, to 5, *always*. Total score is the mean; higher scores indicated more restraint in eating behaviors. The DRES has adequate internal consistency (Cronbach’s alpha = .94), 1-month test-retest reliability (.92), and correlates strongly with the DIS ($r = .92$) and Restraint Scale ($r = .82$; Herman & Polivy, 1980). The DRES also correlates negatively with self-reported caloric intake (Laessle, Tuschl, Kotthas, Pirke, 1989; Stice, 1998). Cronbach’s alpha for the current study was .94.

**Negative affect.** Twenty-three items from the Positive and Negative Affect Schedule – Expanded Form (PANAS-X; Watson & Clark, 1992) assess levels of Fear (6 items), Sadness (5 items), Anger (6 items), and Guilt (6 items). For each mood state, participants rate their level of agreement using a 5-point scale that ranges from 1, *very slightly or not at all*, to 5, *extremely*. A
total score is derived for each of the four negative moods and is the average for that scale; higher scores indicate stronger negative affect. Cronbach’s alphas have ranged between .61-.87 (Fear), .54-.98 (Sadness), .56-.87 (Anger), and .70-.83 (Guilt), and two-month test-retest reliabilities have range from .64 to .71 in samples of male and female undergraduates (Bagozzi, 1993). Cronbach’s alphas for the current study were .88 (Fear), .92 to .93 (Sadness), .87 (Anger), and .92 (Guilt). Watson and Clark (1992) provided extensive information regarding the scale’s validity.

**Modeled behaviors.** A 20-item measure was designed for this study to assess the extent to which individuals have seen others engaging in known behavioral indicators of disordered eating, including: dieting behaviors/controlling food, using purging/weight control behaviors, expressing/exhibiting body image concerns, binge-eating, and excessively exercising after eating. For each behavior, participants rate the extent to which they have seen family members, coaches, teammates, and friends (romantic, school) engaging in that behavior on a 5-point Likert scale from 1, *never* to 5, *always*. Total scores are determined for each behavior by summing across and averaging the ratings of family, coaches, teammates, and friends; higher scores indicate greater presence of that behavior. Cronbach’s alpha for the current study were .75 to .76 (Dieting), .72 (Purge/weight control), .76 to .79 (Body image concerns), .80 to .81 (Binge eating), and .73 to .74 (Excessive exercise).

**Disordered eating.** The 36-item Bulimia Test Revised (BULIT-R; Thelen, Mintz, & Vander Wal, 1996) assesses bulimic symptoms based on criteria from the *Diagnostic and Statistic Manual of Mental Disorders - 4th ed., Text Revision (DSM-IV-TR)* (American Psychiatric Association [APA], 2000). Using a 5-point scale ranging from 1, *absence of a disturbance* to 5, *extreme disturbance*, individuals rate all 36 items, though only 28 are scored. Total scores range
28, no bulimic symptomatology, to 140, high levels of bulimic symptomatology. Thelen et al. (1996) reported Cronbach’s alpha (.98) and two-month test-retest reliability (.95) in samples of female undergraduates, and provided extensive data concerning the scale’s validity. Cronbach’s alphas from the current study were .91 to .94.

The 50-item Questionnaire for Eating Disorder Diagnoses (Q-EDD; Mintz, O’Halloran, Mulholland, & Schneider, 1997) measures eating disorder symptoms based on DSM-IV-TR criteria (APA, 2001). Based on their endorsement of symptoms, participants were classified as: eating disordered (i.e., anorexia nervosa, bulimia nervosa, subthreshold bulimia, menstruating anorexia, non-bingeing bulimia, and binge-eating disorder), symptomatic (i.e., some symptoms), or asymptomatic. Mintz et al. (1997) provided extensive evidence on the scale’s reliability and validity, and it has been used successfully to designate eating disorder diagnosis in research with college athletes (Greenleaf, Petrie, Carter, & Reel, 2009).

Social desirability. The 12-item Marlowe-Crowne Social Desirability Scale (MCSD; Form B, Reynolds, 1982) assesses whether or not an individual is responding in a socially desirable way or present themselves in a positive light. For each item, individuals respond True or False. Total scores are the sum of all the items to which individuals respond in a socially desirable manner and can range from 0, low, to 12, high. Reynolds (1982) reported a KR-20 of .76 and adequate validity 12-item version of the MCSD-Form B in samples of men and women. KR-20 from the current study was .57 to .62.

Demographics. Participants provided information regarding their age, race/ethnicity, year in school, GPA, height, weight, ideal weight, menstrual history, living arrangements, athletic history, past eating disorder diagnoses, current injuries, and team weighing procedures.
Procedure

Following approval from the University of North Texas Institutional Review Board to conduct the study, 62 NCAA Division-I gymnastic head coaches and 45 swimming/diving head coaches were contacted to solicit their participation in the study. The coaches were notified initially by email regarding the study and its purpose (see Appendix C for letter of solicitation and support); follow-up contact was made via phone or email depending on the coach’s preference. The coaches were told that the study had been sponsored by an NCAA grant and its purpose was to examine the physical and psychological well-being of collegiate female student-athletes. To participate, coaches had to provide permission for their teams to complete a survey questionnaire during the fall semester (September) and to identify a contact person (e.g., athletic trainer) who would take responsibility for administering the surveys to the participants.

Of the 107 teams solicited initially, 69 did not respond, 12 responded but declined to participate, and 26 indicated they would participate in the study. Of the 26 participating schools, surveys were distributed by athletic trainers \( n = 9 \), team managers \( n = 1 \), assistant coaches \( n = 3 \) and head coaches \( n = 13 \). For their assistance, each team contact was paid $150.00 after the completion of the data collection.

A few weeks prior to the data collection, which occurred during the last two weeks of September 2008, each team contact was emailed a reminder about the upcoming research project and the specific date on which they would administer the surveys was scheduled. Contacts were then mailed a package that contained: (1) the specific number of surveys needed for that team (each survey was placed in an unsealed envelope on which the athlete’s identifying code number was written), (2) standardized instructions for administering the surveys (see Appendix D), and (3) the researcher’s contact information. In addition, the first author called each team’s contact
prior to data collection at his/her school to answer any questions he/she might have regarding the research process.

At the data collection meetings, each athlete received an unsealed envelope that contained the consent form and the survey packet. Because athletes did not put their names or any other identifying information on the survey itself, a special code number was placed on the survey and the envelope that was linked to the athletes’ names. Each survey contained the demographic questionnaire, Social Desirability Scale (SDS), Weight Pressure in Sport Scale, Perceived Sociocultural Pressure Scale (PSPS), Sociocultural Attitudes Toward Appearance Scale-3 (SATAQ-3), Body Parts Satisfaction Scale-Revised (BPSS-R), Body Shape Questionnaire (BSQ-10-R), Dietary Intent Scale (DIS); Dutch Restrained Eating Scale (DRES), Bulimia Test Revised (BULIT-R), Questionnaire for Eating Disorder Diagnosis (Q-EDD) and the Positive Affect Negative Affect Scale-Revised (PANAS-X). Questionnaires were counterbalanced to control for ordering effects. At the beginning of the data collection, the team contacts read the instructions to the team and then had the athletes complete the consent form. Participation was voluntary, though no athlete refused to complete the survey packet. Once instructions and consents were completed, the team contacts left the area so the athletes could complete the questionnaires in private, without the presence of anyone other than teammates.

When each athlete finished her survey, she placed it (and the signed consent form) back in the envelope, sealed it, and then wrote an X across the flap to ensure that it was not opened prior to the first author receiving the packets. When all athletes were done with the survey, the team contact returned to the area and collected all the sealed envelopes. The team contact placed all the envelopes in the provided postage-paid mailing carton and then mailed the package to the first author. The first author confirmed receipt of the mailing packages with the team contacts.
Inspection of the envelopes revealed that none had been tampered with prior to being returned to the first author.
CHAPTER 3

RESULTS

Data Analysis

For the 26 teams, team contacts identified 503 athletes who were active and on the team rosters. Of the 503 surveys that were sent to the teams, 454 were returned. Of these, 24 were blank and 16 had significant missing data and were discarded, giving a participation rate of 91%. For the 414 usable surveys, no one was missing more than 20% of the items on any measure. Missing values were replaced using the average score on that measure for that individual participant. For example, if a participant omitted 1 item from the DRES, then the mean for the 9 remaining items was obtained, rounded to the nearest whole number, and then used to replace the missing value. Across the 414 surveys, no single participant had more than a total of 9 missing items across an entire survey packet.

Once missing data were replaced, total scores were computed and distributional properties examined. Skewness and kurtosis were within acceptable ranges, with the exception of the BULIT-R, which was positively skewed. Next, internal consistencies, means, standard deviations, and bivariate correlations were computed for each variable. Because the purpose of the study was to test Petrie and Greenleaf’s (2007) proposed model and then confirm it in an independent sample, the 414 athletes were matched on body mass index (BMI) and then grouped into Sample A (n = 207; exploratory sample) and Sample B (n = 207; confirmatory sample). To ensure that the two samples truly were similar to each other, they were compared using MANOVAs for each factor’s set of measured variables. For all variables, no significant differences were found between the two groups (p’s > .05). Structural equation modeling (SEM) was used to test the proposed model (Anderson & Gerbing, 1988). SEM involves two steps.
First, confirmatory factor analysis (CFA) is used to establish the measurement model, which is the relationship of the measured variables to the hypothesized constructs. Second, once the measurement model has been confirmed, the structural model is tested to determine the strength and significance of the proposed pathways among the latent constructs. Structural Equation Modeling Multivariate Statistics Program (EQS) (Bentler, 1995), with the maximum likelihood (ML) procedure, was used to perform these analyses and estimate the model parameters. Incremental, absolute, and predictive fit indices, such as the Satorra-Bentler chi-square ($\chi^2$) goodness of fit, the comparative fit index (CFI), the nonnormed fit index (NNFI), the standardized root mean square residual (SRMR), the root mean-square error of approximation with 90% confidence interval (RMSEA), and Akaike’s information criterion (AIC), were used to evaluate the model’s fit as recommended (Weston & Gore, 2006; Worthington & Whittaker, 2006).

The data in both Samples A and B demonstrated adequate univariate and multivariate normality for the maximum likelihood procedure in EQS (Weston & Gore, 2006). Correlations among the measured variables that were part of the final measurement model are in Table 1. Means, standard deviations, skewness, and kurtosis and internal consistencies are presented in Table 2. Although a few of the variables had significant correlations with the SDS, none of the correlations exceeded .21 (or 4% of shared variance) so there were limited problems regarding the athletes presenting themselves in a favorable light in how they responded to the other questionnaires.

Regarding the prevalence of disordered eating among the athletes, based on the Q-EDD, 290 (70%) were classified as asymptomatic, 98 (23.7%) as symptomatic, and 26 (6.3%) as eating
disordered. On the BULIT-R, using the recommended cut-off of 104 (Thelen et al., 1996) 7 (1.6%) were classified as having bulimia nervosa.

Measurement Model - Sample A

CFA was used to test the measurement model. Sport Pressures was added first and represented by the two factors from the WPS – Appearance and Weight. The two variables loaded positively on the Sport Pressures construct, indicating that higher scores on this latent variable represented higher levels of perceived weight pressures resulting from participation in sports. Next, Sociocultural Pressures was added to the model and represented by the seven areas of pressure from the PSPS (e.g., have a thin body, lose weight). All seven pressures loaded positively, indicating that the construct represented the experience of general societal pressures regarding weight, body and appearance.

Internalization was the next construct added to the model, and was represented by the two parceled measures from the SATAQ-3 (parcel 1 was comprised of the even items and parcel 2 the odds items). The error variance for parcel 2 had to be set using Bollen’s (1989) method, but after that, both variables loaded positively on the Internalization construct, indicating that it measured the extent to which individuals had internalized society’s values regarding beauty, body, appearance and attractiveness.

Body Satisfaction was added next and represented initially by the BPSS one-item overall body measure, BSQ-10-R, and the BPSS-body factor. Due to poor fit, the BSQ-10-R was dropped. The BPSS-overall body and BPSS-body factor loaded positively on the construct, and thus represented level of satisfaction with one’s body.

Negative Affect was added next and represented initially by the PANAS Fear, Anger, Sadness, and Guilt subscales. Because the PANAS-guilt demonstrated poor fit, it was dropped
from the model. The remaining three variables loaded positively as expected, so higher scores indicated greater feelings of Negative Affect. Dietary Restraint was represented by the DIS and DRES total scores; each measured variable loaded positively as expected, so the construct represented greater levels of dietary restraint/behaviors.

Modeled Behaviors was added next and represented by the five behaviors that are related to disordered eating (e.g., dieting, binge-eating). Purging and binge-eating did not load significantly on the construct and thus were dropped from the model. The remaining three measured variables loaded positively, indicating that the construct represented higher levels of exposure to these behaviors. Finally, Disordered Eating was entered and represented by the Q-EDD and the BULIT-R. After setting the error variance for the BULIT-R using Bollen’s (1989) method, the two variables loaded positively as expected, indicating that the construct represented higher levels of disordered eating. See Table 3 for the factor loadings and errors associated with each measured variable. The overall fit of the final measurement model was good (see Table 4).

