REVIEW OF THE LITERATURE REGARDING FEMALE COLLEGIATE ATHLETES WITH EATING DISORDERS AND DISORDERED EATING

_____

A Doctoral Research Paper

Presented to

the Faculty of the Rosemead School of Psychology

Biola University

_____

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Psychology

_____

by

Nicole Klasey

August 2009

REVIEW OF THE LITERATURE REGARDING FEMALE COLLEGIATE ATHLETES WITH EATING DISORDERS AND DISORDERED EATING

By

Nicole Klasey

APPROVED:

_____ Date _____
Cherry G. Steinmeier, PsyD

_____ Date _____
Tamara L. Anderson, PhD

APPROVED:

_____
Paul L. Poelstra, PhD, Interim Dean

_____
Date

ABSTRACT

REVIEW OF THE LITERATURE REGARDING FEMALE COLLEGIATE ATHLETES WITH EATING DISORDERS AND DISORDERED EATING

by

Nicole Klasey

The primary objective of this review of literature was to examine the relationship of eating disorders and disordered eating among female collegiate athletes. Since the institution of Title IX in 1972, the Educational Amendment to the Civil Rights Act of 1964, female participation in sports has been consistently rising at all levels of competition. As researchers have begun to examine the role of athletics in an athlete's life, the relationship between sports and eating disorders has begun to receive more attention, specifically with female athletes. Research on this topic has been inconsistent as some say sports act as a protective factor against the development of an eating disorder, while others suggest that sports place female athletes at a greater risk of developing an eating disorder.

The review of current literature indicated that female collegiate athletes were more likely to exhibit disordered eating/eating disorder symptomatology as compared to male athletes and non-athletes, with Caucasian female athletes being at the greatest risk. The prevalence of disordered eating was greater than the prevalence of clinical eating disorders among female collegiate athletes. The type of sport in which an athlete

participated produced the most variance in regards to disordered eating/eating disorder indices, with lean, aesthetic, and judged sports producing a higher incidence of disordered eating/eating disorder symptomatology. This finding indicates that it is not athletic participation as a whole that increases one's risk of disordered eating/eating disorder symptomatology; rather it is the particularities of the respective sport.

As female athletic participation continues to rise at all levels of competition, female athletes remain at an increased risk of developing disordered eating attitudes and behaviors. To combat the increasing risk of disordered eating/eating disorder symptomatology among female collegiate athletes, suggestions for coaches regarding preventative measures and intervention strategies were noted. Coaches play a vital role in the life of an athlete, and it is of paramount importance that they ensure the safety and health of their athletes.

TABLE OF CONTENTS

PAGE

PAGE

REVIEW OF THE LITERATURE REGARDING FEMALE COLLEGIATE ATHLETES WITH EATING DISORDERS AND DISORDERED EATING

Introduction

Female participation in sports has increased tremendously across all competitive levels since the institution of Title IX in 1972, the Educational Amendment to the Civil Rights Act of 1964. Title IX states, "No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any educational program or activity receiving federal financial assistance" (National Collegiate Athletic Association (NCAA), 2008). The National Collegiate Athletic Association Gender Equity Task Force (NCAA) also added,

> An athletics program can be considered gender equitable when the participants in both the men's and women's sports programs would accept as fair and equitable the overall program of the other gender. No individual should be discriminated against on the basis of gender, institutionally or nationally, in intercollegiate athletics.

Title IX has increased athletic opportunities for women at every competitive level. According to the Women's Sport Foundation (2008), female high school athletic participation has increased 904% since the institution of Title IX, while female collegiate athletic participation has increased 456% (NCAA, 2008). In 1970 there were 2.5

women's teams per school and currently, in 2008, there are 8.65 women's teams per school (Women's Sport Foundation).

The increase of female athletic participation, particularly at the collegiate level, is of particular importance. Over the past several years, females have begun investing more time and energy into athletics. Women not only are participating at an earlier age, but they are participating for a longer period of time with the increase of collegiate and professional opportunities available for women.

Athletes have spent countless hours devoted to their respective sport whether that is on the practice field, in the weight room, or watching game film. Sports are no longer a seasonal activity; greater numbers of teams have implemented pre- and post- season training programs, requiring athletes to lift weights, condition, and practice their respective sport. Due to these increased expectations and requirements, athletes, especially at the collegiate level, have frequent interactions with their teammates, coaches, and other sport personnel. These individuals play a very influential role in an athlete's life, as they spend a great deal of time with their respective sport.

As the rate of female participation in sports has grown tremendously and continues to grow, researchers have begun to look at the impact sports play in a female athlete's life. One area receiving increasing attention over the past couple of years has been the relationship between sports and eating disorders. Eating disorders are multifaceted and have several contributing factors such as sociocultural, biological, psychological, behavioral, and environmental factors (Beals, 2000). Female athletes are not only under the sociocultural pressure to obtain an ideal body, but they are also under

pressure in the athletic environment to succumb to the aesthetic requirements of their respective sport.

Sports have been shown to act as a protective factor against the development of an eating disorder and disordered eating; however, it has also been shown to act as a risk factor. Research has been inconsistent in regards to this relationship. The inconsistent findings are attributed to several moderator variables such as terminology, type of sport, gender, control/comparison group, and eating disorder measures (Hausenblas & McNally, 2004). For instance, the term *athlete* has been used loosely in some previous studies, in which the researchers did not specify the competitive level of the athlete. An athlete can thereby be described as an individual participating on the varsity team at the collegiate level, as well as an individual participating in extracurricular sport programs (i.e., intramurals). Another example of unclearly defined terms are *eating disorders* and *disordered eating*. In some instances *eating disorder* refers to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision* (DSM-IV-TR) (American Psychiatric Association, 2000) criteria while at other times the term is more loosely used to describe abnormal eating. Thus, it becomes important to clearly delineate the terminology.

Sample size has also been an issue; some studies have lacked an adequate number of comparison groups, and some studies have lacked an adequate number of athletic teams, making it difficult to compare any differences among teams (Beals, 2004; Smolak, Murnen, & Ruble, 2000). Also of concern have been the instruments that several studies have utilized. Few studies used a clinical interview to assess the presence and/or severity

of eating disorders, rather studies relied heavily on self-report measures. This becomes problematic with athletes who may be reluctant to accurately report eating disorder symptomatology for fear of any consequences and/or repercussions. For instance, athletes may fear suspension from athletic competition or removal from their respective team if their coach or athletic staff were to find out about any eating disorder/disordered eating symptomatology.

In addition to the above mentioned moderator variables, there are several personality characteristics which have made it difficult to examine the relationship between sports and eating disorders. Several characteristics of "good athletes" are similar to characteristics of anorexics (Thompson & Trattner-Sherman, 1999). Thompson and Trattner-Sherman found that mental toughness/ascetism, commitment to training/excessive exercise, pursuit of excellence/perfectionism, coachability/ overcompliance, unselfishness/selflessness, and performance despite pain/denial of discomfort were areas of overlap between the two groups.

This paper will review the current literature regarding the prevalence and symptomatology of eating disorders and disordered eating among female collegiate athletes. More specifically, this paper will examine variables related to eating disorders among collegiate athletes, such as gender differences, and differences among sports and competitive levels. Also reviewed are the varying severities of eating disorders, ranging from abnormal eating to DSM-IV-TR eating disorder criteria. Due to the influential role coaches and sport professionals have in an athlete's life, coaches' awareness of eating-related problems in their athletes will also be investigated. Lastly, suggestions are

provided in regards to eating disorder/disordered eating prevention and intervention for college athletes.

Methodology

The following section will review commonly used terms and testing measures. This section will also review the current literature regarding female collegiate athletes and eating disorders/disordered eating.

Terminology

Several of the studies discussed in this paper have used common terms to describe athletes and symptoms associated with eating disorders. Definitions for the common terms as defined by Beals' (2004) *Disordered Eating Among Athletes: A Comprehensive Guide for Health Professionals* and various studies are noted below.

Classification of sports. Athletes are often categorized by the type of sport they participate in and the physical requirements of that particular sport. *Lean sports* are weight-dependent sports in which aesthetics and leanness are essential for successful competition (Reinking & Alexander, 2005). Lean sports include gymnastics, diving, figure skating, and long distance running. *Non-lean sports* are sports in which aesthetics and leanness are not emphasized. *Aesthetic sports* are defined as "sports in which performance is judged, such as cheerleading, diving, figure skating, gymnastics, and synchronized swimming" (Beals, 2004, p. 255). *Endurance sports* "involve prolonged aerobic activity, such as cross-country skiing, cycling, distance running, and swimming" (p. 226). *Judged sports* are sports that "place more importance on the individual's body appearance," such as "gymnastics, diving, cheerleading, and dance" (Schwarz, Gairrett,

Aruguete, & Gold, 2005, p. 345). *Refereed sports* are those sports that "place a stronger emphasis on training and being in good physical condition, but do not rely as much on individual body appearance" such as "basketball, swimming, and cycling" (p. 345). *Thin-build sports* are "sports in which a low body weight is thought to confer a competitive advantage either for aesthetic reasons or speed and economy of movement, including aesthetic sports, endurance sports, and weight-dependent sports are included in this category" (Beals, p. 228). *Weight-dependent sports* are "sports that use weight classifications, such as bodybuilding, jockeying, karate, lightweight rowing, power lifting, and wrestling" (p. 229).