Structural Model – Sample A

The hypothesized model was: (a) Sport Pressures and Sociocultural Pressures would be correlated with each other and positively related to Internalization, (b) Internalization would be negatively related to Body Satisfaction, (c) Body Satisfaction would be negatively related to Negative Affect and Dietary Restraint, (d) Negative Affect, Dietary Restraint, and Modeled Behaviors would be positively related to Disordered Eating. The initial model had a poor fit with the data (see Table 4), including nonsignificant pathways among some of the constructs. Thus, a model respecification was undertaken following the guidelines outlined by MacCallum (1995). Initially, the non-significant pathways were examined. First, the pathway between Modeled Behaviors and Disordered Eating, and then the pathway from Sport Pressures to Internalization,
was dropped. All remaining pathways in the model were significant and in the expected direction. Next, based on the Lagrange Multiplier Test statistic and consideration of existing theory and research (e.g., Reel & Gill, 1996), a pathway between Sport Pressures and Dietary Restraint was added to the model. The resulting respecified model fit the data well (see Table 4).

As mentioned previously, the remaining pathways were significant and in the expected direction. The experience of more Sociocultural Pressures was related to greater Internalization of those societal values about beauty, appearance and body ($R^2 = .27$). Greater Internalization, in turn, was related less Body Satisfaction ($R^2 = .16$). Less Body Satisfaction then was associated with more Negative Affect ($R^2 = .16$). Less Body Satisfaction and greater Sport Pressures were related to greater use of Dietary Restraint by the athletes ($R^2 = .63$). Finally, greater Dietary Restraint and higher levels of Negative Affect were associated with more Disordered Eating symptoms ($R^2 = .48$).

**Measurement Model - Sample B**

The final measurement model from Sample A was tested in Sample B. All the same measured variables loaded similarly in Sample B and the overall fit of the model was good. See Table 3 for the factor loadings and errors associated with each measured variable and Table 4 for the model fit indices.

**Structural Model – Sample B**

The respecified model that resulted from Sample A was tested with the Sample B data. The model fit the data well (see Table 4) and all pathways were significant and in the expected directions (see Figure 3). Again, Sociocultural Pressures was related to greater Internalization.
(R² = .41), and Internalization to lower levels of Body Satisfaction (R² = .38). Less Body Satisfaction was associated with more Negative Affect (R² = .14), and Less Body Satisfaction and greater Sport Pressures with more Dietary Restraint (R² = .69). Finally, greater Dietary Restraint and higher levels of Negative Affect were associated with more Disordered Eating (R² = .58).
In the current study, Petrie and Greenleaf’s (2007) etiological model for the development of disordered eating among female athletes was tested. In this model, both general sociocultural and sport-specific pressures were hypothesized to increase athletes’ internalization of the sociocultural beauty ideals which, in turn, would lead to body dissatisfaction. Body dissatisfaction’s affect on disordered eating would occur indirectly, through increases in negative affect and higher levels of dietary restraint. In addition, seeing important people in one’s life engage in pathological eating and weight control behaviors was expected to have a direct effect on the development of disordered eating. Although based on general eating disorder theory as well as research conducted with athletes, this multidimensional, sociocultural model had not been tested previously with athletes, so the current study represented an advance in research on disordered eating among female athletes.

The initial test of the Petrie and Greenleaf (2007) model revealed a poor fit with the data. Based on nonsignificant parameter estimates, the pathways from Sport-specific Pressures to Internalization and from Modeled Behaviors to Disordered Eating were dropped. Although these changes did improve the fit slightly, one additional change was made in the model. A pathway from Sport-specific Pressures to Dietary Restraint was added, which significantly improved the model’s fit to the data. This respecified model then was tested in the confirmatory sample (Sample B) and found to fit the data well, with all pathways being significant and in the hypothesized directions. This result suggests that the respecified model is valid and may generalize to other comparable samples of female collegiate athletes.
In the respecified model, as hypothesized, higher levels of general sociocultural pressures to be thin and attractive were associated with greater internalization of those beauty and body ideals. That is, the more female athletes are exposed sociocultural ideals concerning appearance and body shape, the more they took on as their own and integrated into their belief systems these images and ideals and viewed them as central to their self-evaluation. This finding is consistent with research that has demonstrated the powerful influence of sociocultural ideals on young women’s beliefs about themselves and their bodies (Cafri, Yamamiya, Brannick & Thompson, 2005; Stice, 2000; Thompson et al., 2004). For example, Tylka and Subich (2004) found that, among female undergraduates, sociocultural pressures predicted greater internalization of societal ideals, accounting for 48% of its variance. In addition, a meta-analysis of longitudinal and experimental research identified sociocultural pressures as a risk factor in the development of internalization (Stice, 2002). Among athletes, general and sport-specific pressures have been related to disordered eating (e.g., Greenleaf, 2002; Reel & Gill, 1996; Ryujin et al., 1999; Sundgot-Borgen, 1993). In a recent study involving a large, diverse group of female collegiate athletes, Petrie et al. (in press) found that those classified at eating disordered and symptomatic were similar to one another, though both more pressures regarding their weight from the media, family, and friends than did those athletes who were asymptomatic. Collectively, these findings support the importance of general sociocultural pressures in understanding the development of disordered eating among athletes.

The originally hypothesized link between Sport Pressures and Internalization was not supported, though a new pathway direct to Dietary Restraint was added and found to contribute significantly to the model. This finding is consistent with other studies that have shown sport pressures to be associated with increases in eating pathology (e.g., Berry & Howe, 2000; Byrne
& McLean, 2002; Ertel, 2008; Marchand, 2008; McNulty, Adams, Anderson, & Affenito, 2001; Rosen & Hough, 1988; Sundgot-Borgen, 1994). In this study, Sport Pressures predicted Dietary Restraint and accounted for the majority of the 62.4% of variance explained in this variable. Thus, the effects of sport pressures appear to be different than originally proposed by Petrie and Greenleaf (2007). Instead of operating indirectly, through internalization, sport pressures from significant others (e.g., coaches, teammates, judges) appears to have a direct effect on the onset and maintenance of pathological eating attitudes and behaviors. For example, Petrie et al. (in press) found that those female collegiate athletes who were classified as eating disordered reported experiencing more pressures from their coaches to lose weight than either the symptomatic or the asymptomatic groups. In addition, the eating disordered and symptomatic athletes felt more pressure about their weight from the judges and teammates than did the asymptomatic athletes. Further, in their study of current and retired gymnasts, Kerr et al. (2006) reported a strong association between negative comments made by coaches about body size and shape and the gymnasts believing they needed to lose weight. In particular, the gymnasts indicated that coaches needed to accept that female athletes’ bodies were going to vary in size and shape and to stop weighing gymnasts and making comments about their bodies. For athletes, particularly those in lean-body or physique-dependent sports (e.g., gymnastics), pressures from coaches (and potentially teammates) to have a certain body type and lose weight may occur even when they are satisfied with their bodies and may trigger specific pathogenic weight control behaviors, such as restricting food intake, as was found in the current study. Additional research is needed to better understand the strength and direction of sport pressures’ influence on disordered eating and to determine if different relationships exist than were found in this study among athletes from sports that are not so weight/body shape dependent.
The more the female athletes took on as their own society’s ideals concerning beauty, appearance, and body size/shape, the less satisfied they reported being with the size and shape of their own bodies. This finding, Internalization being inversely related to Body Satisfaction, is consistent with research conducted with nonathletes (e.g., Stice, 2002) and athletes (Greenleaf, Petrie, Reel & Carter, in press). Because most women fall short of the societal beauty ideal (Brownell, 1991), when physical appearance is central to their self-evaluation they are likely to be disappointed in themselves and their bodies. These women will view their bodies as unacceptable when compared to the internalized ideal and subsequently experience feelings of discomfort and dissatisfaction with how they look and the size and shape of their bodies.

Body dissatisfaction has been found to be a causal risk factor (Stice, 2002) and is central to all models of disordered eating (e.g., Stice, 2001; Tylka & Subich, 2004), though its effects may not be direct. Stice and colleagues (Stice & Agras, 1998; Stice, Shaw & Nemeroff, 1998; Stice, Nemeroff & Shaw, 1996; Stice, 1994) have suggested that body dissatisfaction leads women to either (1) restrict their food intake in hopes of shrinking their body size to more closely approximate the thin ideal, which is particularly difficult to achieve, and/or (2) blame themselves for how they look, view themselves as physically inadequate, and experience feelings of guilt, anger, sadness, disappointment and anxiety, because physical appearance is a central self-evaluative dimension and most women’s bodies fall short of the societal ideal. In the current study, the influence of body satisfaction on disordered eating was indirect, occurring through negative affect and dietary restraint as hypothesized. Female athletes who reported being more dissatisfied with their bodies also indicated experiencing more feelings of anger, sadness, and fear and being more restrictive in their eating, which is consistent with research conducted with nonathletes (e.g., Stice, 1994). For example, Stice et al. (1998) provided a confirmatory test of
the dual pathway model of bulimia using prospective data from a community sample of female adolescents. They found that initial body dissatisfaction predicted negative affect and dietary restraint roughly 6 months later. Thus, body dissatisfaction appears to be an important predictor of disordered eating for athletes, as well as nonathletes, and its influence indirect through the experience of negative emotions and a drive to limit food intake.

As hypothesized, Negative Affect and Dietary Restraint were related positively to Disordered Eating, accounting for between 48% and 58% of the variance in this construct. Female athletes who were feeling angry, sad and fearful and who were restricting their food intake reported increased levels of bulimic and other disordered eating symptoms. This finding is consistent with research conducted with nonathletes, which has demonstrated similar strong relationships among these variables (e.g., Stice, 2002). Women who feel unhappy, sad, discouraged or angry may try to cope with and distract themselves from their negative emotions (and thus comfort themselves) by binge eating (Stice, 2001; Stice, 1998). Stice (2002) reported that women who experienced negative emotions consumed more calories than those who felt more positively. Bulimics often report feeling depressed before the onset of a binge (Mitchell et al., 1981), and significantly less so afterwards (Steinberg, Tobin & Johnson, 1990). Among athletes, higher levels of sport anxiety have been related to more bulimic symptoms (Holm-Denoma, Scaringi, Gordon, Van orden, & Joiner, 2009), and feelings of inadequacy associated with disordered eating patterns (Wichstrom, 2000). Women who are restricting their food intake and experiencing severe caloric deficits may be overwhelmed by their physiology and experience disinhibited eating. Whether caused by negative affect or dietary restraint, binge eating may be followed by additional negative emotions (e.g., guilt, shame, anger) and a recommitment to restrict food intake (Heatherton & Baumeister, 1991). When this occurs, women increase the
likelihood that they will binge eat again, which may then lead to other forms of purging (e.g., vomiting) as they attempt to rid themselves of the calories they have consumed. This cycle is the direct precursor to the development of bulimia nervosa.

Although hypothesized in the original model, Modeled Behaviors were unrelated to Disordered Eating. Social learning theory (Bandura, 2004; Bandura, Blanchard & Ritter, 1969) and social conformity would support the idea that others influence ones behaviors. Such observational learning/modeling might be particularly salient among members of cohesive units, such as sport teams or sororities (Crandall, 1988). However, in the current study, athletes reported that observing what their teammates, family members, and friends were doing was not associated with their own levels of disordered eating attitudes and behaviors. Because this is one of the first studies to examine this construct in relation to disordered eating, it will be important to include it in future studies to see if its plays a role different than hypothesized by Petrie and Greenleaf (2007) and/or is related to disordered eating, but for different subgroups of athletes.

Overall, most pathways in the Petrie and Greenleaf (2007) model were supported. As expected, the experience of general sociocultural pressures regarding beauty, appearance and self were related to greater internalization of those ideals. Internalization, in turn, was associated with higher levels of body dissatisfaction, which then predicted greater dietary restraint and the experience of more negative emotions. Pressures from the sport environment regarding appearance and weight were not, as expected, related to internalization, but were strongly associated with the female athletes restricting their food intake. The female athletes who felt sad, angry and fearful and who reported restricting how much they ate experienced more bulimic and other disordered eating symptoms. Although this model was tested and then confirmed in an
independent sample, additional research is needed to further test and validate the pathways supported in this study.

Treatment Implications

First, it is important to not overlook subclinical levels of disordered eating in athletes. Just over one-quarter of the athletes in this study were identified as “symptomatic” and engaged in subclinical levels of disordered eating, whereas another 5% were considered to be eating disordered. These findings are consistent with past prevalence research (e.g., Carter & Rudd, 2005; Greenleaf et al., 2009), and underscores the extent of the problem among female collegiate athletes. In addition, these athletes reported engaging in chronic dieting in an attempt to lose weight, feeling “overweight,” perceiving negative pressure from their sport environment, and dealing with “body composition expectations on their team.” Because many symptoms and characteristics associated with disordered eating can be hidden within the sport environment, and even considered ideal (Thompson & Sherman, 1999), sport consultants and counselors need to understand the extent of the problem and be attuned to signs and symptoms. On an optimistic note, a large majority of the athletes indicated that they were offered services to meet with a nutritionist and often times had mandatory consultations with campus dieticians. These and other interventions (e.g., Smith & Petrie, 2008) show promise for assisting athletes who already are having body image concerns and eating pathology and preventing their development among those who are not.

Second, because sport pressures play a significant role in the development of dietary restraint, athletes may benefit from sport consultants working directly with sport organizations and coaches to change the sport environment and lessen the pressures that are present. Coaches self-awareness about their behaviors toward and influence with their female athletes appears
limited. For example, in a recent study with gymnasts, coaches attributed the use of unhealthy weight control practices to other coaches, but not to themselves, even while athletes themselves identified coaches as the source for most pressures about body size/shape and weight (Kerr, Berman, & De Souza, 2006). Thus coaches need to become aware of their behaviors regarding weight, body and performance expectations, need to understand how strongly their behaviors and comments influence female athletes’ beliefs about themselves and the extent to which they engage in pathogenic eating and weight control behaviors, and then refrain from behaviors (e.g., weighing athletes) that have been linked to negative outcomes. Sport consultants can work directly with coaches to implement these changes or with sport organizations to develop eating disorder prevention and treatment policies that encourage a healthy approach to weight, eating, body shape, exercise, and performance.

Third, given the connection between sociocultural pressures, internalization and body image concerns and the development of disordered eating, body dissatisfied athletes can be targeted for intervention to reduce their risk. These interventions, which can include nutritional education, self-esteem education, and media literacy, can be implemented in a time-limited manner and do not even have to address disordered eating directly. For example, Smith and Petrie (2008) compared a cognitive-dissonance based intervention for eating disorders with two alternatives- a psychoeducationally based healthy weight and a weight-list control- to determine the effectiveness in reducing body dissatisfaction, negative affect, dietary restraint and internalization of the sociocultural ideal in body dissatisfied female collegiate athletes. They found that meeting 1 x per week for an hour for three weeks using the cognitive-dissonance based intervention provided some positive effects in decreasing depression and sadness, and internalization, as well as increasing body satisfaction. In cognitive-dissonance based
intervention, there might be potential opportunities to intervene with athletes’ perceived pressures and/or levels of internalization of the thin-ideal, and subsequently help reduce symptoms in the other areas.

Finally, given the large percentage of female athletes who were classified as eating disordered or symptomatic, collegiate athletic departments may want to development and implement annual screening for disordered eating. Measures, such as the QEDD, or those developed specifically for use with athletes, such as the Survey of Eating Disorders among Athletes (SEDA; Guthrie, 1991), Athletic Milieu Direct Questionnaire (AMDG; Nagel et al., 2000) for university athletes or the Health, Weight, Dieting, and menstrual History Questionnaire (Beals & Hill, 2006), could be given as part of athletes’ annual pre-participation medical evaluation (Bonci et al., 2008). Female athletes who score as at-risk could then undergo a clinical interview to determine diagnosis. Such screening could identify those who are at-risk and target them for treatment.

Limitations and Implications for Future Research

There were several limitations in the current study that warrant discussion. First, all data were collected via self-report, which can result in under or dishonest reporting. However, the athletes completed the questionnaires anonymously and no athletic personnel were present during data collection. Further, relationships to a measure of social desirability were low, suggesting that the athletes were not trying to present themselves in a favorable light through their responses. In future studies, researchers may want to corroborate self-report prevalence data with clinical interviews to more accurate determine diagnostic categories.

Second, the study’s sample was comprised of only female swimmers/divers and gymnasts from Division I universities, so generalizability is limited to only similar groups of athletes.
Future research should examine this study’s respecified model in a broader group of female athletes (e.g., different sports, different competitive levels, racial/ethnic minorities) and consider these factors in relation to the development of disordered eating among male athletes. It will be important to determine if sport pressures has the same effect with other female athletes and men as it did in this study.

Third, the data collected were cross-sectional so conclusions about causality cannot be determined. Now that the model have been supported, however, future research should examine pathways using longitudinal data to determine if sport pressures experienced at the beginning of an athlete’s season predicts her level of dietary restraint at the end of the season. Research among nonathletes supports the directionality of the proposed pathways in the Petrie and Greenleaf (2007) model, but these paths need to be examined empirically in samples of female athletes.

Finally, longitudinal studies might follow athletes during their college careers and then into their post-college years to determine if changes occur when athletes stop training and competing at a high level. It would be important to determine the duration and extent to which college sport experiences influence later behaviors. For example, does the experience of extensive weight pressures in the sport environment have a carryover effect after retirement from athletics? If so, future research may want to examine treatment approaches that can address the long-term eating attitudes/behaviors in retired student-athletes.

Conclusions

This study provided information about the nature of the development of disordered eating in collegiate athletes. For athletes, general and sport specific pressures appear to play an important role in the development of body image concerns and ultimately disordered eating
behaviors, though the originally hypothesized path for sport pressures was not supported. Instead, sport pressures effects were direct on to dietary restraint, being associated with athletes consuming less food in response to comments/pressures concerning their weight and appearance. Further, body dissatisfaction’s influence appears to occur through negative affect and restrained eating, and accounts for about 50% of the variance in athletes’ disordered eating behaviors. The findings from this study provide a foundation on which sport consultants can develop interventions to target and reduce risk factors for disordered eating.
Table 1

Correlation Matrix of Measured Variables in Sample A (n = 207) and Sample B (n = 207)

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<th>Variable</th>
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Note. Sample A correlations are shown above the diagonal and Sample B below the diagonal. WPS = Weight Pressures Scale Factor 1 (social appearance) Factor 2 (sport/coach); PSPS = Perceived Sociocultural Pressures Scale (lose weight, thin body, exercise, attractiveness, perfect body, diet, change appearance); SITAQ = Sociocultural Attitudes Towards Appearance Scale-3; BPSS-R = Body Parts Satisfaction Scale-Revised Body Factor and Overall Body Factor; PANAS-X = Positive Affect Negative Affect Schedule-Expanded; DIS = Dietary Intent Scale; DRES = Dietary Restrained Eating Scale; Q-EDD = Questionnaire for Eating Disorder Diagnoses; BULIT-R = Bulimia Test-Revised; SDS = Social Desirability Scale; * = p < .05; ** = p < .01.
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**Note:** WPS = Weight Pressures in Sport (scores range from 1 [never felt pressure from sport to lose weight] to 6 [always feel pressure from sport to lose weight]). PSPS = Perceived Sociocultural Pressures Scale (scores range from 1 [never feel pressure] to 5 [always feel pressure]); SATAQ-3 = Sociocultural Attitudes Towards Appearance Scale-3 (scores range from 1 [completely disagree with sociocultural attitudes about appearance] to 5 [completely agree with sociocultural attitudes about appearance]); BPSS-R = Body Parts Satisfaction Scale-Revised Body Factor (scores range from 1 [extremely dissatisfied with body] to 6 [extremely satisfied with body]); PANAS-X = Positive Affect Negative Affect Schedule-Expanded (scores range from 1 [very slightly or not at all experience negative emotions] to 5 [extremely experience negative emotions]); DIS = Dietary Intent Scale (scores range from 1 [never engage in dietary behaviors] to 5 [always engage in dietary behaviors]); DRES = Dietary Restrained Eating Scale (scores range from 1 [never engage in disordered eating behavior] to 5 [always engage in disordered eating behavior]); Q-EDD = Questionnaire for Eating Disorder Diagnoses (categorical variable with no means/SD.), BULIT-R = Bulimia Test-Revised (scores range from 28 [few bulimic behaviors] to 140 [a lot of bulimic behaviors]).
### Table 3

**Standardized Parameter Estimates for the Measurement Model (n = 207 per sample)**

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*Note.* WPS = Weight Pressures Scale Factor 1 (social appearance) Factor 2 (sport/coach); PSPS = Perceived Sociocultural Pressures Scale (lose weight, thin body, exercise, attractiveness, perfect body, diet, change appearance); SATAQ-3 = Sociocultural Attitudes Towards Appearance Scale-3 parcel 1 and 2; BPSS-R = Body Parts Satisfaction Scale-Revised Body Factor and Overall Body Factor; PANAS-X = Positive Affect Negative Affect Schedule-Expanded; DIS = Dietary Intent Scale; DRES = Dietary Restrained Eating Scale; BULIT-R = Bulimia Test-Revised; Q-EDD = Questionnaire for Eating Disorder Diagnoses.
Table 4.
Model Fit (n = 207 per sample)

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<td>.084 (.073-.094)</td>
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<tr>
<td>Sample B</td>
<td></td>
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<tr>
<td>Measurement Model</td>
<td>150</td>
<td>281.57</td>
<td>.954</td>
<td>.964</td>
<td>-18.42</td>
<td>.037</td>
<td>.079 (.068-.090)</td>
</tr>
</tbody>
</table>

Note. df = degrees of freedom; NNFI = non-normed fit index (> .95 indicates good fit); CFI = comparative fit index (> .90 indicates good fit); AIC = Akaike Information Criterion indicates good fit; SRMR = standardized root mean squared residual (< .08 indicates good fit); RMSEA = root mean square error of approximation (90% Confidence Interval; < .06 indicates good fit). $X^2$ Chi-square change values reflect a comparison to sample B * = p < .05, ** = p < .01, *** = p < .001.
Figure 1. Etiological model of the interplay of eight risk or causal risk constructs determined to be factors in the development of disordered eating (Petrie & Greenleaf, 2007).
Figure 2. Respecified model with standardized parameter estimates and disturbance terms for Sample A. (\(* = p < .05\).)
Figure 3. Respecified model with standardized parameter estimates and disturbance terms for Sample B. (* = p < .05.).
APPENDIX A

LITERATURE REVIEW
Certainly sport environments may contribute to the development of disordered eating and those that heavily emphasize weight and/or body shape can be particularly damaging to an athlete’s body image, self-concept, and eating behaviors. Few studies, however, have used an etiological model to explore the development of eating disorders among athletes and little work has been done longitudinally to determine how risk factors lead to the formation of pathological eating. Understanding how disordered eating develops in certain athlete populations will help professionals take important preventative measures, as well as aid in the construction of more effective intervention and treatment programs for current disordered eating athletes.

In light of the need to do more extensive etiological research with respect to eating disorders in athletes, the goal of the study is to test a comprehensive etiological model with collegiate gymnasts, swimmers, and divers, specifically examining the pathways from social and sport-specific pressures to internalization, body dissatisfaction, negative affect, dietary restraint and disordered eating. Using Petrie and Greenleaf’s (2007) etiological model for guidance, it is hypothesized that pressures to fit unrealistic body ideals, whether they be culturally defined or sport-specific, will encourage internalization and body dissatisfaction in collegiate gymnasts, swimmers and divers and subsequently disordered eating.

Eating Disorders

More prevalent among women than men, eating disorders are one of the most common clinical problems faced by women and girls today (Smolak & Murnen, 2001; Stice & Shaw, 2002). The Eating Disorders Awareness and Prevention Organization estimates that between 5 and 10 million U.S. women struggle with eating disorders (Shisslak, Crago, & Allender, 1994). In a body image survey done by Psychology Today, 89% of women reported that they wanted to lose weight and desired to weigh an average of 15 lbs. less (Garner, 1997). Shockingly, fifteen
percent of the women went on to state that they would give up more than 5 years of their life to be the weight they wanted. In Western societies, being considered attractive is often linked with being thin.

Through pervasive media images, industrialized, Western societies broadcast extremely powerful messages to women that being thin, young and attractive is ideal. These messages saturate the culture with unrealistic expectations and standards of beauty that often are unnatural and unattainable for most women (Brownell, 1991). These values pressure women to conform to a “thin-ideal” that is the accepted standard by which individuals’ judge their appearance. Consequently, these societal pressures to be thin and attractive can influence the development of eating disorders. When there are discrepancies between one’s actual body and society’s ideal, body dissatisfaction, negative affect and restrained eating can emerge, and propagate an unhealthy cycle of disturbed eating (Polivy & Herman, 1986; Striegel-Moore et al., 1986). Moreover, objectification of the female body is believed to contribute to the risk of disordered eating as women and young girls learn to view appearance as a measure of one’s value and self-worth in U.S. culture, only further encouraging women’s overzealous pursuit of attractiveness (Striegel-Moore & Bulik, 2007). Many women who develop disordered eating often believe that others evaluate them according to their appearance and to the exclusion of other personal qualities and attributes, such as a sense of humor or kindness (Cooper & Fairburn, 1987). As a result, eating disorders have become extreme means through which women try to attain the prevailing thin-ideal (Fredrickson & Roberts, 1997), and pathological eating poses a hazardous threat to women’s overall health and psychological well-being. In fact, strong relationships have been found between disordered eating attitudes and behaviors, and lower levels of psychological well-being, including decreased body satisfaction (Stice & Shaw, 2002), lower self-esteem,
depression, substance abuse (Stice et al., 2000), psychosocial impairment and increased suicide risk (Stice & Shaw, 2002).

**Diagnostic categories.** As described by the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR)*, eating disorders are characterized by severe disturbances in eating behavior and distortions in perception/attitude of body shape and weight, that when left untreated, can be potentially life-threatening (American Psychiatric Association, 2000). The three main types of clinical eating disorders are anorexia nervosa (AN), bulimia nervosa (BN), and eating disorder not otherwise specified (EDNOS) (APA, 2000); however, at times these categories can be complicated by evidence suggesting that eating disorders lie on a continuum of disturbance, rather than defined by discrete categories (Mazzeo & Espelage, 2002; Stice, Killen, Hayward, & Taylor, 1998; Tylka & Subich, 2002).