Anthropometric measures. Various *anthropometric measures* are mentioned throughout the studies to measure body mass and composition, as well as girth and diameter of the body. Two of the most commonly refereed terms were the body mass index and body fat. *Body Mass Index* refers to the "ratio of body weight (kg) relative to height (m^2)" (Beals, 2004, p. 225). *Body fat content*, also refereed as *fat mass*, refers to all extractable lipids from adipose and other tissues in the body (Beals).

Classification of eating disorder/disordered-eating symptoms. In addition to the above-mentioned terms, *eating disorder* and *disordered eating* are used interchangeably to describe one's attitudes and behaviors towards food. Although these terms are frequently interchangeable, they refer to varying degrees of eating-related problems. An *eating disorder* often refers to one of the three diagnosable categories based on the DSM-IV-TR (i.e., Anorexia Nervosa, Bulimia Nervosa, Eating Disorder Not Other Specified). *Disordered eating/sub-clinical eating disorder* describes "a wide range of abnormal and

harmful eating behaviors that are used in a misguided attempt to lose weight or maintain a lower-than-normal body weight" (Beals, 2004, p. 19). A few studies use the term *symptomatic* to describe an individual who displays any eating disorder or disordered eating behaviors and/or attitudes (Hausenblas & McNally, 2004).

Female athletic triad. Another term receiving attention in research is the *female athletic triad,* which refers to the presence of disordered eating (discussed in the previous paragraph), amenorrhea, and osteoporosis (Trattner-Sherman & Thompson, 2006). The female athletic triad affects athletes in all sports, at all levels of competition, and is a rising concern of health care professionals working with collegiate athletes. *Primary amenorrhea* is defined as "the absences of menses by age 16," while *secondary amenorrhea* is defined as "the absences of 3-6 consecutive menstrual cycles in a female who has begun menstruating" (Committee on Sports Medicine and Fitness, 2000, p. 610). Amenorrhea has been linked to low energy availability (Beals, 2004; Trattner-Sherman & Thompson). Trattner-Sherman and Thompson reported that "if this imbalance [energy availability] is extreme or persistent, the body attempts to reduce the deficit by suppressing physiologic functions that are not essential for survival but are necessary for normal growth, development, and health [i.e., menstrual functioning]" (p. 194). Thus, amenorrhea can be viewed as "an energy-conserving strategy" (Beals, p. 89). *Osteoporosis* is broadly defined as a bone disorder, in which there is "a reduction of bone mineral density of more than 2.5 standard deviations below the mean for age-matched individuals" (p. 228). The decrease in bone mass is associated with low energy availability coupled with a decrease in endogenous estrogen, both of which are associated

with amenorrhea (Keen & Drinkwater, 1997). This has become problematic because bones become overly porous, fragile, and more susceptible to fractures (Beals; National Osteoporosis Foundation, 2008). Keen and Drinkwater recommended that "physicians should consider early intervention in young athletes presenting with amenorrhea in order to minimize the threat of irreversible vertebral bone loss and the long-term risks of osteoporosis" (p. 314). Thus, the female athletic triad is of concern because, if athletes do not take in an adequate number of calories, the reduction in energy availability can have lasting implications on their overall health.

Competitive level. Several competitive levels are mentioned in the following studies. *Elite athletes* represent the highest competitive level. These athletes compete successfully at the national, international, and/or professional level. Colleges and universities are divided into *NCAA Divisions I, II, and III, and National Association of Intercollegiate Athletics (NAIA) Divisions I and II*. NCAA Division I is considered the most competitive collegiate division, while NAIA Division II is considered the least competitive division.

Instruments

In reviewing the literature, several studies have utilized similar instruments to assess variables such as pathological eating, self-esteem, and competitive anxiety. The measures will be discussed below, with the more common measures discussed first.

Eating Attitudes Test. The Eating Attitudes Test (EAT) is a 26-item self-report scale designed to measure attitudes and beliefs about food which are associated with pathological eating based on the EAT 40-item questionnaire (Garner, Olmstead, Bohr, &

Garfinkel, 1982). Items are scored on a 6-point scale ranging from “never” to “always.” The EAT yields three subscales: Dieting, Bulimia and Food Preoccupation, and Oral Control. Scores at or above 20 indicate the presence of eating disorder behavior. Garner et al. reported high validity and reliability. The EAT-26 was strongly correlated with the EAT-40, $r = .98$. The Cronbach alpha of the EAT-26 was .90 for the anorexic sample.

Eating Disorder Inventory. The Eating Disorder Inventory (EDI) is a 64-item scale, which assesses the attitudinal, behavioral, and psychological symptoms associated with eating disorders (Garner & Olmstead, 1984; Krane, Stile-Shilpley, Waldron, & Michalenok, 2001). The inventory yields eight subscales that consist of the (a) Drive for Thinness (measures the desire to lose weight and the fear of fat), (b) Body Dissatisfaction (assesses symptoms related to body-image disturbance), (c) Tendencies Towards Bulimia (examines tendencies for uncontrollable binging and self-induced vomiting), (d) Feelings of Ineffectiveness (assesses feelings of general inadequacy, insecurity, and lack of control over one’s life), (e) Perfectionism (examines the need to control all areas of one’s life), (f) Interceptive Awareness (identifies impairment in recognizing and identifying hunger and satiety), (g) Interpersonal Distrust (assesses feelings of alienation and reluctance to form close relationships), and (h) Maturity Fears (assesses the desire to regress to preadolescent years and to avoid the demands of adulthood). The items are scored on a 6-point scale ranging from “never” to “always.” The EDI has demonstrated good reliability and validity. More specifically, the EDI was highly correlated with the EAT, $r = .88$, $p < .001$ (Garner, Olmstead, & Polivy, 1983).

Eating Disorder Inventory-2. The Eating Disorder Inventory-2 (EDI-2) is a 91-item Likert scale questionnaire which incorporates the eight subscales from the Eating Disorder Inventory, as well as three provisional subscales consisting of (a) Asceticism (examines control over one's behavior through self-restraint), (b) Impulse Regulation (measures one's propensity toward impulsive acts such as substance abuse or self-destructiveness), and (c) Social Insecurity (assesses perceptions of one's social interactions as being unfulfilling) (Garner, 1991). The items are scored on a 6-point scale ranging from "never" to "always." Reinking and Alexander (2005) reported that "the EDI-2 has been shown to have high reliability when used in college-aged populations" based on Garner (1991) and Garner, Olmsted, and Polivy's research (1983, p. 48).

Questionnaire for Eating Disorder Diagnosis. The Questionnaire for Eating Disorder Diagnosis (QEDD) is a 50-item yes/no questionnaire that classifies individuals as either eating disordered (i.e., anorexia nervosa, bulimia nervosa, binge eating disorder, and eating disorder not otherwise specified), symptomatic, or nonsymptomatic (Mintz, O'Holloran, Mulholland, & Schneider, 1997). Individuals falling into the symptomatic category demonstrate some pathological eating attitudes and behaviors, and report high body dissatisfaction. Individuals in the nonsymptomatic category do not meet any diagnostic criteria for an eating disorder. The QEDD has demonstrated strong psychometric properties. More specifically, the convergent validity was good with the Bulimia Test-Revised, $t(133) = 6.67$, $p < .001$, and the EAT, $F(2, 134) = 99.65$, $p < .0001$, while criterion validity was supported with a strong relationship with clinical interviews, with a kappa value of 1.00 (Mintz et al.). Test-retest reliability was stable

over a 2-week period of time; kappa values ranged from .85 to .94 and were less stable after a 1- and 3-month period of time, with kappa values ranging from .54 to .64.

Eating Disorders Examination Questionnaire. The Eating Disorders Examination Questionnaire (EDE-Q) is a self-report version of Fairburn and Cooper's (1993) Eating Disorder Examination (Fairburn & Beglin, 1994). This measure assesses behavioral and attitudinal symptoms associated with eating disorders over a 28-day period. The EDE-Q yields four subscales: Eating Concern, Shape Concern, Weight Concern, and Restraint. The EDE-Q has adequate psychometric properties. Luce and Crowther (1999) found good internal consistency and test-retest reliability, with Cronbach alphas ranging from 0.78 to 0.81 and a Pearson correlation of .87 for Eating Concern, and a Cronbach alpha of .89 and a Pearson correlation of .92 for Weight Concern.

Dutch Eating Behavior Questionnaire. The Dutch Eating Behavior Questionnaire (DEBQ) is a 33-item self-report Likert scale that assesses eating behaviors (Van Strein, Frijters, Bergers, & Defares, 1986). It yields three subscales: Restrained Eating, Emotional Eating, and External Eating. Wardle (1987) found good reliability and validity on the DEBQ. For example, Emotional Eating and External Eating were inter-correlated with bulimic patients, .56, $p < .001$, and anorexic patients, .45, $p < .001$.

Body Shape Questionnaire. The Body Shape Questionnaire (BSQ) is a 34-item self-report measure, which assesses an individual's preoccupation with weight and body shape (Cooper, Taylor, Cooper, & Fairburn, 1987). Pearson's correlations demonstrated that the BSQ was significantly correlated with the Body Dissatisfaction subscale on the EDI, $r = .66$, $p < .001$. Rosen, Jones, Ramirez, and Waxman (1996) found that the test-

retest reliability was .88, $p < .001$ and the BSQ demonstrated strong concurrent validity with the Body Dysmorphic Disorder Examination among undergraduate students, $r = .77$, $p < .05$.