Anorexia nervosa typically begins in mid-to late adolescence and the onset may be associated with a stressful life event (APA, 2000). Anorexia nervosa is defined as the refusal to maintain body weight at or above 85% of what is expected for a given age and height, intense fear of gaining weight or becoming fat despite being underweight, undue influence of body weight/shape on self-evaluation, denial of the seriousness of the current low weight, disturbance in an individual’s perception of their body weight/shape, emergence of amenorrhea lasting for at least 3 months, and the presence of restriction and/or binging and purging (APA, 2000, p. 589). Apart from a high mortality rate, the incidence of anorexia appears have increased in recent years (APA, 2000, p. 587). Ninety percent of those suffering from anorexia are women and those with the disorder have a suicide risk 50 times greater than that of most women (APA, 2000; Chavez & Insel, 2007). In fact, according to the National Institute of Mental Health, anorexia nervosa has the highest mortality rate of any psychiatric disorder (Chavez & Insel, 2007).
The onset of bulimia nervosa is usually in late adolescence or early adulthood and often begins following an episode of dieting. Bulimia is defined by several features including recurrent episodes of binge eating characterized by eating an amount of food that is larger than what most people would eat during a similar period of time and under similar conditions, a sense of lack of control over eating during the episode, recurrent inappropriate compensatory behavior in order to prevent weight gain (e.g., self-induced vomiting, fasting, excessive exercise, and misuse of laxatives, diuretics, enemas, or other medications), binge eating and compensatory behaviors that occur twice a week for three months, and undue influence of body weight/shape on self-evaluation (APA, 2000). Ninety percent of those suffering from bulimia are women and those with the disorder typically experience persistent disturbed eating for several years (APA, 2000).

Eating disorder not otherwise specified is a category of clinical eating disorder where all the criteria for anorexia or bulimia are not met, but sufficient disturbances still exist. EDNOS categories/criteria include the (1) regular use of inappropriate compensatory behaviors by an individual of normal weight after eating small amounts of food, (2) repeatedly chewing and spitting out, but not swallowing, large amounts of food, (3) binge-eating disorder, (3) anorexia without menstrual dysfunction, (3) anorexia with significant weight loss, but still at a normal weight, and (3) bulimia with binge-eating and compensatory behaviors that occur less than twice per week or for less than three months (APA, 2000, p. 594). EDNOS is the most common category of eating disorders encountered in routine clinical practice, yet it has barely been studied in the literature. In fact, there has been little to no research on its treatment (Fairburn & Bohn, 2005).

Subclinical disordered eating categories are different from the clinical disorders. Many young women report feeling fat, dieting excessively, being dissatisfied with the size and shape of
their body and exhibiting disordered eating symptomatology (Mintz et al., 1997; Tylka & Subich, 1999), but do not meet the criteria for anorexia, bulimia or EDNOS. Individuals with subclinical disordered eating often exhibit unhealthy eating behaviors or have unhealthy views of their body and self. For example, Mintz et al. (1997) categorized those who did not have an eating disorder into groups of symptomatic (i.e., some eating disorder symptoms, but no DSM-IV diagnosis) and asymptomatic (i.e., no eating disorder symptoms), and those with a clinical eating disorder into groups of anorexia, bulimia and four EDNOS. Mintz et al. (1997) described those that were symptomatic as individuals who were at risk for the development of an eating disorder, but were subclinical and did not meet the criteria for any DSM-IV eating disorder diagnosis. The clinical eating disorder categories of EDNOS defined by Mintz et al. (1997), as well as by the DSM-IV were (1) menstruating anorexia, (2) subthreshold bulimia, (3) nonbinging bulimia, and (4) binge-eating disorder. The DSM-IV also suggests two additional EDNOS; “normal weight anorexia” and “chew-spitting.” Longitudinal research has shown that subclinical disorders can, but do not always, progress into more severe eating disorders (Shisslak et al., 1995).

**Prevalence.** Among women in the United States, 0.5 to 1.0 % meet full criteria for anorexia nervosa and about 1 to 3 % meet full criteria for bulimia nervosa (APA, 2000). Recent data indicates that roughly 60% of those suffering from eating disorders do not meet DSM-IV-TR diagnostic criteria for anorexia or bulimia (Fairburn & Bohn, 2005; Wade, Crosby & Martin, 2006). Instead, most meet criteria for EDNOS, with binge-eating disorder accounting for the largest part of the category (Wade, Bergin, Tiggemann, Bulik & Fairburn, 2006). Overall research indicates that females are naturally at a higher risk for disordered eating, and specifically college women are more prone to as a result of several factors, such as needing to cope with new and difficult adjustments in their lives, changes in social and dating pressures and
societal expectations to be thin, young and attractive. Current prevalence rates among college women for clinical eating disorders are estimated to be in a somewhat similar range of .5% to 3% (APA, 2000; Hoek & van Hoeken, 2003); however, bulimic symptomatology has been reported to be as high as 40% in some female college populations (Kaplan & Sadock, 1998). University women are known to be at risk for disordered eating (Kirk et al., 2001; Mintz & Bretz, 1988), and in particular, dieting, weight concerns and disordered eating patterns have been shown to be prevalent among them (McCann, 1995; Mintz & Bretz, 1988; Spitzer, Henderson & Zivian, 1999). Furthermore, higher rates of bulimia have been found in college cultures that place a heavy emphasis on dating (Rodin, Striegel-Moore & Silberstein, 1985), and eating disorders in young women have been shown to be exacerbated by increased peer pressure (Berry & Howe, 2000) and life transitions, such as beginning college (Surrey, 1991).

Although the percentage of true clinical eating disorders in the general population is low, there are large numbers of women who nevertheless report engaging in unhealthy eating and weight regulatory behaviors that fall in the subclinical range. For example, Cohen and Petrie (2005) found in a sample of female undergraduates that 38.9% were symptomatic. Tylka and Subich (2002) found that 59% of college women reported frequently skipping meals in an effort to control their weight and 36% ate fewer than 1,200 calories per day. Roughly 25-30% reported eliminating fats and carbohydrates from their diets, and fasting for more than 24 hours, whereas 4-7% admitted using laxatives, diuretics and vomiting after eating to control their weight (Tylka & Subich, 2002). This research provides evidence that college women engage in disordered eating behavior at relatively high levels, thus, further attention is warranted by researchers to address the harmful and detrimental health concerns that arise in this population.
Physical and psychological complications. The ramifications of eating disorders can be staggering because those suffering are at risk for a plethora of health problems involving serious medical difficulties, physical consequences, and psychological disturbances. These physical and medical problems include kidney and liver damage, disruption of the menstrual cycle leading to osteoporosis and infertility, permanent loss of bone mass, destruction of the teeth, rupture of the esophagus, cardiac problems and disruption of vitamin and mineral balances in the body, to name a few (Mitchell, Pomeroy & Adson, 1997). Other health consequences include abdominal pain, dehydration, electrolyte imbalance, hormone irregularities, weight loss, anxiety, depression, social withdrawal, rigidity, poor self-esteem, impulsiveness, lack of assertiveness, body checking, excessively weighing, sleep disturbances, substance abuse, secret eating, and excessive exercising (Petrie & Greenleaf, 2007). Research has shown women with no history of an eating disorder exhibit lower food preoccupation (Palmer, Robertson, Cain, & Black, 1996), less body checking (Shafran, Fairburn, Robinson, & Lask, 2003), lower concerns about dieting (Cohen & Petrie, 2005), fewer thyroid problems (O'Connor, Gwirtsman, & Loosen, 2003) and higher levels of sensory disturbances to gastric distention, than do bulimics (Zimmerli, Walsh, & Guss, 2006). Cohen and Petrie (2005) found that female undergraduates who met clinical eating disorder diagnoses or who were symptomatic, were similar to each other, but had more sadness/depression, less confidence, lower self-esteem, greater sociocultural internalization of thin and attractiveness, and more shame, than those who were asymptomatic. However, they did find that those with eating disorders reported more bulimic symptoms and greater weight fluctuations than the symptomatic and asymptomatic groups, as well as more dichotomous thinking, self-control, and preoccupation with their body shape and size (Cohen & Petrie, 2005). Interestingly, despite these physical and psychological features associated with disordered eating
in undergraduate women, Meyer (2005) found that 56% of college females who reported eating disorder symptomatology did not believe that their disturbed attitudes and behaviors warranted therapy.

**Summary.** Although there are distinct differences and diagnostic criteria among anorexia, bulimia, EDNOS and subclinical eating disorder categories, all types of disordered eating can be characterized by disturbances in eating attitudes, body image, and self-perceptions, as well as by the use of pathogenic weight control behaviors. These disorders generally are associated with a wide range of physical and psychological problems, such as the loss of bone density, preoccupation with food, mineral deficiencies, amenorrhea, anxiety and liver damage. In the general population, prevalence rates of clinical eating disorders are relatively low, though the frequency of subclinical disorders is much higher. Research indicates that the college environment may present unique risk factors for undergraduate women making them more vulnerable to the development of disordered eating.

**Sport Environment**

By most accounts, athletes tend to exhibit enhanced emotional health, high self-esteem and an appreciation of body strength (Morgan & Costill, 1972); however, research also suggests that athletes as a population may be at greater risk for disordered eating due to additional pressures placed upon them to be thin (Garner, 1991; Striegel-Moore et al., 1986). When sport demands promoting an ideal physique are coupled with societal pressures encouraging thinness and physical fitness (Brownell, 1991), a dangerous combination of weight pressures can develop that may lead to disordered eating in athletes. Moreover, certain factors may have the potential to add additional pressure and result in an overemphasis on weight and body shape, such as sport-specific or coach sanctioned weight restrictions, routine “weigh-ins,” form-fitting uniforms,
subjective judging that assesses physical form and ideal appearance, stereotyped body standards of what an athlete “should be,” and/or low percent body fat for optimal performance (Petrie & Greenleaf, 2007). Female athletes can feel tremendous pressure to be lean in order to please a coach, make the team or maintain a competitive edge in their sport (Black 1991; Borgen & Corbin, 1987; Harris & Greco, 1990). In fact, female athletes have been shown to report wanting to lose weight and wanting an ideal body that is thinner, tighter, more toned, and lower in body fat than their own (Krane, Waldron, Michalenok & Stiles-Shipley, 2001). This idealized body description is similar to society’s thin-ideal body expectations and to the ideal physique reported by women in the general population (Bordo, 1993). In a study with high school girls, athletes with disordered eating were twice as likely to report suffering from amenorrhea than athletes without disordered eating (Nichols, Rauh, Barrack, Barkai, & Pernick, 2007). With female collegiate gymnasts, O’Connor, Lewis & Kirchner (1995) found athletes to have significantly higher rates of amenorrhea than their female college counterparts, illustrating how a lean-body sport, believed to be at risk for disordered eating, can experience eating disorder-like complications as well.

Given the prevalence of body image concerns and disordered eating in college women, athletes are a special subgroup, whose dual roles as athletes and students, can create a stressful college experience that may put them at greater risk for disordered eating (Williams, Sargent & Durstine, 2003). Female student-athletes have been shown to be more apt to evidence signs of pathological eating, more prone to the development of an eating disorder, and at greater risk than the general female college population (Picard, 1999), specifically if they are a part of a judged, lean-body or weight-focused sport (Carter & Rudd, 2005; Gutgesell, Moreau & Thompson, 2003; Reinking & Alexander, 2005; Schwarz, Arugute & Gold, 2005). Chopak & Taylor-
Nicholson (1991) found that 66% of those female collegiate athletes who reported having had an eating disorder at some point in their lives, believed that their disordered eating was exacerbated by their participation in athletics, which seems to illustrate how female student-athletes may experience a type of joint pressure from their sport and culture to be thin.

In addition to the actual sport environment, athletes’ personalities have been identified as potential risk factors (Brooks-Gunn et al., 1988; Garner & Garfinkel, 1980; Hopkinson & Locke, 2004; Johnson, 1994; Taub & Blinde, 1992). For example, high level athletes often exhibit personality and psychological characteristics that are similar to those of disordered eating individuals, such as perfectionism (Hopkinson & Locke, 2004; Johnson, 1994). Also, the need to maintain control over one’s body shape is common in both anorexia and bulimia, and has been found in ballet dancers (Brooks-Gunn, Burrow & Warren, 1988; Garner & Garfinkel, 1980) and female athletes in lean body sports (Taub & Blinde, 1992).

Investigators have attempted to identify risk factors for the development of disordered eating in athletes, such as certain environments, societal pressures or personality traits, yet the majority of studies indicate that the sport in which an athlete participates contributes to whether or not they are prone to develop disturbed eating attitudes and behaviors (Davis, 1997; Hausenblas & Carron, 1999; Petrie, 1996; Sundgot-Borgen, 1994; Williamson, Netermeyer, Jackman, Anderson, Funsch & Rabalais, 1995). In particular, aesthetically-oriented, lean body, weight regulated, judged sports are thought to place the greatest pressure on athletes for developing body, weight and eating concerns. For instance, certain athletes compete in weight classification systems (e.g., rowing, riding, weigh lifting, wrestling) that force them to focus on weight, caloric intake, and body size in order to maintain eligibility, whereas other athletes may compete in sports (e.g., gymnastics, figure skating, diving, dance) that involve an aesthetic
component and emphasize appearance and the contours of one’s physique in determining one’s performance. Some athletes compete in endurance sports (e.g., cycling, swimming, cross country running), where a lower weight can be considered advantageous for long-distance endeavors.

Athletes who compete in aesthetically-oriented, lean body focused sports, such as figure skating, dance, diving and gymnastics, may be at the greatest risk. Sports such as these often focus on the perfection of the body and promote thin-ideal physiques, in addition to involving subjective judging and encouraging the belief that being thinner will improve performance. Research has found that female athletes who participate in aesthetically-oriented sports are more likely to report body dissatisfaction, score higher on eating disorder inventories and have clinical eating disorders than those who participate in non-aesthetic or non-weight dependent sports (Berry & Howe, 2000; Smolak et al., 2000; O’Connor & Lewis, 1997; Sundgot-Borgen, 1994).

Borgen and Corbin (1987) found that 20% of athletes in lean body sports were either significantly weight preoccupied or displayed tendencies toward eating disorders, whereas this was true for only 10% of the athletes in other sports and for 6% of non-athletes. Further, Garner, Garfinkel, Rockert and Olsmsted (1987) found that among ballet dancers, 41% met criteria for either a fully developed eating disorder or subclinical disordered eating patterns. Tiggemann & Slater (2001) found that former dancers self-objectified more often than non-dancers, and also scored higher on self-surveillance and disordered eating, with differences in disordered eating being accounted for by the dancers’ self-objectification. The fact that former dancers scored higher on self-objectification than non-dancers provides further evidence for the notion that women in body-focused sports are at greater risk for worrying about what their bodies look like and developing disordered eating (Tiggemann & Slater, 2001).
Much like with dancers, Greenleaf (2004) conducted a study examining the weight and physical appearance pressures experienced by 86 collegiate synchronized figure skaters from five teams, and found that the “ideal” skating body was described as tall, thin and strong. The skaters reported experiencing moderate weight pressures, where almost half felt pressure to lose weight and have an “ideal” skating physique. Interestingly, the majority of weight pressures experienced were self-imposed suggesting that several of the skaters had internalized the sport-specific body ideal. Although the weight concerns in Greenleaf’s (2004) study were not found to be as negative as some of those found among single and pair skaters, the synchronized figure skaters still reported that their uniforms increased awareness and consciousness of their bodies and appearance.

Similar to dance and figure skating, previous research has indicated that gymnasts experience weight and body image concerns, as well as disordered eating disturbances (Kerr et al., 2006; Petrie, 1993). Petrie (1993) extended previous research on eating disorders by examining how attitudinal and personality characteristics might vary across eating disorder classification in 215 female collegiate gymnasts. Petrie (1993) found that over 60% of the gymnasts endorsed some sort of disordered eating symptomatology with only 22% of the gymnasts reporting normal or non-disordered eating. In fact, the entire sample wanted to be on average, 7 pounds lighter. Furthermore, when the groups of eating disordered gymnasts were compared, higher levels of disordered eating were associated with lower self-esteem, a desire to weigh less, and a greater endorsement of socio-cultural values regarding women’s attractiveness (Petrie, 1993). In addition to wanting to weigh less, O’Connor et al. (1995) found that former female collegiate gymnasts exhibited higher scores than average college females on the drive for
thinness subscale of the Eating Disorders Inventory and reported an increase in body satisfaction upon graduating college.

Reel and Gill (2001) found that 45% of female swimmers reported that wearing a revealing swimsuit is a weight stressor. Toro et al. (2005) also found that swimmers experienced body concerns as a result of wearing a swimsuit and having their bodies publicly exposed. Moreover, they found that out of 18 different sports, the highest percentage of athletes who induced vomiting to manage their weight were swimmers. Swimmers expressed concerns related to feeling fat, fearing weight gain and dieting to lose weight (Toro, Galilea, Martinez-Mallen, Salamero, Capdevila & Mari, 2005).

Athletes in aesthetic, lean body sports experience weight pressures and often believe weight and appearance is important to performance. These sport cultures appear to believe that performance will improve with weight loss (Rosen & Hough, 1988) and that expectations to be thin and have an “ideal” body shape are part of the sport context (Greenleaf, 2004). Although several sports may increase the risk of disordered eating, the motives behind the pathological attitudes and behaviors may differ. For example, a wrestler may aim to be a specific weight, whereas a gymnast may try to attain a certain “look.” Female aesthetic athletes tend to exhibit a greater drive for thinness and anorexic symptoms than do endurance athletes or ball/game athletes (Hausenblas & Carron, 1999). Therefore, not all sports necessarily increase the risk of disordered eating the same way; however, a heavy emphasis on weight does seem to create more vulnerability, regardless of the motives, and increase athletes’ propensity toward developing disordered eating attitudes and behaviors.

For athletes, training or competing in an overly weight-focused environment can lead to the development of eating pathology. Apart from the thin-focused nature of aesthetically-
oriented, lean body, weight-regulated sports, it is important to consider whether these sport environments have added sources of weight pressure from variables such as “weigh-ins,” physical evaluations (e.g., percent body fat), or comments by coaches to lose weight. Research indicates that “weigh-ins” and other forms of physical evaluation can increase anxiety and weight-related concerns (Kerr and Dacyshyn, 2000), potentially foster negative body image (Thum, 2007) and heighten disturbed eating behaviors (McNulty, 2001) in both women and men. It is assumed that there are likely to be similar effects with athletes as well, especially if the athletes are engaged in a lean-body, weight-regulated or aesthetic sport already.

When retired elite gymnasts were asked about their former experiences, Kerr and Dacyshyn (2000) found that some reported being subjected to daily “weigh-ins,” monthly “fat tests,” public posting of their weights, and punishment if they were considered overweight by their coaches, which many of them believed was responsible for their enduring preoccupation with weight and body image. In addition, relevant to intervention and treatment, the gymnasts indicated that the emphasis on weight and body shape was a constant stress while they were competing, and that many of them remained in a continued battle to control their weight, even after retirement (Kerr & Dacyshyn, 2000).

McNulty’s (2001) study illustrated the negative outcomes of physically evaluating individuals, especially those engaged in physical performance. McNulty (2001) examined the factors contributing to eating disorder behaviors in several thousand active duty military men and women. It was found that unhealthy weight-related behaviors, such as use of laxatives, diuretics, diet pills, vomiting, excessive exercising and fasting, to meet set military standards, all increased during body measurement and fitness periods for both genders, which were part of mandatory biannual Physical Readiness Testing cycles lasting a few months. Year-round use of these
behaviors occurred at significantly higher rates among Marines. McNulty (2001) argued that the strict military regulations regarding weight and fitness put additional pressure on service women. The weight restrictions and fitness requirements in some way may function similarly to what athletes experience on their teams.

In addition to “weigh-ins” and physical fitness or evaluation tests, another potential risk factor for athletes is comments made by coaches to lose weight. Rosen & Hough (1988) found that two-thirds of the gymnasts in their sample reported that their coach had given them feedback that they were too heavy and needed to lose weight. Seventy-five percent reported engaging in unhealthy weight control behaviors, such as vomiting, fasting and using diet pills in response to their coach’s directives. Rosen and Hough (1988) concluded that, “comments from someone critically important in an athlete’s life, someone whom the athlete always wishes to please, carry much weight. When these comments focus on a highly sensitive issue, they can devastate an athlete. Telling a gymnast that she is too fat or praising her for losing excess weight, without investigating the means by which she has lost the weight, can easily initiate or solidify an overt eating disorder” (p.144).

When athletes are weighed, physically evaluated or told to lose weight, an environment so overly focused on weight and body shape may form, which may act as a catalyst for the development of disordered eating. When paired with training and competing in an aesthetically-oriented, lean body sport, these additional sources of weight pressure might add to the existing pressures to be thin and fit. If this is the case, female athletes in these sport contexts might be even more inclined to develop disordered eating than those who are not subjected to such additional weight pressures.
Especially among already at-risk sports, professionals have been shown to stress the importance of de-emphasizing weight to reduce the risk of athletes developing eating disorders (Cogan, 2005). Researchers recommend that weighing athletes, just for its own sake is not wise, because “weigh-ins” are potentially one of the most destructive forms of monitoring for athletes. Instead, sport professionals should refrain from weighing athletes to prevent future eating problems (Cogan, 2005; Petrie & Sherman, 1999). Moreover, weight monitoring by coaches is not necessary and can be problematic in helping athletes achieve their desired weight (Cogan, 2005). Experts warn that for athletes who are self-conscious, publicly exposing their weight could have detrimental psychological consequences as well, so it is advised that if done at all, “weigh-ins” be conducted in private. In fact, Petrie and Sherman (1999) recommend that when weighing athletes, evaluation should be conducted only when medically necessary and done by a sports medicine professional. Also, they should be conducted in a sensitive manner, where athletes’ are weighed in private and “blind” to their own measurements (turned away from the scale and not read out-loud).

Athletes and non-athletes, particularly those in college, are exposed to the same general pressures about body size/shape and diet, but athletes experience additional pressures inherent in the sport environment. Smolak et al., (2000) conducted a meta-analysis on both the risk and protective elements of athletic participation and eating problems, and found that athletes are at somewhat greater risk for disordered eating than nonathletes, especially if they participate at an elite level in a lean-body sport that emphasizes thinness. Research and meta-analyses on eating disorders among athletes suggests that specific subgroups of athletes have a higher propensity toward developing disordered eating than individuals in the general population or in other types of sports (Borgen & Corbin, 1987; Byrne & McLean, 2001; Hausenblas & Carron, 1999; Picard,
Given these findings, it is not surprising that female collegiate student-athletes involved in lean body, aesthetically-oriented sports have added pressures from their sport, in addition to those that come from being a college woman. Pressures to perform well, look a certain way, control their weight, earn/keep financial benefits (scholarships), meet demands of the sport, and/or make the “line-up” can often lead to disordered eating and other unhealthy ways of coping to meet expectations. Certain personality traits, such as perfectionism, and competing at higher levels like Division-I, also seem to increase the likelihood of disordered eating. It’s not surprising then to see that Division-I female collegiate gymnasts are an extremely vulnerable population to the development of disordered eating.

Despite evidence that female athletes in certain sports are at increased risk for disordered eating, more research needs to be done to address the specific individual and sport-related characteristics that create disordered eating and other types of increased risks for women in college. Research examining eating disorders and athletes appears to neglect the complexities involved in determining the risk factors and contributing causes of disordered eating, primarily focusing on simple comparison studies between athletes and non-athletes (Petrie & Greenleaf,
More extensive investigation of within and between group comparisons is needed to better understand how eating disorders develop over time and progress in certain populations of female athletes. Etiological models help do this, as well as provide hypothesized relationships among the proposed risk factors. Many important risk factors have been examined in the literature; however, few studies have explored the role sport pressures play in the development of eating disorders from a model framework. Additional research needs to be done to test proposed relationships to help explain why some athletes are at higher risk for disordered eating than others and to clear up some of the ambiguity in the research regarding athletes and eating disorders.

**Prevalence.** Consistent with the general population, rates of clinical eating disorders are relatively low, with anorexia nervosa ranging between 0% and 2% for female athletes, bulimia nervosa ranging between 0% and 6%, and EDNOS occurring in roughly 8% of female athletes (Carter & Rudd, 2005; Johnson, Powers, & Dick, 1999; Sundgot-Borgen & Torstveit, 2004). In a study with 1620 male and female elite athletes, Sundgot-Borgen & Torstveit (2004) found that more athletes (13.5%) than controls (4.6%) had subclinical or clinical eating disorders. The prevalence was higher among female athletes in aesthetic sports (42%) than in endurance (24%), technical (17%), or ball sports (16%), suggesting that female athletes in weight-dependent sports have a higher prevalence of subclinical and clinical disordered eating (Sundgot-Borgen & Tortveit, 2004). Using the Q-EDD, Sanford-Martens et al., (2005) examined clinical eating disorders in 158 female NCAA athletes and found that 5.1% of the overall sample and 3.6% of those in lean-body sports met criteria for clinical eating disorders.