The Body Cathexis Scale. The Body Cathexis Scale (BCS) measures the degree of satisfaction with various parts and functions of the body (Secord & Jourard, 1953). Participants are asked to rate 46 body parts or functions of the body using a 5-point Likert scale. Secord and Jourard found that the intercorrelations between body cathexis and self-cathexis was .66 for females. Additionally, reliability for body cathexis for females was .83.

Body Image Survey (BIS, also referred to as the Body Image Assessment Procedure [BIA]). The Body Image Survey (BIS) examines the participant's perceived body size and ideal body size (Fallon & Rozin, 1985). The BIS consists of 12 female silhouettes ranging in shape from anorexic to obese, and females are asked to identify which silhouette is most comparable to their actual size as well as their ideal size. Data regarding the validity and reliability was not noted in the articles that utilized the BIS.

Rosenberg Self-Esteem Scale. The Rosenberg Self-Esteem Scale (RSES) is a 10-item Likert scale questionnaire that measures global self-esteem (Johnson et al., 2004; Rosenberg, 1965). The scale is comprised of statements such as "I feel I have a number of good qualities." The items are scored on a 4-point likert scale, ranging from 1 (strongly agree) to 4 (strongly disagree). The RSES has strong internal validity, with an alpha of 0.81 (Neumark-Sztainer, Beutler, & Palti, 1996).

Marten's Sport Competition Anxiety Test. The Marten's Sport Competition Anxiety Test (SCAT) measures competitive anxiety, with a higher score indicating higher competitive anxiety (Corcoran, 1989; Martens, 1977). The SCAT demonstrated moderately high validity, with significant correlations ranging from .29 to .56, suggesting that the SCAT is able to distinguish competitive anxiety from other variables (Corcoran).

Although several studies utilized the preceding measures, other studies have chosen different measures, which will be discussed in the respective studies.

Relevant Research

The relationship between female collegiate athletes and eating disorders/disordered eating will be examined below. To begin with, personal characteristics affecting collegiate athletes and specific sport factors will be reviewed.

Personal Characteristics Affecting Collegiate Athletes

Some of the individual characteristics of collegiate athletes will be examined to gain a better understanding of the relationship between athletic participation and eating disorders/disordered eating. To start with, the overlapping personality characteristics of a "good athlete" and anorexia nervosa will be examined. Then the impact of gender and ethnicity will be explored in relation to disordered eating among collegiate athletes.

Overlapping characteristics of athletes and eating disordered individuals. Thompson and Trattner-Sherman (1999) examined six characterological traits associated with anorexia nervosa and compared them to six traits associated with being a "good athlete." The "good athlete" traits were based on Ogilive's (1968) research and included

emotional stability, tough mindedness, conscientiousness, self-control, low tension, extroversion, and trust (i.e., coachability; Thompson & Trattner-Sherman). The traits associated with anorexia nervosa consisted of a need for approval, conformity, conscientiousness, lack of responsiveness to inner needs, high personal expectations, and all or nothing thinking. The researchers matched the anorexic symptoms to corresponding "good athlete" traits that may be (mis)perceived as attributes in the athletic environment. Thus, the following comparisons were made: asceticism/mental toughness, excessive exercise/commitment to training, perfectionism/pursuit of excellence, overcompliance/coachability, selflessness/unselfishness, and denial of discomfort/performance despite pain.

Mental toughness was used to describe individuals who override their emotions in order to persist through difficult circumstances (Thompson & Trattner-Sherman, 1999). Asceticism refereed to the control of one's behavior through self-restraint and self-discipline. An athlete who was able to control her emotions and sacrifice herself for the team was valued in the sporting world. Thus, "an anorexic athlete might appear to be a mentally tough individual with good self-control" (p. 185). Commitment to training refereed to the athlete's ability to persist through obstacles, push herself to get the job done, and give her best effort (Orlick, 1990). In a similar manner, anorexics have exercised excessively despite physical or psychological consequences (Thompson & Trattner-Sherman). As a result of fear of rejection and accompanying anxiety, anorexics were driven by a need to please others and a need for perfectionism. In the athletic world, athletes who were never satisfied with their performance, were constantly striving for a

more optimal performance, and were committed and determined to be better, possessed characteristics many coaches looked for in their athletes. Coachability refereed to the degree of teachability the athlete exhibited. Anorexics are typically characterized as people pleasers, resulting in conformity and a need for approval from others. An athlete who was coachable and compliant was more likely to be valued and praised.

Good athletes placed the team before themselves; their decisions were based on what was best for the team (Thompson & Trattner-Sherman, 1999). Anorexics tended to display difficulty making decisions for themselves, as they tended to focus on what they thought others wanted from them. An anorexic athlete likely put the needs of the coach, players, and/or team before her own needs, and this self-sacrifice may be respected and even encouraged. In the sporting world, playing with pain has been not only an acceptable behavior, but also a glorified behavior. Athletes were seen as strong and committed if they played through the pain. Similarly, anorexics that over exercised often times exercised despite being injured and malnourished. In sum, many of the anorexic symptoms were synonymous with good athletic characteristics, making it even more difficult to identify athletes at risk of an eating disorder. The authors stated, “these characteristics are not only found frequently in athletes; they are also encouraged and reinforced in the athletic environment” (p. 188). Athletes and coaches have struggled with finding the acceptable line between promoting and discouraging these traits.

The impact of gender and ethnicity on disordered eating among collegiate athletes. Although it has been difficult to identify athletes with eating-related problems, one subgroup has consistently been identified as a population at risk. Research has

consistently shown that females displayed more eating disorder symptoms than males. Johnson et al. (2004) examined gender and ethnic differences (i.e., Caucasian compared to African American) in regards to self-esteem and disordered eating among 1,287 NCAA Division I collegiate athletes. The athletes participated in 11 sports (i.e., football, basketball, track, swimming, gymnastics, wrestling, cross-country, crew, tennis, Nordic skiing, and volleyball). The athletes completed a 133-item self-report questionnaire, which consisted of three subscales from the Eating Disorder Inventory-2 (Body Dissatisfaction, Drive for Thinness, and Bulimia; Garner, 1991), the Rosenberg Self-Esteem Scale (Rosenberg, 1965), as well as questions regarding demographics and participation in sport. The demographic questionnaire yielded three indices (purge index, restriction index, and the binge index).

The results indicated males had significantly higher self-esteem than females, $F(1,1283) = 15.77$, $p < .001$, and African Americans had significantly higher self-esteem than Caucasians, $F(1,1283) = 15.40$, $p < .001$ (Johnson et al., 2004). Caucasian females reported the lowest self-esteem compared to African American females and both groups of males, $F(1,1283) = 8.86$, $p = .003$. Additionally, females reported a significantly greater amount of body dissatisfaction compared to males, $F(1,1141) = 46.739$, $p < .001$, and Caucasians reported more body dissatisfaction compared to African Americans, $F(1,1141) = 25.968$, $p < .001$. Caucasian females reported a significantly greater amount of body dissatisfaction than African American females and both groups of males, $F(1,1141) = 32.708$, $p < .001$. Furthermore, females demonstrated significantly higher scores on the Drive for Thinness subscale compared to males, $F(1,1170) = 67.339$, $p <$

.001, and Caucasians demonstrated significantly higher scores on the Drive for Thinness subscale than African Americans, $F(1,1170) = 22.048$, $p < .001$. Caucasian females reported a significantly higher degree of drive for thinness compared to African Americans and both groups of males, $F(1,1170) = 30.005$, $p < .001$.

In regards to athletes' eating behaviors, females purged more often than males, $F(1,1357) = 8.75$, $p = .003$, and females restricted more often than males, $F(1,1357) = 17.83$, $p < .001$ (Johnson et al., 2004). Caucasians restricted more often than African Americans, $F(1,1357) = 62.133$, $p < .001$, and Caucasian females restricted more than the other three groups. Caucasians reported significantly more binging behavior than African Americans, $F(1,1357) = 6.905$, $p = .009$. Given the above-mentioned findings, Johnson et al. concluded that Caucasian female collegiate athletes "may be the subpopulation most at risk" of disordered eating (p. 154). This group demonstrated significantly lower self-esteem and significantly more behaviors and attitudes associated with disordered eating compared to African American females and males, as well as Caucasian males.

Specific Sport Factors

Athletic participation encompasses several factors such as competitive level, type of sport, classification of the perspective sport (i.e.,, lean, non-lean, judged, and refereed sport), and level of physical activity. These factors and others will be examined below. Additionally, meta-analyses will be investigated to further explore the relationship of specific sport factors and eating disorder/disordered eating among female collegiate athletes.

Competitive level differences in regards to disordered eating. In addition to gender, competitive level has been shown to be an influential factor in the prevalence of disordered eating. Hausenblas and McNally (2004) examined the prevalence of disordered eating among high school, three NCAA Division I universities, and elite track (i.e., sprinters vs. middle/long range runners) and field athletes, as well as non-athletes (higher-active or lower-active non-athletes). Two hundred seventeen male and female track and field athletes and 195 male and female non-athletes participated in the study. Track and field athletes were chosen because sprinting "(emphasized) strength and neuromuscular efficiency, enlisting athletes with a lean and muscular build," while middle/long distances required "aerobic training that is most effectively tolerated with a lighter and leaner body," and field events emphasized "size and muscular force" (p. 279). Additionally, field athletes "tended to have developed musculature and above average body fat levels" (p. 280).