Similar to the general population, subclinical disordered eating is more prevalent in athletes than clinical eating disorders (Johnson et al., 1999). For the most part, with respect to
subclinical and pathogenic weight control behaviors, female athletes tend to report more
disordered eating symptomatology, than do females from the general population (Hausenblas &
Carron, 1999), and college-aged female athletes tend to resort to more dysfunctional dietary
behaviors for weight control than their male counterparts (Swearngin, 1995). In a study
conducted by the NCAA with 1,445 female athletes, 5.5 % reported that they engaged in
pathogenic weight control behaviors on a weekly basis, such as vomiting and using laxatives and
diuretics (Johnson et al., 1999). Furthermore, Rosen et al., (1986) conducted a study with 182
female collegiate athletes and found that 32 % reported practicing at least one pathogenic weight
control behavior, although how frequently was not mentioned. In a large study by Carter and
Rudd (2005), surveyed 900 Division-I student-athletes over the course of two years and found
that subclinical eating problems were more common than clinical eating disorders in athletes;
19% of female athletes reported disordered eating in year one and 17% in year two. Furthermore,
athletes from lean sports reported significantly more subclinical symptoms than did those from
non-lean sports (18.8% vs. 12.1%). Similarly, differentiating between “clinical” and
“symptomatic” disordered eating, Sanford-Martens et al., (2005) conducted a study with 266
collegiate female athletes. They defined clinical eating disorders as meeting all criteria in the
*DSM-IV* for an eating disorder and symptomatic as reporting any symptoms of an eating disorder
regardless of whether or not all criteria is met. In other words, the symptomatic category
included both diagnosable and subclinical individuals. Sanford-Martens et al., (2005) found that
as a whole, 20% were found to be “symptomatic” for an eating disorder, and after excluding
those with diagnosable eating disorders, 14.5 % of them reported subclinical disordered eating;
more than twice as much as Johnson et al. (1999) found six years earlier. In addition, 12.8% of
the female athletes in lean-body sports reported subclinical disordered eating (Sanford-Martens
et al., 2005). The results of these prevalence studies indicate that a large percentage of athletes do exhibit disordered eating behaviors and these behaviors depict a wide array of eating patterns, ranging from normal eating to severe, diagnosable eating disorders. In part, it appears that a significant number of collegiate athletes report subclinical, non-diagnosable eating problems.

Etiological Model for the Development of Disordered Eating Among Female Athletes

Basing their work on the dual-pathway model (Stice, 1994), socio-cultural model (Striegel-Moore et al., 1986), and general eating disorder research (Jacobi et al., 2004; Stice, 2002), Petrie and Greenleaf (2007) proposed an etiological model for disordered eating specific to the sport environment. The model was based on eating disorder research from women, thus, it is most predictive for female athletes, although they say it can be used for male athletes if interpreted cautiously. Despite the plethora of research on eating disorder risk factors, there were few integrative etiological models of disordered eating for athletes. The model offers insight into how specific sport pressures interact with other risk factors to impact athletes’ eating attitudes and behaviors. Although Petrie and Greenleaf’s (2007) etiological model is not representative of all potential risk factors in the development of eating disorders, it does allow risk factors to be tested longitudinally within groups, establishing the precedence needed to determine if a variable is indeed a risk factor.

In light of the need to do more extensive etiological research with respect to eating disorders in athletes, the goal of the study is to test a comprehensive etiological model with collegiate gymnasts, swimmers and divers, specifically examining the pathways from social and sport-specific pressures to internalization, body dissatisfaction, negative affect, dietary restraint and disordered eating. Using Petrie and Greenleaf’s (2007) etiological model for guidance, it is hypothesized that pressures to fit unrealistic body ideals, whether they be culturally defined or
sport-specific, will encourage internalization and body dissatisfaction in collegiate gymnasts, swimmers and divers. It is expected that greater body dissatisfaction will subsequently result in an increased propensity toward disturbed eating, and that athletes with more body dissatisfaction in general, will report more negative affect and dietary restraint. It is also predicted that modeled behaviors will be related to disordered eating as well.

The etiological model provides a framework for understanding the interplay of eight constructs considered to be risk factors in the development of disordered eating (Petrie & Greenleaf, 2007). These constructs are as follows: (1) general societal pressures to be thin or achieve a societally determined body shape (e.g., thin-ideal); (2) sport-specific pressures regarding weight, body shape, and performance; (3) internalization of societal body ideals, be they thin or muscular; (4) body dissatisfaction; (5) negative affect; (6) dietary restraint; (7) modeling of disordered eating and other weight control behaviors by peers and family; and (8) binge eating and bulimia (Petrie & Greenleaf, 2007). In addressing the relationships among the eight constructs in the etiological model, a concise explanation of each pathway is described below. In the current study an emphasis is placed on using the model with females; therefore, research related to males is not mentioned.

Pressures Regarding Weight and Body Size

Eating disorder research has consistently found that body dissatisfaction and eating disturbances among young women are often accompanied by a social environment that reinforces the thin body-ideal, whether it be by society, family, peers or a sport culture (Berry & Howe, 2000; Nevonen & Broberg, 2000; Stice, 1998; Strong & Huon, 1998; Wade & Lowes, 2002). With college women, Stice (1998) showed that social reinforcement of the thin-ideal in the form of negative comments made by family, peers and the media significantly correlated
with bulimic symptomatology, such as binge eating and purging. Similarly, in a qualitative study on women with clinical eating disorders, Nevonen and Broberg (2000) found that many women felt that comments made by others about weight or appearance had contributed to the development of their eating disorder, underlining and further emphasizing the importance of the social environment on shaping eating attitudes and beliefs. Social pressures from significant others (e.g., parents, coaches, teammates, judges, peers, fans, etc.) are persuasive and compelling forces that can contribute to the onset and maintenance of pathological eating attitudes and behaviors (Rosen & Hough, 1988; Sundgot-Borgen, 1994). A study by Berry and Howe (2000) demonstrated that social pressure by coaches and peers to diet and be thin was a significant predictor of restrained eating and eating disorder symptomatology in female university gymnasts. Similarly, Doughty and Hausenblas (2007) found that collegiate female gymnasts indicated increased body dissatisfaction and drive for thinness, the more they experienced negative influences related to their physique and appearance by parents, coaches, teammates, friends, fans and judges. Moreover, research indicates that pressure from parents to diet and lose weight are associated with restrained eating (Paxton et al., 1991), eating pathology (Thelen & Cormier, 1995), unhealthy dieting, body dissatisfaction and drive for thinness (Strong & Huon, 1998), illustrating the influential role parents have on their children’s eating attitudes and behaviors as well. The role of a parental figure might be important in better understanding a coach’s influence as well, particularly in sports that require athletes to spend long, extensive training time with the coach or move away from home at a young age to train.

Both children and athletes seek approval, positive reinforcement and validation from parents and coaches, thus, one could speculate that they might respond similarly to unhealthy pressures to diet or lose weight, whether the pressure comes from a parent or a coach. A large
percentage of athletes in Sundgot-Borgen’s (1994) study admitted that they dieted due to recommendations made by their coach, and Kerr et al., (2006) found that retired gymnasts who received disparaging comments about their bodies or instructions to lose weight while they were participating had significantly more disordered eating patterns than those who had not received such comments. Both studies demonstrate the tremendous impact social pressures from important others can have on athletes’ eating and weight control practices.

In addition to general pressures to be a particular body size, athletes also experience specific sport pressures. The true influence of sport-specific pressures on internalization of the thin-ideal is unknown for the most part because studies examining the relationship are sparse. Consequently, including this pathway in the etiological model allows for the relationship to be further studied. Despite the lack of evidence for the relationship between sport-specific pressures and internalization of the thin-ideal, the relationship of sport-specific pressures and disordered eating has been documented (Dale & Landers, 1999; Reel & Gill, 1996). Dale and Landers (1999) hypothesized that weight loss techniques used by wrestlers to make their weight limits would be similar to the behavior of bulimics because wrestlers often "cut weight" (intentional rapid weight loss), in order to compete in their lowest possible weight category. Their study compared 85 male wrestlers on eating disorder symptoms and found that in-season wrestlers and off-season wrestlers differed on the Drive for Thinness subscale, with more in-season wrestlers scoring above the at risk cutoff on EAT scores. Interviews with the in-season wrestlers revealed that their concerns about weight were due entirely to the demands of wrestling illustrating the intense pressure they experienced from their sport to lose weight. When the wrestlers were no longer required to make weight (i.e., postseason, off season), most of them lost their weight preoccupation (Dale & Landers, 1999). In addition, Reel and Gill (1996) demonstrated that
revealing swim attire was a sport specific pressure to be thin and weight conscious in swimmers because they stated that they perceived that their form fitting swim suits allowed others to notice their weight and whether or not they lost or gained pounds.

Generally, weight and body shape pressures seem to cluster more often in sports where low weight is thought to improve performance (e.g., distance running), where ratings by judges may be influenced by appearance (e.g., diving, figure skating, gymnastics), or where athletes must compete in specific weight categories (e.g., wrestling, rowing) (Brownell & Rodin, 1992). Clearly, sport pressures can stem from a variety of sources depending on the sport environment, such as judging criteria, body weight categories, ideal sport physiques, coach expectations, wearing revealing uniforms (Petrie & Greenleaf, 2007), or undergoing “weigh-ins.” Sport-specific pressure to lose weight might stem from routine “weigh-ins” or body composition measurements (e.g., BMI, percent body fat, girth measurements, height, etc.) performed by coaches, trainers and physicians as well. In sport, such physical evaluations communicate that weight and body fat are important in determining performance and appearance.

In conjunction with general and sport-specific pressures to be thin, athletes living in Western society also experience intense societal pressures to be thin and weight-conscious. Environments that promote an unrealistic, thin-ideal body standard and emphasize dieting and thinness, pressure individuals--particularly women--to internalize and conform to these unnatural physical standards, often leading to body shame, eating disorders, low self-esteem, and negative body image (Striegel-Moore et al., 1986). From this perspective, American society communicates damaging messages to women that equate beauty with goodness and virtue, delineating ultra thinness as synonymous with attractiveness. Magazine images, television advertisements, fashion-models, movie celebrities and other media outlets endorse unrealistic
appearance ideals, persuading women to adopt an unattainable physique. It is not uncommon for people to implement mechanisms, such as dieting, in order to acquire a thinner, more socially acceptable figure, whereby they may plausibly raise their status among peers and gain more approval from significant others (Gilbert & Meyers, 2005).

Athletes are exposed to powerful socio-cultural, sport-specific, and family/peer pressures to be thin and low weight. Athletes can interpret these pressures and internalize the underlying messages that they ‘should’ fit the valued thin-ideal body standard they feel is being conveyed by others, society and their sport. Internalization is the incorporation of specific values to the point that they become guiding principles for an individual. In the case of societal, sport and social pressures to be thin, athletes ‘buy into’ to the norms of size and appearance and that being thin, lean and attractive means being valued (Thompson & Stice, 2001). Although the pathway from socio-cultural pressures to internalization of the thin-ideal has been well established in eating disorder meta-analyses, the pathway between other social pressures (e.g., sport, family, peers) to internalization of the thin-ideal is more ambiguous (Stice & Shaw, 1994; Tylka & Subich, 2004). When internalization of a thin-ideal body occurs, individuals (or athletes) apply the ideal standard to their own physique and begin to overemphasize physical size, shape and appearance when they are evaluating themselves (Diehl, Johnson, Rogers & Petrie, 1998). If athletes modify their behavior in order to approximate the perceived standards, they may put themselves at risk for developing disordered eating. Research has demonstrated that internalization is a factor for the onset of eating disturbances, as well as a significant predictor of treatment success in women with anorexia (Haug, Heinnberg, Guarda & 2001). Moreover, while trying to meet expectations and comply with social, sport-specific and societal pressures to be thin, they begin to personally identify with the pressures and incorporate the suggested values
and attitudes about weight into their sense of self (Fredrickson & Roberts, 1997). As women who are immersed in an environment where there are ubiquitous messages about how they should look and behave, where being thin and attractive means feeling good about one’s self, over time, the messages can become a part of women’s own belief systems, rather than just society’s. In time, with this repeated exposure, many women, particularly those with an external locus of control, poor self-concept, or socially prescribed perfectionism, will internalize the messages as their own. In doing so, they may come to believe that a certain body type or set of attitudes and behaviors about food and weight are necessary and represent an ideal that should be pursued.

**Internalization of the Thin-Ideal.** When athletes have internalized societal, social or sport-specific expectations and images about how they should look and behave, they risk feeling badly about themselves when they fall short or do not sufficiently meet these internalized ideals. The driving mechanism from internalization to the development of body dissatisfaction occurs when individuals make physical appearance central to their self-evaluation, and consequently experience personal disappointment if they do not fit the ideal. According to the 2002 U.S. Department of Health and Human Services, a large majority of women report feeling fat, and express this as a personal failure (Roberts & Gettman, 2004). The attitude that it is a personal failure not to meet important body expectations of beauty seems to demonstrate that significant portions of women apparently internalize thin-ideal standards, are dissatisfied with how they look, and perceive that they are to blame for not having an ideal body. Environments that promote a certain physique ideal that may be unrealistic or far different from what women actually are, often leads to body shame, eating disorders, low self-esteem, and negative body image (Striegel-Moore et al., 1986).
The mechanism responsible for athletes experiencing body dissatisfaction stems from a process of comparing one’s physique to that of the ideal and coming up short. If athletes see a discrepancy between their own body and that of the valued ideal encouraged by society, their coaches or demands of their sport, they may become dissatisfied with and ashamed of that which has let them down— their bodies. When athletes internalize pressures that encourage an ideal body physique, they embrace this referent as the body shape against which they compare their own body (Stice, 1994). Thus, the personal belief that their bodies are unacceptable when compared to the ideal referent is what can lead to dissatisfaction with their current weight and body shape.

Individuals who idealize a figure smaller than their actual size tend to uphold more negative attitudes about their bodies, exhibit a preoccupation with their bodies, report experiencing social physique anxiety, and engage in more body-changing behaviors than those people who idealize a larger figure or whose idealized figure matches their real figure (Sands & Griffiths, 2003). When large discrepancies occur between an athlete’s actual and ideal body weight, they are more inclined to be body dissatisfied (Petrie, 1996). Body dissatisfaction is considered a risk factor for disordered eating (e.g., Stice, 2002), so measuring this variable is key to understanding the development of eating pathology.

*Body Dissatisfaction, Negative Affect & Dietary Restraint.* Research provides evidence for the predictive relationship between body dissatisfaction and disordered eating, as well as for the indirect relationship through negative affect and dietary restraint (Stice, 2001). Stice’s Dual-Pathway Model (Stice, 1994; Stice & Agras, 1998; Stice, Nemeroff & Shaw, 1996; Stice, Shaw & Nemeroff, 1998) identifies two primary mechanisms that explain how body dissatisfaction leads to disordered eating. With respect to the restraint pathway, Stice (1994) proposed that dieting serves the purpose of eliminating feelings of dissatisfaction about one’s body by
attempting to make one’s actual physique match the ideal. A mistaken, yet common belief is that restricting caloric intake is one of the most effective techniques in which to lose weight and change one’s physique. Unfortunately, such dietary restraint leads not to weight loss, but to episodes of binge eating, which is a precursor to bulimia nervosa (Mitchell et al., 1986). During the process of restriction, most individuals’ physiological hunger will override their desire to restrict. In other words, physiology will overwhelm cognitive restraint, making them more prone to binge eating (Ruderman & Besbeas, 1992), and potentially extremely unhappy if they succumb to hunger and “break” their diet. Individuals trying to restrain may perceive succumbing to hunger as a personal failure, reflective of their lack of discipline, goodness, will power or commitment to what they value (Stice, 2001). These reactions are part of the bulimic binge-purge cycle.

As for the affect regulation pathway, the model proposes that body dissatisfaction will lead to negative affect because, “appearance is a central evaluative dimension for women in our culture” (Stice, 2001, p. 125). Therefore, upon evaluation of themselves, body dissatisfied individuals are likely to feel unhappy and view themselves as “less” than others or physically not good enough. They may experience disappointment, guilt, embarrassment, frustration or even shame as a result of how they perceive their bodies to look, especially if they blame themselves for looking the way they do or feel a lack of control in being able to change their appearance. It makes sense that individuals may resort to overeating when they feel unhappy, discouraged or shameful because doing so serves as a way of comforting and distracting themselves from negative emotions (Stice, 2001). Stice (2002) reviewed several studies and found that those who were allowed to eat while they were experiencing negative emotions consumed more calories than those who were not. In addition to binge eating being a part of bulimia nervosa, Stice (1998)
suggested that women may use binging/purging methods as a way to deescalate preexisting negative emotions and distract themselves from the uncomfortable feelings. Many bulimics have reported feeling depressed before the onset of a binge (Mitchell et al., 1981), and significantly less depressed following a binge (Steinberg et al., 1990). In fact, bulimics report experiencing more negative affect prior to binging than to normal eating (Schupak-Neuberg & Nemeroff, 1993), suggesting that negative affect may be a reliable precursor to binge eating (Stice, 2001).

Modeled Behaviors & Disordered Eating

Petrie & Greenleaf (2007) proposed that social conformity and modeled behaviors influence dieting, bulimia, and binge eating behaviors. That is, seeing others who are like you in important ways (e.g., same age, athletic status, gender, etc.) engage in certain behaviors may increase your likelihood of following suit. Therefore, athletes who see others (e.g., teammates, coaches) in their same sport environment and under similar sport demands engage in disturbed eating behaviors, may learn and may come to believe that disordered eating is the norm and an accepted way of losing weight and controlling one’s body shape. Direct modeling of body image and eating disturbances by significant others is thought to increase the likelihood of a child emulating these disturbed attitudes and behaviors (Attie & Brooks-Gunn, 1989; Pike & Rodin, 1991). In addition, individuals are usually interested in earning approval and respect from those around them, particularly if they look up to or idolize their models, so it would not be surprising if athletes engaged in pathological weight control behaviors when important and influential others, such as coaches, sport idols, Olympians, or successful teammates, also did. Lastly, it could be assumed that if individuals modeling disordered eating were substantially rewarded or reinforced for disordered eating or reaped benefits from being thinner, such as compliments or
spots in the line-up, others watching or observing might be more inclined to seek those same rewards and benefits by way of similar means.

In his meta-analysis, Stice (2002) found that modeling is a risk factor for disordered eating in women. For athletes and others who are part of cohesive groups/teams, the risk of developing disordered eating as a result of being modeled by important others seems high, especially because athletes are often surrounded by a group of peers that at times rely on one another for success. In sororities, Crandall (1988) found that binge eating was positively correlated with peer binge eating, and that the relationship was stronger among close friends. Provided this finding, an assumption might be that teammates on athletic teams, who spend hours training together as peers and competitors, and endure sometimes years of emotional and physical highs and lows with one another, might be just as easily influenced by each other as they would by outside peers. Crandall (1988) suggested that individuals may adopt certain behaviors that are reinforced or perceived positively by the larger group, so if disordered eating or pathogenic weight control behaviors are viewed as an acceptable or even ideal means by which to achieve the body size and shape they associate with peak performance, athletes might be willing to engage in those behaviors. One might speculate that disordered eating in one athlete on a team could potentially encourage additional disordered eating in other teammates or that eating disturbances could spread throughout a team as well.

Summary of etiological model. Etiological models outline how known risk factors interact to heighten an individual’s susceptibility. Based on general socio-cultural models, as well as Stice’s (1994) Dual-Pathway model, Petrie and Greenleaf’s (2007) model presents the primary routes through which disturbed eating may occur, and acts as an organizational framework from which to study eating disorders in athletes. The etiological model suggests that athletes are
exposed to both societal and sport-specific pressures that can arise from coaches, peers, family members and others, and can involve pressure to lose weight, be a certain size, optimally perform, or meet expectations of the sport. Sport pressures can stem from a variety of sources depending on the sport environment, but pressure regarding weight could potentially stem from a heavily weight-focused training environment consisting of procedures such as conducting routine “weigh-ins” or body composition measurements. The model hypothesizes that when certain pressures are internalized and considered by athletes as important to who they are, and their body size is far from their internalized ideal, body dissatisfaction will result. When athletes are dissatisfied with their physique, either because they do not meet society’s thin-ideal body or the ideal defined by their sport, the model predicts that they may experience negative affect or engage in dietary restraint, which may subsequently result in the development of binging and purging, which are precursors to Bulimia Nervosa. Upon evaluation of themselves, body dissatisfied individuals are likely to feel disappointment, guilt, embarrassment, frustration or even shame as a result of perceiving having failed at meeting their internalized ideal. Individuals may resort to overeating when they feel unhappy or discouraged as a way of comforting and distracting themselves from experiencing their negative emotions, and try to restrict their food intake in order to lose weight (Stice, 2001). Furthermore, disordered eating is thought to be influenced by eating attitudes and behaviors being modeled by meaningful others, such as family and peers or teammates.

Testing the proposed pathways of Petrie and Greenleaf’s (2007) etiological model with athletes will help explain why some athletes are at higher risk for disordered eating than others and may offer clarity to some of the mixed findings in the research regarding athletes and eating disorders. Establishing better precedence will permit more accurate identification of risk factors,
Critical points of vulnerability and key developmental steps in the etiology of disordered eating, as well as data that can be used to develop prevention and intervention programs appropriate for implementation with athletes.

Overall Summary

Although eating disorders have been studied with female athletes, further research is needed to better understand the development of disordered eating in college and with respect to Petrie and Greenleaf’s (2007) etiological model. The primary etiological pathways have not been firmly determined with respect to collegiate gymnasts, swimmers and divers, especially when with respect to sport pressures and modeled behaviors. There is a need to more thoroughly examine the role social, societal and sport-specific influences, particularly those in the athletic environment, play in the development of disordered eating. Also, much of the research on athletes and eating disorders cluster sports into those with similar perceived demands, however, pressures can vary remarkably from sport to sport, so combining sports does not always provide an accurate picture of exactly how a specific sport environment (e.g., college gymnastics) affects athletes’ disordered eating.

Current Study

The current study hopes to use an etiological model to theoretically guide research that will improve prediction and the ability to test eating disorder risk factors. Moreover, including a larger sample with more risk factors and extensive analyses will help generate more representative, generalizable results that will offer information beyond what is understood currently about disordered eating in athletes.

A cross-sectional investigation is planned of the risk factors for collegiate female swimmers, divers and gymnasts. The study aims to measure the social and sport-specific
pressures female athletes experience in college and determine if these pressures are associated with internalization and body dissatisfaction, and in turn disordered eating, along the proposed pathways by Petrie and Greenleaf’s (2007) etiological model. Beginning of the NCAA training season in September data will be collected in order to test the full etiological model. Specifically, attitudinal and behavioral eating characteristics among Division-I female gymnasts, swimmers and divers will be tested by measuring perceived weight and social pressures, internalization, body dissatisfaction, negative affect, dietary restraint, modeled behaviors and disordered eating.

Based on Petrie and Greenleaf’s (2007) Etiological Model for the development of disordered eating in athletes, the following hypotheses were proposed for the study:

1. Sport-specific and general social pressures would be related positively to higher levels of internalization.
2. Internalization would be related positively to higher levels of body dissatisfaction.
3. Body dissatisfaction would be related positively to higher levels of negative affect.
4. Body dissatisfaction would be related positively to higher levels of dietary restraint.
5. Body dissatisfaction would be related positively to higher levels of disordered eating symptomatology.
6. Negative affect would be related positively to higher levels of disordered eating symptomatology.
7. Dietary restraint would be related positively to higher levels of disordered eating symptomatology.
8. Observing modeled behaviors would be related positively to higher levels of disordered eating symptomatology.
APPENDIX B

QUESTIONNAIRES
Demographic Questionnaires

DEMOCRATIC QUESTIONNAIRE

Please answer the following questions honestly. It is important that you answer every question. There are no "wrong" or "right" answers, so just do the best you can.

Background Information

1. Age: _______  

3. Current Academic Status:  
   _____ Freshman  
   _____ Sophomore  
   _____ Junior  
   _____ Senior  
   _____ 5th year or above

4. Race/Ethnicity:  
   _____ Caucasian/White  
   _____ Hispanic/Latino/Mexican American  
   _____ African-American/Black  
   _____ American Indian  
   _____ Asian American/Pacific Islander  
   Other (specify:______________)

5. Current Living Arrangements:  
   _____ dormitory w/ NO teammate(s)  
   _____ dormitory w/ teammate(s)  
   _____ apartment w/ NO teammate(s)  
   _____ apartment w/teammate(s)  
   _____ at home  
   _____ sorority house  
   _____ other

Health Information

1. Present height: _____feet _____inches
2. Present weight: ________ lbs.
3. Length of time at current weight: _______ (months)
4. Lowest weight in past 2 years:______ lbs.
5. Highest weight in past 2 years:______ lbs.
6. Are you satisfied with your current weight? Yes No
   If NO, do you consider yourself to be: ____ overweight ____ underweight
7. Ideal weight: ___________ pounds
8. On average, how many times do you weigh yourself per week? ______/week
9. Have you ever had a menstrual period? Yes No
   If YES, how old were you when you had your first menstrual period? _______
10. How many menstrual cycles have you had in the past 12 months? ______
11. On average, how many days are there between your menstrual cycles? _______
12. During the past 6 months, I have used hormone-based methods of birth control, such as oral contraceptives, patch, Norplant, or shots. Yes No
   If Yes, please indicate the effect it has had on your menstrual cycle:
13. Do you experience significant weight fluctuations (10+ lbs) during season    Yes  No  
   If YES, please explain:______________________________________________

14. Do you experience significant weight fluctuations (10+ lbs) during off-season  Yes  No  
   If YES, please explain:______________________________________________

15. What are you trying to do about your weight?     
   _____ Lose weight  
   _____ Gain weight  
   _____ Stay the same weight  
   _____ I am not trying to do anything about my weight  

16. My average daily caloric intake is:  
   _____ Less than 1000 calories/day  
   _____ 1000-1500 calories/day  
   _____ 1500-2000 calories/day  
   _____ 2000-2500 calories/day  
   _____ More than 2500 calories/day  

17. Does your team weigh you or conduct regular “weigh-ins”?  
   Yes  No  
   If YES, how often are you weighed?_____  
   If YES, are you weighed ……..  
   _____ In private by the athletic trainer  
   _____ In private by your coach  
   _____ In front of teammates by your coach  
   _____ In front of teammates by your trainer  
   _____ In private, but your weight is posted or made public  
   _____ Other (explain)  
   If YES, What do you do ahead of time to prepare for the weigh-in? Check all that apply.  
   _____ Restrict my food intake  
   _____ Exercise more  
   _____ Eat low fat foods  
   _____ Take laxatives  
   _____ Use diet pills  
   _____ Vomit  
   _____ Other (explain)?