Non-athletes were classified as higher active (n = 111, moderate to strenuous activity 5 or more times per week) or lower active (n = 84, moderate to strenuous activity 4 or less days per week; Hausenblas & McNally, 2004). The Leisure-Time Exercise Questionnaire (LTEQ) assessed non-athletes' level of physical activity (i.e.,, strenuous, moderate, and mild intensity) over the course of a typical week (Godin, Jobin, & Bouillon, 1986). Godin et al. indicated that the LTEQ has adequate psychometric properties. Additionally, the Eating Disorder Inventory-2 (EDI-2; Garner, 1991) and the Questionnaire for Eating Disorder Diagnosis (QEDD; Mintz et al., 1997) assessed eating disorder pathology.

A MANCOVA and univariate follow-up analysis revealed women reported significantly greater drive for thinness, $L(1) = 5.65$, $p < .05$, $\omega^2 = .06$, and body dissatisfaction, $L(1) = 6.34$, $p < .05$, $\omega^2 = .10$, than men (as measured by the EDI-2; Hausenblas & McNally, 2004). Post hoc tests demonstrated athletes reported greater body satisfaction than higher- and lower-active non-athletes. When athletes were compared to non-athletes, track and field athletes reported more body satisfaction than non-athletes. Furthermore, approximately 7% of athletes ($n = 16$), 14% of higher-active non-athletes ($n = 18$), and 8% of lower-active non-athletes ($n = 7$) met eating disorder/symptomatic criteria (as measured by the QEDD). Females were significantly more likely to be classified in the eating disorder/symptomatic category compared to males, 13.93% and 4%, respectively.

Approximately 6% of high school athletes, 9% of collegiate athletes, and 8% of elite athletes were classified in the eating disorder/symptomatic category (Hausenblas & McNally, 2004). The prevalence of eating disorders did not differ significantly among the various competitive levels; however, factors which are common to eating disorders varied among the groups. For instance, high school athletes reported higher scores on the Ineffectiveness and Maturity Fears subscales on the EDI-2 compared to collegiate and elite athletes. In comparing the difference between middle and long distance and sprint athletes, 11.8% of the middle and long distance runners met criteria for an eating disorder, while 4.7% of the sprinters met criteria.

Overall, the results suggested that women endorsed more eating disorder and symptomatic behaviors than men (Hausenblas & McNally, 2004). Additionally, eating

disorder symptomatology did not significantly differ among competitive levels (i.e., high school, college, and elite). Also, track and field athletes did not appear to be at an increased risk of developing an eating disorder compared to non-athletes.

Prevalence of eating disorder and disordered eating among female collegiate athletes. Similar to the findings by Hausenblas and McNally (2004), Johnson, Powers, and Dick (1999) found that female collegiate athletes exhibited more symptomatic eating attitudes and behaviors than male collegiate athletes. Johnson et al. conducted the largest investigation to date exploring the prevalence of eating disorders among collegiate athletes. Specifically, they examined pathological eating behaviors and attitudes among 1,445 student athletes (562 female, 883 male) from 11 NCAA Division I schools. The athletes participated in 11 different sports (i.e., football, basketball, track, swimming, gymnastics, wrestling, cross-country, crew, tennis, Nordic skiing, and volleyball). The researchers constructed a 133-item questionnaire designed specifically for student athletes, including three subscales of the Eating Disorder Inventory-2 (i.e., Body Dissatisfaction, Drive for Thinness, and Bulimia; Garner, 1991), the Rosenberg Self-Esteem Scale (Rosenberg, 1965), and the Body Cathexis Scale (Secord & Jourard, 1953).

Results indicated that female athletes felt more out of control while overeating compared to male athletes (81% vs. 45%, $p < .0001$; Johnson et al., 1999). Female athletes also reported more binge eating episodes than male athletes (22.68% vs. 11.97% at $p < .001$). Female athletes reported vomiting (23.90%), use of diet pills (14.30%), and use of laxatives (11.72%) as means to lose weight at some time in their lives ($p < .0001$). The mean body mass index for female athletes was 21.1 kg/m2 ($SD = 2.4$) compared to

25.7 kg/m2 (*SD* = 4.5) for male athletes. Both male and female athletes reported a lowered ideal body fat content compared to their actual body fat content. Females desired a mean total fat content of 13% (*SD* = 7.3) while their actual mean fat content was 15.4% (*SD* = 4.5). Similarly, males desired a mean total fat content of 8.6% (*SD* = 7.3) while their actual mean fat content was 10.5% (*SD* = 10.3). Additionally, female athletes desired their fat content to result in amenorrhea. Sixteen percent (*n* = 33) of the female athletes reported amenorrhea. Females who reported normal menses had a mean fat content of 20.9% (*SD* = 4.6%), while females with amenorrhea had a mean fat content of 16.2% (*SD* = 4.0).

Johnson et al. (1999) created four categories to classify the degree of pathological eating behaviors among athletes in this study: DSM-IV, clinically significant (also known as subclinical), self-identified, and at risk. The DSM-IV category for anorexia nervosa required a BMI $\leq$ 15 kg/m2, amenorrhea in females, and an elevation on the Drive for Thinness (score $\geq$ 10) and Body Dissatisfaction (score $\geq$ 12) subscales on the Eating Disorder Inventory-2. None of the athletes met this criterion. The DSM-IV category for bulimia nervosa required binging and purging (i.e., vomiting, laxatives, diuretics) twice weekly for 3 months, and elevations on the Drive for Thinness and Body Dissatisfaction subscales of the EDI-2. No male athletes met criteria and 1.1% of female athletes met criteria. The clinically significant category for anorexia required a BMI $\leq$ 20 kg/m2, amenorrhea for females, and an elevation on the Drive for Thinness or Body Dissatisfaction subscales. No male athletes met criteria and 2.85% of female athletes met criteria. The clinically significant category for bulimia nervosa required binging and

purging on a monthly or greater basis, and elevations on the Drive for Thinness and Body Dissatisfaction subscales. Approximately 9% of female athletes met criteria and .005% of male athletes met criteria. Self-identified athletes simply reported that they had either anorexia or bulimia. One percent of male athletes reported having anorexia, while 1.96% of female athletes reported having anorexia. Five and a half percent of female athletes reported having bulimia, while .005% of males reported having bulimia. The at risk category for anorexia nervosa required a BMI $\leq$ 20 kg/m2, amenorrhea, or an elevation on either the Drive for Thinness or Body Dissatisfaction subscale. Approximately 35% of female athletes were at risk of anorexia, while 9.5% of male athletes were at risk. The at risk category for bulimia nervosa required six or more episodes involving binge eating, vomiting, laxatives, diuretics, diet pills, or an elevation on either the Drive for Thinness or Body Dissatisfaction subscales. Thirty-eight percent of both male and female athletes were at risk for bulimia.

When comparing male and female athletes, an unpaired *t*-test (Body Cathexis Scale) revealed that female athletes generally demonstrated higher body dissatisfaction than male athletes (Johnson et al., 1999). Female athletes also appeared to have statistically significant lower self-esteem than male athletes (Rosenberg Self-Esteem Scale) ($p < .0001$). When comparing the different athletic teams, an ANOVA and a post-hoc analysis using the Sheffe *F* (EDI-2) demonstrated that female gymnasts scored higher on the Drive for Thinness subscale than female basketball players ($p = .0002$) and female swimmers ($p = .0179$).

Overall, Johnson et al. (1999) found the prevalence of symptomatic eating behaviors and attitudes among collegiate athletes was lower compared to previous studies. However, female athletes consistently reported more eating disorder attitudes and behaviors than male athletes. The low incidence of eating disordered attitudes and behaviors may have been the result of underreporting in an attempt to protect their respective team as well as their athletic department from NCAA regulatory actions. Additionally, previous research has predominately involved less competitive athletic programs, while the current study included only "prominent and competitive" NCAA Division I athletic programs, which could suggest that athletes from less competitive programs may be at a greater risk of disturbed eating attitudes and behaviors (p. 186).

Additionally, Karlson, Black-Becker, and Merkur (2001) examined the prevalence of eating disordered behaviors in female collegiate lightweight rowers (n = 122), a subgroup of athletes that have received little attention in research, long distance runners (n = 79), and a control group (n = 95), and found similar results to Johnson et al. (1999). The Eating Disorders Examination-Questionnaire (EDE-Q) assessed symptoms associated with eating disorders (Fairburn & Beglin, 1994). In regards to these symptoms, an ANCOVA revealed that rowers restricted their caloric intake more than runners or controls, M = 2.01 (1.47) compared to M = 1.48 (1.21) and M = 1.59 (1.29), respectively, $p < .05$, but were less concerned with their body shape than runners and controls, M = 1.51 (1.27) compared to M = 1.83 (1.48) and M = 2.33 (1.38), respectively, $p < .05$. Furthermore, the rowers, runners, and controls did not significantly differ on measures of eating or weight concern.

Karlson et al. (2001) also assessed at risk behaviors (i.e., self-induced vomiting and/or use of laxative and/or diuretics) among the three groups. The rowers reported a significantly greater use of diuretics compared to the runners or controls, $M = 10.7$ (13) compared to $M = 2.5$ (2) and $M = 1.1$ (1), respectively, $p < .05$. The three groups did not significantly differ in regards to vomiting or use of laxatives. To determine the prevalence of probable eating disorders, the researchers used DSM-IV criteria. Although no significant difference existed among the three groups regarding the prevalence of an eating disorder; 26 participants were identified as having a "probable eating disorder" (i.e., disordered eating). Three participants met probable criteria for bulimia nervosa, while 23 participants met probable criteria for eating disorder, not otherwise specified. Overall, the results suggested that although lightweight female rowers did not display a higher prevalence of eating disorders, they reported a significantly greater amount of eating restraint compared to long distance runners and the control group. An additional concern was the unhealthy weight-loss method (i.e., diuretics) rowers reported. This problematic behavior may be an indication of other harmful weight-loss methods that were not examined in the present study.

To further investigate eating disorder and disordered eating among collegiate athletes, Sanford-Martens et al. (2005) examined clinical and subclinical eating disorders in 325 NCAA Division I athletes and 164 collegiate non-athletes. Approximately 49% of the participants were female athletes. The athletes were involved with the following sports: volleyball, gymnastics, golf, track and field, cross country, softball, basketball, soccer, swimming/diving, tennis, wrestling, football, and baseball. The sports were

classified as either a lean sport (i.e., cross country/distance running, gymnastics, swimming, diving, and wrestling) or a non-lean sport (i.e., volleyball, golf, softball, baseball, soccer, tennis, football, and basketball). Participants were classified as symptomatic/subclinical if they reported any eating disorder symptom, regardless of how many symptoms. The QEDD assessed the eating disorder symptomatology (Mintz et al., 1997).

In general, females reported more problematic eating behaviors than males (Sanford-Martens et al., 2005). Twenty percent of female athletes and 16% of male athletes were classified as symptomatic. Five percent of female athletes reported a diagnosable eating disorder, while 2% of male athletes reported one. Interestingly, non-athletes were 1.72 times more likely than athletes to be symptomatic, which could be attributed to not accounting for the physical activity of the non-athletes. Nevertheless, it is important to note that Sanford-Martens et al. (2005) found that non-athletes displayed more symptomatic disordered eating attitudes and behaviors. When examining the difference between lean and non-lean sport athletes, lean sport athletes did not report more disordered eating symptomatology than non-lean sport athletes. The results suggested that although female athletes were not found to be at a significantly greater risk of an eating disorder, female athletes still exhibited eating disorder symptomatology.

The majority of the above-mentioned studies indicated that female athletes displayed more disordered eating patterns compared to clinical eating disorders, and this was further supported by Williams, Sargent, and Durstine (2003), who examined subclinical eating disorders in 587 NCAA Division I, II, and III female athletes. The

athletes were comprised of 14 teams (i.e., basketball, crew, cross-country, diving, field hockey, golf, gymnastics, lacrosse, soccer, softball, swimming, tennis, track & field, and volleyball). Eating attitudes and behaviors were assessed by the Eating Attitudes Test (EAT; Garner et al., 1982) and the Eating Disorder Inventory-2 (EDI-2; Garner, 1991). To qualify for a subclinical eating disorder an athlete needed to either meet or exceed the pre-existing cut off on the EAT (i.e., a score of 20 or higher; Garner et al., 1982), the Body Dissatisfaction subscale on the EDI-2 (i.e., a score of 14 or higher; Garner, 1991), or the Drive for Thinness subscale on the EDI-2 (i.e., a score of 14 or higher; Garner, 1991). With the above-mentioned criteria, 118 athletes (20.1%) were classified as having a subclinical eating disorder, with at least two athletes from each team.

Regarding competitive level differences, chi square tests and logistic regression analyses demonstrated that athletes competing at the Division I level were not at a higher risk of developing a subclinical eating disorder compared to athletes at the Division II and III levels (Williams et al., 2003). Furthermore, at least half of the athletes participating in 11 of the 14 sports (i.e., basketball, crew, cross-country, diving, field hockey, golf, gymnastics, lacrosse, soccer, swimming, and tennis) reported dieting and/or other weight control methods to enhance their performance, while at least half of the athletes participating in 13 of the 14 sports (i.e., basketball, crew, diving, field hockey, golf, gymnastics, lacrosse, soccer, softball, swimming, tennis, track and field, and volleyball) reported dieting and/or other weight control methods to enhance appearance. Over 50% of the athletes in crew, field hockey, and volleyball were required to weigh-in. Additionally, athletes from every sport except diving desired a lower BMI.

Overall, the athletic teams did not significantly differ on the prevalence of subclinical eating disorders. However, significant results were found between the presence of a subclinical eating disorder and dieting/other weight control methods to enhance performance (11 of 14 sports) and appearance (13 of 14 sports; Williams et al., 2003). Additionally, athletes who heard expressed concern from others regarding eating attitudes and behaviors (i.e., coaches, teammates, friends, parents, or significant others) had significantly higher scores on the EAT-26, Drive for Thinness subscale, Body Dissatisfaction subscale, and the subclinical eating disorder index than those who did not hear concern from others. These results signify the influential role that coaches and teammates, as well as others, play in the identification of disordered eating.

To further examine the prevalence of eating disorders among athletes, Engel et al. (2003) investigated the relationship among female athletes and eating disorders, specifically purging, restricting, and binging behavior in 1,445 NCAA Division I athletes (562 females and 883 males). The athletes participated in the following sports: football, basketball, track, swimming, gymnastics, wrestling, cross country, crew, tennis, Nordic skiing, and volleyball. Eating related attitudes were assessed by the Drives for Thinness and Body Dissatisfaction subscales on the Eating Disorder Inventory-2 (EDI-2; Garner, 1991), while self-esteem was assessed by the Rosenberg Self-Esteem Scale (Rosenberg, 1965). The authors constructed three indices based on the demographic questionnaire: purge index, restriction index, and binge index.

The results indicated that female athletes reported higher Drive for Thinness scores than male athletes; however, it was a nonsignificant difference (Engel et al., 2003).

Athletes in swimming, basketball, and gymnastics reported significantly higher Drive for Thinness scores compared to athletes in football, cross country, and wrestling. Additionally, athletes with lower self-esteem reported higher Drive for Thinness scores (nonsignificant finding). In regards to Body Dissatisfaction, female athletes reported more body dissatisfaction compared to male athletes. Athletes in track, cross country, and wrestling reported lower Body Dissatisfaction scores compared to athletes in other sports.

The eating disorder indices demonstrated that female athletes endorsed significantly more purging behavior than male athletes. Significant differences on the purge index were noted among the following teams; gymnasts and wrestlers had higher purge index scores than basketball players. Furthermore, when athletes perceived that their teammates vomited or used laxatives, they reported significantly higher purge index scores. This finding once again points to the influential role of teammates. Additionally, female athletes restricted significantly more food than male athletes. Differences in restricting behavior were found among the various athletic teams; wrestlers and gymnasts reported significantly higher restriction index scores, while athletes in basketball, track, swimming, cross country, and Nordic skiing reported less restrictive behavior. Also, cross-country athletes reported significantly higher binge index scores as compared to other athletes. No other significant differences existed on binging behaviors.

Engel et al. (2003) concluded that collegiate athletes demonstrated similar patterns of disordered eating compared to the general population. Additionally, the types of sport, as well as an athlete's perception of teammates' eating and weight maintance behaviors, were significant predictors of eating disorder indices. The type of sport in

which an athlete participated produced the most variance in the eating disorder indices; this was especially noted with wrestlers and gymnasts in regards to food restriction.

Disordered eating indices among various collegiate athletic teams. As previous studies have noted, the type of sport in which the athlete participated impacted the development of eating disordered symptoms. Berry and Howe (2000) examined risk factors associated with disordered eating such as social pressure, self-esteem, body image, and competition anxiety in female collegiate athletes participating in field hockey (n = 8), swimming (n = 8), soccer (n = 10), rowing (n = 8), and basketball (n = 12). Self-esteem was assessed with the Rosenberg's Self-Esteem Scale (RSES; Rosenberg, 1965). Competitive anxiety was measured with Marten's Sport Competition Anxiety Test (MSCAT; Martens, 1977). Body image was assessed with the Body Shape Questionnaire (BSI; Cooper et al., 1987). Eating disorder symptomatology was assessed with the Dutch Eating Behavior Questionnaire (DEBQ; Van Strien et al., 1986).

Canonical correlations indicated athletes who reported high restrained eating (.972) and high emotional eating (.499) exhibited the following risk factors: low body image (.963), high social pressure (.723), low self-esteem (.428), and high competition anxiety (.520; Berry & Howe, 2000). Athletes reporting high restrained eating (.855) also had high body fat content (.516) and high BMI (.988). Individual regression analysis revealed that body image, $t(45) = 4.89$, $p < .001$, social pressure, $t(45) = 2.746$, $p < .01$, and BMI, $t(45) = 2.92$, $p < .05$, predicted restrained eating. Additionally, body image predicted emotional eating, $t(45) = 2.076$, $p < .05$. No significant differences existed among the various athletic teams and disordered eating measures. These results suggested

poor body image, low self-esteem, high competitive anxiety, and high social pressure (i.e., coaches and peers) were significant predictors of restrained eating among collegiate athletes. Additionally, the type of sport an athlete participated in did not increase the risk of disordered eating, indicating that athletes from all sports are potentially at risk of developing unhealthy eating patterns.