18. Do you receive guidance about how to healthily manage your weight?   Yes  No  
   If YES, what type?  

______________________________________________________________

Athletic Information

1. Before entering college, what was the highest level in which you competed?  
   Olympic  
   _____ Elite/Olympic  
   _____ JO National  
   _____ Lower than JO National  
   _____ Other ()  

2. Before entering college, how many hours did you train per week?  
   _____ Less than 20  
   _____ Between 20-30  
   _____ Between 30-35  
   _____ Between 35-40  
   _____ More than 40
3. How many years have you been doing your sport? _______

4. I currently receive an athletic scholarship for my sport. Yes No

Injury Information

1. During the last 12 months, I have been injured as a result of participating in my sport. Yes No
   If NO, skip questions 2 & 3.

2. What types of injury did you suffer (check all that apply)?
   _____ sprain (such as on your ankle)
   _____ broken bone/fracture
   _____ dislocation of joint
   _____ muscle pull or tear
   _____ tendonitis
   _____ Other (please specify _____________________________)

3. What factors contributed to my injury (check all that apply)?
   _____ Poor technique/execution
   _____ Lack of spot/sufficient matting
   _____ Lapse in concentration
   _____ Lack of adequate preparation/training
   _____ Body was too heavy
   _____ Body was too light
   _____ Overuse
DEMOGRAPHIC QUESTIONNAIRE

Please answer the following questions honestly. It is important that you answer every question. There are no “wrong” or “right” answers, so just do the best you can.

Background Information


Health Information

1. Present height: _____ feet _____ inches
2. Present weight: ______ pounds
3. Length of time at current weight: ______ (months)
4. Are you satisfied with your current weight?  Yes  No
   If NO, do you consider yourself to be _____ overweight   _____ underweight
5. Ideal weight: ______ pounds
6. On average, how many times do you weigh yourself per week? _____/week
7. Since the beginning of the season in September, circle the response that best describes your weight status:
   A. My weight has remained relatively stable, within + or – 5 pounds of my weight at that time.
   B. I am 6 to 10 pounds heavier than I was at the beginning of the season
   C. I am 6 to 10 pounds lighter than I was at the beginning of the season
   D. I am 11 or more pounds heavier
   E. I am 11 or more pounds lighter

9. My average daily caloric intake is _____ calories.
   _____ Less than 1000 calories/day
   _____ 1000-1500 calories/day
   _____ 1500-2000 calories/day
   _____ 2000-2500 calories/day
   _____ More than 2500 calories/day
8. What are you trying to do about your weight?
   _____ Lose weight
   _____ Gain weight
   _____ Stay the same weight
   _____ I am not trying to do anything about my weight
10. Has your team conducted regular “weigh-ins” this season?  Yes  No  [If NO, GO TO #14]
11. If YES, how often? ________________________________
12. If YES, are you weighed ........
    _____ In private by the athletic trainer
    _____ In private by your coach
    _____ In front of teammates by your coach
    _____ In front of teammates by your trainer
    _____ In private, but your weight is posted or made public
    _____ Other (explain)
13. If YES, What do you do ahead of time to prepare for the weigh-in? **Check all that apply.**
   - [ ] Restrict my food intake
   - [ ] Exercise more
   - [ ] Eat low fat foods
   - [ ] Take laxatives
   - [ ] Use diet pills
   - [ ] Vomit
   - [ ] Other (explain)?

14. Do you receive guidance about how to healthily manage your weight?  **Yes**  **No**
   If YES, what type and from whom?

15. I have missed at least 3 consecutive menstrual cycles (not including those missed during a pregnancy).  **YES**  **NO**
   If YES, how old were you when you missed 3+ periods? ________
   If YES, for how long did you go without having a period? ________
   If YES, did you see a physician?  **YES**  **NO**
   If YES, what was the diagnosis and treatment? ____________________________

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**Athletic Information**

1. How well have you performed in practice this year?
   - [ ] Better than expected
   - [ ] Worse than expected
   - [ ] Normal [skip # 2]

   1a. If “better” or “worse”, please explain why you think that occurred? ____________________________

2. In your best estimate, circle the national ranking of your team?
   - 1st
   - 2nd
   - 3rd
   - 4th
   - 5th
   - 6th
   - 7th
   - 8th
   - 9th
   - 10th
   - 11th – 15th
   - 16th – 20th
   - 25th+

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**Injury Information**

1. During the last 6 months, I have been injured as a result of participating in my sport.  **Yes**  **No**
   If NO, skip questions 2 & 3.

2. What types of injury did you suffer? **Check all that apply**
   - [ ] sprain (such as on your ankle)
   - [ ] broken bone/fracture
   - [ ] dislocation of joint
   - [ ] muscle pull or tear
   - [ ] tendonitis
   - [ ] Other (please specify ____________________________)
3. What factors contributed to my injury? **Check all that apply.**
   
   - [ ] Poor technique/execution
   - [ ] Lack of spot/sufficient matting
   - [ ] Lapse in concentration
   - [ ] Lack of adequate preparation/training
   - [ ] Body was too heavy
   - [ ] Body was too light
   - [ ] Overuse
APPENDIX C

LETTERS OF SOLICITATION
Dear Coach X,
I am a doctoral student in the counseling psychology program at the University of North Texas (UNT). I am contacting you to ask for your assistance in my doctoral dissertation, which is an NCAA funded study about the psychological health and physical well-being of gymnasts. The NCAA believes that a study about the mental and physical well-being of collegiate gymnasts is so important that it has awarded me a grant to help conduct my research. As a former collegiate gymnast at UCLA (1999-2004), I am honored by the NCAA’s support, and mirror their interest in wanting to help improve student-athletes’ overall sport experiences at the Division-I level.

I have included a letter of support from my former coach, Valorie Kondos-Field, to give you some more information about who I am.

I know time is always a concern when making the decision to participate in research. For my study, I am asking for a total of only 45 minutes. In September, at the beginning of the practice season, I will need about 30 minutes from your athletes to complete a survey questionnaire that I have developed. In February/March, I will need an additional 15 minutes of their time to complete a follow-up questionnaire. The questionnaires will be completed anonymously and no specific information about any one athlete will be shared. I will only report information from the total group of participants, and I am anticipating approximately 300 student-athletes from over 20 different universities across the country.

For your participation, I will send you a summary of the study’s results, including recommendations that may assist you and/or your sports’ medicine staff in maximizing your athletes’ physical and psychological health and overall sport performance. I will also provide a small monetary stipend to the individual in your program (i.e. athletic trainer, coach, manager, grad assistant, etc.) who oversees the data collection (e.g. distributing questionnaires). I look forward to talking to you about this opportunity and will follow up this email with a call in the next few days. In the meantime, if you have any questions or need any additional information, please feel free to contact me.

Thank you,
Carly Raab, M.S.  (Research Advisor: Trent A. Petrie, Ph.D.)

Counseling Psychology Intern
Wichita State Counseling & Testing Center
University of North Texas Center for Sport Psychology
1025 E. Stone Path
Derby, KS.  67037
Dear Coach X,

I am a doctoral student in the counseling psychology program at the University of North Texas (UNT). I am contacting you to ask for your assistance in my doctoral dissertation, which is an NCAA funded study about the psychological health and physical well-being of swimmers and divers. The NCAA believes that a study about the mental and physical well-being of collegiate swimmers and divers is so important that it has awarded me a grant to help conduct my research. As a former collegiate athlete at UCLA (1999-2004), I am honored by the NCAA’s support, and mirror their interest in wanting to help improve student-athletes’ overall sport experiences at the Division-I level.

I have included a letter of support from Joe Dykstra, the head swimming coach at the University of North Texas, to give you some more information about me and my research advisor, Trent A. Petrie, Ph.D. I know time is always a concern when making the decision to participate in research. For my study, I am asking for a total of only 45 minutes. In September, at the beginning of the practice season, I will need about 30 minutes from your athletes to complete a survey questionnaire that I have developed. In February/March, I will need an additional 15 minutes of their time to complete a follow-up questionnaire. The questionnaires will be completed anonymously and no specific information about any one athlete will be shared. I will only report information from the total group of participants, and I am anticipating approximately 300 student-athletes from over 20 different universities across the country.

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Thank you,
Carly Raab, M.S.    (Research Advisor: Trent A. Petrie, Ph.D.)

Counseling Psychology Intern
Wichita State Counseling & Testing Center
University of North Texas Center for Sport Psychology
1025 E. Stone Path
Derby, KS.  67037
APPENDIX D

INSTRUCTIONS PAGE
Hi Coach X,
Thank you for your help!

Instructions:
1. You have received a box of surveys, each placed in their own manila envelope to respect your athletes’ privacy. In each envelope, your athlete will find a consent form and survey. Each envelope is individually addressed and stamped to be mailed back to me.

2. Please allot 45 minutes for your team to complete the surveys. Make sure each student-athlete receives a manila envelope and understands that their answers will be kept confidential. Please state to your team….

   “I will act to protect your confidentiality as a participant in this study. As such, you will provide no identifying information on any of the survey materials. Instead, all questionnaires will be identified only through code number. The only place where you will provide identifying information is on this consent form, which will be sealed in your own envelope and separated from the questionnaire when the data is analyzed. The researcher and her supervisor will be the only individuals with permission to open your envelope with your completed questionnaire and consent form inside. No completed questionnaires or data will be provided to your coach, athletic trainer, or other personnel in your athletic department. When you are done answering all the questions, please put your completed survey and consent form in your manila envelope and SEAL IT. Put an “X” across the flap to ensure the researchers that it has not been opened by anyone.

3. Once you have gotten the team started, please leave the room and have a student-athlete come get you when the team is done. As the distributor of a confidential survey, please ensure that you are not present while the team is completing the survey (if you are a coach). We request this only to be consistent in data collection across universities and encourage honest answers. (It has been shown that individuals will answer questions differently in the presence of an important figure than when by themselves.)

4. Once the athletes have finished completing the surveys, collect the manila envelopes and simply put them in the mail! All postage should be on each manila envelope with my address on the front.

As a reminder, when all the data is collected (by Feb/Mar), you will receive an honorarium of $150. Thank you!

Carly Raab, M.S.
Psychology Intern
University of North Texas
Center for Sport Psychology & Performance Excellence
APPENDIX E

INFORMED CONSENT
University of North Texas Institutional Review Board
Informed Consent Form

Before agreeing to participate in this research study, it is important that you read and understand the following explanation of the purpose and benefits of the study and how it will be conducted.

Title of Study: The Physical and Psychological Health of Female Collegiate Athletes.
Principal Investigator: Carly Raab M.S., a graduate student in the University of North Texas (UNT) Department of Counseling Psychology.

Purpose of the Study:
You are being asked to participate in a research study that involves looking at the physical and psychological health of female collegiate athletes over the course of their athletic seasons.

Study Procedures:
You will be asked to fill-out a set of survey questionnaires involving different aspects of your current physical and psychological functioning. The questionnaires will take approximately 40 minutes to complete and will be done on two different occasions during your athletic season – once in September and again in February or March.

Foreseeable Risks:
The potential risks involved in this study are minimal. You will be asked questions about particular health topics that you may consider to be sensitive or may make you feel slightly uncomfortable.

Benefits to the Subjects or Others:
Your participation in this project is expected to contribute to the understanding of the physical and psychological well-being of female collegiate athletes and how that may change over the course of a college sport season. You also may become more aware of your own attitudes and behaviors through completion of the questionnaires. At the completion of this study, a general summary of data collected will be provided to all athletic departments and to individual athletes if requested (no specific individuals or teams will be identified in this summary).

Procedures for Maintaining Confidentiality of Research Records:
The researcher will act to protect your confidentiality as a participant of this project. As such, you will provide no identifying information on the questionnaire itself. Instead, all questionnaires will be identified only through code number. The only place where you will provide identifying information is on this consent form, which will be sealed in your own envelop and separated from the questionnaire when the data is analyzed. The researcher and her supervisor will be the only individuals with permission to open your envelop with your completed questionnaire and consent form inside. No completed questionnaires or data will be provided to your coach, athletic trainer, or other personnel in your athletic department.

Questions about the Study
If you have any questions about the study, you may contact Dr. Trent A. Petrie, Ph.D., UNT Department of Psychology, at (940) 565-2671.

Review for the Protection of Participants:
This research study has been reviewed and approved by the UNT Institutional Review Board (IRB). The UNT IRB can be contacted at (940) 565-3940 with any questions regarding the rights of research subjects.

**Research Participants’ Rights:**

Your signature below indicates that you have read or have had read to you all of the above and that you confirm all of the following:

- Your trainer has explained the study to you and answered all of your questions. You have been told the possible benefits and the potential risks and/or discomforts of the study.
- You understand that you do not have to take part in this study, and your refusal to participate or your decision to withdraw will involve no penalty or loss of rights or benefits. The study personnel may choose to stop your participation at any time.
- You understand why the study is being conducted and how it will be performed.
- You understand your rights as a research participant and you voluntarily consent to participate in this study.
- You have been told you will receive a copy of this form.

Print Name

________________________________________  __________

Signature of Participant                     Date

________________________________________
REFERENCE LIST

Academy of Eating Disorders (June, 2009). www.aedweb.org