Meta-analytic findings on eating disorders/disordered eating among female collegiate athletes. To further explore eating disorder symptomatology in female athletes, Smolak et al. (2000) conducted a meta-analysis of 34 studies in which they examined eating problems in female athletes. Study inclusion criteria required a comparison of a group of female athletes with either non-athletes or another group of athletes on a normed measure, and the study results included relevant variables (i.e., percentages, means and standard deviations, *t*-tests, *F* values, or *r* values). All variables were converted to a *z* score to assess the statistical significance of each study. The Eating Disorder Inventory-2 (EDI-2; Garner, 1991) and Eating Attitudes Test (EAT; Garner et al., 1982) were two of the common measures utilized in the 34 studies. Participants included high school, collegiate, and elite athletes.

The meta-analysis concluded that athletes displayed more eating problems than controls (Smolak et al., 2000). Furthermore, collegiate athletes reported more eating problems than collegiate non-athletes ($z = 5.29$, $p < .001$, this was marked by heterogeneity), while there were no significant differences among the high school sample. Among the various sports, dancers (i.e., ballerinas, aerobics instructors, and cheerleaders) appeared to be at an increased risk of developing an eating disorder ($z =$

6.68, $p < .001$), with marked heterogeneity. Elite athletes ($z = 6.84$, $p < .001$) and athletes participating in lean sports ($z = 8.70$, $p < .001$) were at an increased risk of developing an eating disorder compared to non-athletes, with marked heterogeneity. More specifically, elite lean sport athletes appeared to be at the greatest risk of developing an eating disorder compared to controls ($z = 12.18$, $p < .001$).

Although athletic participation has been shown to increase the likelihood of developing an eating disorder, it has also acted as a protective factor for some athletes. Smolak et al. (2000) also found that athletes who participated in non-elite, non-lean sports scored better on measures of pathogenic eating attitudes and behaviors compared to non-athletes ($z = -3.81$, $p < .01$). Additionally, gymnasts, swimmers, and runners did not differ from non-athletes in regard to risk of an eating disorder. This finding was somewhat surprising as previous research has identified these particular athletes as high risk. Smolak et al. concluded that the surprising findings might be due to reform in these sports. It may be interesting to note the marked heterogeneity among athletes, which suggested that it is not sport participation per se, but the sporting environment that may increase the risk for the athletes.

Similar meta-analytical findings were demonstrated by Hausenblas and Carron (1999), who examined eating disorder indices in male and female athletes (elite, varsity, high school, club) in 92 studies. Athletes participated in 58 different sports, which were divided into six categories (i.e., aesthetic, endurance, ball-game, weight-dependent, power, and technique). Approximately 58% of the studies utilized the EDI (Garner & Olmstead, 1984), 19.6% utilized the EAT (Garner et al., 1982), 14.1% utilized de novo

questionnaires, 2.8% utilized the Bulimic Investigatory Test, Edinburgh (Henderson & Freeman, 1987), and 1.6% conducted semi-structured interviews. Study inclusion criteria required a control population, a dependent variable of anorexic, bulimic, or drive for thinness symptomatology, and results that could compute an effect size in order to compare studies.

Hausenblas and Carron (1999) found that athletes reported more symptomatic eating disorder behaviors than the comparison groups (overall average *ES* = .12). Female athletes reported more bulimic symptomatology than female controls (*ES* = .16, *SD* = .23, *n* = 142, $p < .05$) and furthermore, female athletes in aesthetic, endurance, and ball-game sports reported more bulimic symptomatolgy than females in the control group. There was no significant difference among the female athletes in aesthetic (*ES* = .18), endurance (*ES* = .17), and ball-game sports (*ES* = .23) on bulimic symptomatology. Additionally, an athlete's level of competition was significantly related to bulimic symptomatology, $L(3) = 15.09$, $p < .01$. As athletes progressed through competitive levels, the magnitude of the effect size decreased, which indicated that younger athletes reported more bulimic symptomatology than elite athletes.

Regarding the Drive for Thinness, female athletes did not differ from females in the control group (*ES* = -0.01, *SD* = .23, *n* = 130; Hausenblas & Carron, 1999). Post hoc analysis showed that females in aesthetic sports (*ES* = .09) displayed more symptomatology than athletes in ball-game sports (*ES* = -0.14). Athlete's Drive for Thinness symptomatology did not significantly differ across competitive levels. The analyses also demonstrated that female athletes reported more anorexic symptomatology

than females in the comparison group (*ES* = -0.01, *SD* = .21, *n* = .56), and female athletes in aesthetic sports reported more anorexic symptomatology (*ES* = .38) than endurance (*ES* = -.04) and ball-game athletes (*ES* = -0.17). Athletes' anorexic symptomatology did not significantly differ across competitive levels.

Hausenblas & Carron (1999) found that female athletes reported more bulimic and anorexic symptomatology compared to female controls. It should be noted that the effect size for the bulimic and anorexic variables was small. Additionally, female athletes' Drive for Thinness symptomatology was comparable with female controls. Female athletes competing in aesthetic sports reported the most eating disorder indices (i.e., anorexia and Drive for Thinness symptomatology) compared to athletes in other categories.

Lean vs. non-lean sports in regards to disordered eating symptomatology. Aesthetic sports as well as lean sports have been considered risk factors for female collegiate athletes. To further explore the role of lean-sport athletics, Reinking and Alexander (2005) examined disordered eating symptomatology among 84 NCAA Division I female collegiate athletes and 62 female collegiate non-athletes. More specifically, they examined the differences in disordered-eating symptomatology among lean (*n* = 16; swimming and cross-country) and non-lean sports (*n* = 68; basketball, volleyball, soccer, field hockey, and softball). The EDI-2 assessed eating disorder symptomatology (Garner, 1991).

Athletes as well as non-athletes desired a lower body weight, and furthermore lean-sport athletes had a significantly lower desired body weight compared to non-lean

sport athletes (Reinking & Alexander, 2005). Athletes displayed higher body satisfaction (Body Dissatisfaction subscale; $p = .01$) than non-athletes, and non-lean sport athletes (7.3 ± 6.0) reported higher body satisfaction than lean sport athletes (13.2 ± 8.0). Athletes also displayed a greater sense of efficacy (Ineffectiveness subscale; $p = .002$) than non-athletes.

To identify individuals at risk for disordered eating, Reinking and Alexander (2005) utilized a Drive for Thinness (EDI-2) cutoff of 14. No significant differences existed between lean and non-lean sports, or among athletes and non-athletes ($p = .013$). Additionally, no significant differences existed among the groups in regards to oligomenorrhea or amenorrhea.

Overall, female collegiate athletes displayed greater body satisfaction, as well as a greater sense of control and adequacy in their lives compared to non-athletes. These results suggest that collegiate athletes are no more likely to exhibit disordered eating symptomatology than non-athletes. However, lean sport athletes were found to be at a greater risk for disordered eating symptomatology than non-lean sport athletes.

In a similar study, Kirk, Singh, and Getz (2001) examined the prevalence of eating disordered behavior among NCAA Division I female collegiate athletes ($n = 206$) and non-athletes ($n = 197$). The athletes participated in the following sports: volleyball, soccer, tennis, cheerleading, softball, lacrosse, cross-country, track and field, swimming and diving, dance, and basketball. Their attitudes and behavior towards food was assessed with the EAT (Garner et al., 1982). Twenty-two athletes (10.7%) scored in the eating disorder range, while 30 non-athletes (15.2%) scored in this same range, indicating

that athletes are not at a higher risk of developing an eating disorder compared to non-athletes. In comparing the prevalence of eating disorder behavior among the various sport teams, no significant differences existed.

Kirk et al. (2001) divided the athletic teams into two categories: those that place a high emphasis on body leanness (i.e., cheerleading, dance, cross-country, and track and field) and those that place a low emphasis on body leanness (i.e., volleyball, soccer, tennis, softball, lacrosse, swimming and diving, and basketball). Lean and non-lean sports did not significantly differ in regards to eating disorder symptomatology. Overall, these results suggested collegiate female athletes are not at a higher risk of eating disorder behavior as compared to collegiate non-athletes. Additionally, athletic teams prevalence of eating disorder symptomatology did not significantly differ.

Judged vs. refereed sports in regards to disordered eating symptomatology. In addition to aesthetic and lean sports, judged sports have also been considered a risk factor for female collegiate athletes. Judged sports have been thought to place a greater emphasis on one's appearance compared to refereed sports. Schwarz et al. (2005) examined the difference in eating attitudes and habits, body dissatisfaction, and perfectionism among 103 female collegiate students from a community college and a private women's college (the athletic division is unknown). The participants were classified as a non-athlete, judged sport athlete (i.e., gymnastics, diving, cheerleading, and dance), and a refereed sport athlete (i.e., basketball, swimming, and cycling). It is important to note that the athletes were comprised of females from both a community college and private women's college. The Eating Attitudes Test (EAT) examined

pathological eating attitudes (Garner et al., 1982), while perfectionism was measured with the Perfectionism subscale on the Eating Disorder Inventory (EDI; Garner & Olmstead, 1984). To measure body dissatisfaction, participants were asked their actual as well as ideal body weight.

The results indicated that athletes were more satisfied with their bodies compared to non-athletes, $t(97) = -2.59$, $p < .01$ (Schwarz et al., 2005). Eating habits and attitudes did not significantly differ among the two groups, nor was there a significant difference in body size between athletes and non-athletes, $t(82) = -.83$, $p = .41$. Six athletes and six non-athletes displayed problematic eating disordered behavior (as measured on the EAT). However, athletes reported more perfectionism than non-athletes, $t(98) = 2.89$, $p < .01$, and Pearson correlations demonstrated perfectionism was associated with eating pathology, $r(89) = .34$, $p < .05$, dieting, $r(91) = .33$, $p < .05$, and bulimia, $r(93) = .23$, $p < .05$ (as measured by the overall EAT score).

In regards to judged and refereed sports, the only significant finding occurred with dieting, $t(45) = -2.13$, $p < .05$ (Schwarz et al., 2005). Athletes in judged sports dieted more often than athletes in refereed sports ($M = 7.71$, $SD = 7.19$ vs. $M = 4.33$, $SD = 3.96$). In general, athletes and non-athletes had comparable eating disordered symptomatology, which suggests that it is not the athletic environment as a whole which places athletes at a greater risk of disordered eating symptomatology, but rather it is the particular type of sport which places an athlete at a greater risk. For example, female athletes participating in judged sports were more likely to diet compared to female

athletes in refereed sports. Furthermore, female athletes participating in judged sports who have perfectionistic tendencies may be at an increased risk of disordered eating.

Judged and refereed sports were further investigated by Zucker, Womble, Williamson, and Perrin (1999). They examined body weight and shape concerns, pathological eating habits, anxiety, depression, and neuroticism in three groups of NCAA Division I students: athletes participating in refereed sports (n = 33; tennis, basketball, volleyball, and track), athletes participating in judged sports (n = 37; diving, cheerleading, and gymnastics), and non-athletes (n = 62). The Interview for the Diagnosis of Eating Disorders, 4th Edition (IDEA-IV) assessed the diagnostic criteria for eating disorders (Kutlesic, Williamson, Gleaves, Barbin, & Murphy-Eberenz, 1998). The IDEA-IV is an interview that categorizes eating disorders based on DSM-IV criteria into three categories: anorexia nervosa, bulimia nervosa, and eating disorder not otherwise specified. The IDEA-IV has been reported to have adequate reliability and validity (Kutlesic et al.). The Body Dysmorphic Disorder Examination (BDDE) assessed participant's concerns about body size and shape (Rosen & Reiter, 1996). The BDDE is a 33-question semi-structured clinical interview, in which participants were asked to name a body part that they had disliked during the past four months. The interviewer then rated the body part as "not observable," "observable but minimally defective-not abnormal," or "definitely abnormal." The participants then answer other questions regarding body dysmorphic disorder. Reliability and validity on the BDDE was not reported. Furthermore, the Body Shape Questionnaire (BSQ) measured preoccupation with weight and body shape (Cooper et al., 1987). Three subscales from the EDI-2 (i.e., Bulimia,

Drive for Thinness, and Body Dissatisfaction) measured psychological characteristics and symptoms associated with eating disorders (Garner, 1991). Zucker et al. also utilized the neuroticism subscale on the Eysenck Personality Questionnaire (EPQ) to measure emotional instability (Eysenck & Eysenck, 1975). The neuroticism scale on the EPQ has been found to have test-retest reliability of 0.74 to 0.92 at one month, and Zucker et al. reported the validity of this scale was established in several studies. Additionally, the Beck Depressive Inventory (BDI) assessed symptoms of depression (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). The BDI was shown to have adequate reliability and validity. Zucker et al. utilized the State-Trait Anxiety Inventory (STAI) measured variables associated with state and trait anxiety (Spielberger, Gorsuch, & Lushene, 1970). The STAI has been found to have adequate reliability and validity. The Body Image Assessment (BIA) was utilized to measure current and ideal body size and shape (Williams, Davis, Bennett, Goreczny, & Gleaves, 1989).

A chi square analysis demonstrated no significant differences among judged sports, refereed sports, and non-athletes in regards to eating disorder diagnosis. However, judged sport athletes (n = 5; 13.5%) had the largest percentage of diagnoses followed by non-athletes (n = 2; 3.2%) and then refereed sports (n =1; 3.0%; Zucker et al., 1999). Refereed sport athletes scored significantly lower on measures of body dissatisfaction (as measured by the EDI-2; Garner, 1991), concern about one's body size and shape (as measured by the BSQ; Cooper et al., 1987), and symptoms of body dysmorphic disorder (as measured by the BDDE; Rosen & Reiter, 1996) compared to judged sport athletes and non-athletes. Athletes in judged and refereed sports, as well as non-athletes did not differ

in regards to depression (as measured by the BDI; Beck et al., 1961), state and trait anxiety (as measured by the STAI; Spielberger et al., 1970), and neuroticism (as measured by the EPQ; Eysenck & Eysenck, 1975). However, judged sport athletes demonstrated a significantly greater drive for thinness, and a significantly greater concern with body size and shape compared to refereed sport athletes.

Although no significant differences emerged among the three groups regarding eating disorder diagnosis, a trend emerged in which judged sport athletes appeared to have a higher rate of eating disorder diagnoses than refereed sport athletes and non-athletes (Zucker et al., 1999). The athletes and non-athletes did not differ on measures of emotional disturbance (i.e., depression, anxiety, and neuroticism). As suggested in Zucker et al., the "difference between refereed and judged sports [was] primarily related to attitudes and behaviors associated with over concern with body size and shape as opposed to differences in more generalized emotional disturbance" (p. 215).

The impact of athletic uniform type on disordered eating symptomatology. Athletes are often categorized by their respective sport (i.e., lean, non-lean, refereed, and judged); however, this current study categorized athletes by the type of uniform they wore. Krane et al. (2001) examined the relationship among body satisfaction, social physique anxiety, and eating behaviors in NCAA Division I female collegiate athletes (n = 204) and non-athletes (n = 198). The athletes were divided into three groups regarding the type of uniform their respective sport required: revealing (body shape was easily noticed in a form-fitting uniform; i.e., cross-country, track, swimming, gymnastics, and precision figure skating), baggy (body shape was not easily observed in a uniform with a

loose-fitting top and bottom; i.e., basketball, golf, soccer, and softball), and mixed uniforms (baggy tops with tight shorts or skirts; i.e., volleyball, tennis, and lacrosse). Eating attitudes and behaviors were assessed with the EDI (Garner & Olmstead, 1984), while social physique anxiety was assessed with the Social Physique Anxiety Scale (SPAS; Hart, Leafy, & Rejeski, 1989). The SPAS is a 12-item Likert scale in which participants rated statements ranging from "not at all" to "extremely true for me." The SPAS has been shown to have adequate reliability and validity in a number of studies.

Krane et al. (2001) found that the mean scores on the EDI for both the athletes and non-athletes were below the clinical level (score of $\leq$ 14), indicating that the participants as a whole demonstrated healthy attitudes and behaviors towards food. The Perfectionism and Drive for Thinness subscales on the EDI revealed the biggest difference among athletes and non-athletes. Athletes in baggy and mixed uniforms demonstrated significantly higher scores on Perfectionism compared to non-athletes, $F(3,397) = 8.73$, $p < .001$, $eta^2 = .062$. Low scores on Body Dissatisfaction (beta = .536), Drive for Thinness (beta = .296), and Perfectionism (beta = -.135) predicted low social physique anxiety. Overall, Krane et al. found that female collegiate athletes generally did not differ from non-athletes in regards to attitudes and behaviors associated with eating disorders or social physique anxiety.

The protective factor of sport participation against eating disorders and disordered eating. While the majority of research has pointed to some aspect of sports as a risk factor for disordered eating, DiBartolo and Shaffer (2002) looked at the protective factors of sport participation. They examined the eating attitudes, body satisfaction, and

reasons for exercise among 94 NCAA Division III female athletes participating in basketball, volleyball, field hockey, soccer, Alpine skiing, squash, crew, cross-country, and track and field, compared to 115 female non-athletes. The EAT assessed attitudes and beliefs about food associated with Anorexia Nervosa (Garner et al., 1982). The Body Dissatisfaction subscale of the EDI measured body satisfaction (Garner & Olmstead, 1984). The Body Image Survey (BIS) determined the participant's perceived body size and ideal body size (Fallon & Rozin, 1985). The Reasons for Exercise Scale (RFES), an 18-item scale consisting of the Weight & Appearance (external motivation) and Health & Enjoyment (internal motivation) subscales, measured motivations for exercise (DiBartolo, Lin, & Shaffer, 2001). The RFES has demonstrated high internal consistency and good test-retest reliability at a 1-month interval. The Positive and Negative Affect Schedule-Trait (PANAS) version, a 20-item scale which consisted of positive and negative affect subscales, assessed the participants' affect (Watson, Clark, & Tellegen, 1988). The PANAS has a high alpha coefficient and good test-retest reliability at an 8-week interval. The Self-Perception Profile for College Students (SPPCS), a 54-item scale that assessed 12 aspects of self-perception, was utilized to specifically examine global self-worth, appearance competence, and athletic competence (Neeman & Harter, 1986). The appearance competence and athletic competence had high internal consistency; the internal consistency of global self-worth was not noted. The Health Habits Survey (HHS) assessed the length of involvement in intercollegiate sports, height, weight, and past or current medical conditions (DiBartolo & Shaffer, 2002). The reliability and validity of the HHS was not reported.

A MANOVA, as well as follow up univariate tests, demonstrated athletes reporting significantly less disordered eating attitudes (as measured by the EAT; Garner et al., 1982) and higher body satisfaction (as measured by the BIS; Fallon & Rozin, 1985; and the EDI; Garner & Olmstead, 1984) compared to non-athletes (Wilks $\lambda = .88$, $p < .001$; DiBartolo & Shaffer, 2002). Athletes also reported significantly higher intrinsic motivation compared to non-athletes (Wilks $\lambda = .56$, $p < .01$), indicating that their participation is associated with the enjoyment they derive from their sport. Athletes reported higher levels of appearance competence, athletic competence, and global self-worth (as measured by the SPPCS; Neeman & Harter, 1986; Wilks $\lambda = .68$, $p < .001$). Athletes also displayed significantly higher positive affect (i.e., excitement, enthusiasm, interest) compared to non-athletes (as measured by the PANAS; Watson et al., 1988; Wilks $\lambda = -.84$, $p < .001$). An ANOVA indicated that body mass indices did not significantly differ among athletes ($M = 22.74$, $SD = 2.81$) and non-athletes ($M = 22.02$, $SD = 3.31$). Pearson correlations demonstrated that the number of years athletes competed at the intercollegiate level was negatively correlated with eating disorder measures (EAT, $r = .24$, $p < .001$; Garner et al., 1982; EDI-BD, $r = .24$, $p < .001$; Garner & Olmstead; BIS, $r = -.17$, $p < .001$; Fallon & Rozin). Additionally, intercollegiate sports were positively correlated with self-competence and intrinsic motivation for exercise (Health and Enjoyment subscale on the RFES, $r = .50$, $p < .001$; DiBartolo et al., 2001; appearance subscale on the SPPCS, $r = .24$, $p < .001$; Neeman & Harter; athletics subscale on the SPPCS, $r = .45$, $p < .001$; Neeman & Harter; and global self-worth subscale on the SPPCS, $r = .20$, $p < .001$; Neeman & Harter; positive PANAS scores, $r =$

.36, $p < .001$; Watson et al., 1988). Overall, athletes reported healthier eating attitudes and behaviors (i.e., higher body image, more positive affect, greater emotional well being) compared to their non-athlete counterparts. These results suggested that participation in sport at the collegiate level might protect athletes from developing disordered eating attitudes and behaviors.

Athletic status vs. physical activity status in regards to disordered eating symptomatology. Rather than looking at disordered eating among athletes and non-athletes as previous research has done, Malinauskas, Cucchiara, Aeby, and Bruening (2007) examined the relationship between disordered eating and physical activity regardless of athletic status. They investigated physical activity (i.e., low, moderate, high), body composition, and risk of disordered eating among 115 NCAA Division I collegiate female athletes ($n = 68$) and non-athletes ($n = 47$). The athletes consisted of individuals participating on varsity teams as well as individuals participating in a university sponsored sport programs (i.e., intramurals). Both athletes and non-athletes were categorized on the quantity of physical activity they typically engaged in on a weekly basis. Low levels of physical activity were considered exercising less than 34.7 kcal/kg. Moderate levels of physical activity were considered exercising from 34.7 to 45.9 kcal/kg, while high physical activity was considered exercising more than 45.9 kcal/kg. The EDI-2 was utilized to assess risk of disordered eating (Garner, 1991). Skinfold (i.e., triceps, thighs, and suprailiac), circumference (i.e., waist and gluteal), body density, and body fat were also measured.

The results demonstrated that body dissatisfaction was 74% predictive of the total EDI-2 score, while Drive for Thinness was 71% predictive of body dissatisfaction (Malinauskas, et al., 2007). BMI and body fat were 10% predictive of Drive for Thinness, 12% - 15% predictive of the total EDI-2 score, and 22% - 31% predictive of body dissatisfaction. Low physical activity non-athletes reported more body dissatisfaction and had higher body fat compared to low physical activity athletes, $F(1,27) = 4.28$, $p = .05$ and $F(1,27) = 5.96$, $p = .02$, respectively. Moderate physical activity non-athletes reported higher Drive for Thinness scores as compared to moderate physical activity athletes, $F(1,56) = 9.44$, $p < .01$. Moderate physical activity non-athletes had a lower mean BMI compared to moderate physical activity athletes, $F(1,56) = 5.47$, $p = .02$. High physical activity athletes and non-athletes did not significantly differ on psychological or anthropometric measures. Overall, the current study demonstrated the most significant psychological and anthropometric correlation existed between body fat and body dissatisfaction. The study also pointed to a lack of research conducted on physical activity and disordered eating. Given the above-mentioned data, Malinauskas et al. concluded that individuals should be classified by their level of physical activity regardless of their athletic status.

Application

Currently, research has neglected to examine treatment outcomes for athletes with eating disorders (Littlefield, Suercher, Daberkow, Hazel, & Woods, 2006). This has become problematic, as a significant number of athletes have demonstrated disordered

eating attitudes and behaviors. Furthermore, the poor prognosis of individuals with eating disorders regardless of athletic status has added to the complexity of this disorder. For instance, Steinhausen (2002) found that the prognosis for individuals (athletic status was not identified) receiving treatment for anorexia is that 46% will fully recover, approximately 33% will partially recover, and 20% will "remain chronically ill" (p. 1288).

Eating disorders can impact an individual for the rest of his or her life, and in some cases, can end one's life. "Anorexia has one of the highest mortality rates of any mental illness" (Hughes & Hughes, 2004, p. 252). Steinhausen (2002) examined previous studies and found that patients with anorexia nervosa had a mortality rate between 1.36 percent and 17.80 percent, with a high percentage of deaths from suicide. Thus, an athlete showing signs of disordered eating should not be taken lightly and the issue should be addressed immediately before it progresses into a clinical eating disorder.

> The longer an eating disorder persists without treatment, the more severe the consequences to the athlete's health and performance. Thus, early identification and subsequent intervention is essential to limiting the progression and shortening the duration of disordered eating among athletes'. (Beals, 2004, p. 130)

Therefore, it becomes of paramount importance that coaches and athletic staff intervene as early as possible.

The Role of Coaches in the Identification and Treatment of Eating Disorders and Disordered Eating in Athletes.

Coaches play an important role in the identification and treatment of athletes with an eating disorder or disordered eating. Heffner, Ogles, Gold, Marsden, and Johnson (2003) surveyed 303 coaches from NCAA Division I, II, and III as well as NAIA Divisions I and II in regards to eating attitudes and behaviors among their athletes. The coaches were involved in the following sports: gymnastics, swimming, basketball, softball, track, and volleyball. The mean number of years coaching was 11.1. The coaches completed a 40-item survey assessing demographics, coaching behaviors, availability of prevention/intervention services for athletes provided by the university (i.e., eating disorder precautionary measures, assess to on-campus counseling services, and access to a dietician), awareness of general nutritional health issues, eating and weight related problems with athletes, and attitudes towards eating and weight issues in sport. No relationship existed between the coaches' gender and monitoring/managing an athlete's eating and weight, availability of prevention/intervention services, awareness of general nutritional health issues, and/or eating and weight-related problems with athletes. However, male coaches endorsed the statement that "the recent concern about eating disorders in athletes has been exaggerated" more than female coaches, $t(272) = 2.61$, $p < .016$ (p. 214).

Division I coaches endorsed more monitoring/managing athletes' eating and weight, availability of prevention/intervention services, awareness of general nutritional health issues, and/or eating and weight-related problems with athletes compared to

coaches from all other divisions (Heffner et al., 2003). Division I coaches also endorsed the statement that "the recent concern about eating disorders has been exaggerated" (p. 215), more often than coaches from other divisions, $t(199) = 2.73$, $p < .016$. Interestingly, they also reported a higher incidence of eating disorder symptoms in their athletes. Gymnast coaches expressed less agreement with the importance of tracking athletes' weight than other coaches, $t(261) = -2.64$, $p < .016$. They also agreed to a greater extent that it is important for coaches and athletes to collaboratively set a goal weight, $t(65) = 2.66$, $p < .016$, and that losing weight can impair an athlete's performance due to loss of strength, $t(261) = 3.16$, $p < .016$. These results show that although coaches were aware of their athletes' struggle with eating and weight issues, they still took part in some form of weight management. However, many coaches have not been properly trained as to how to monitor weight issues among their athletes. The results also show that on-campus resources were provided for athletes struggling with eating related problems.

Overall, NCAA Division I and gymnastic coaches differed from coaches from other divisions and sports in several areas related to eating/weight attitudes and behaviors (Heffner et al., 2003). This study points to the importance of coaches' awareness of potential risks of not monitoring athletes eating and weight attitudes and behaviors, especially if their respective school does not have access to resources (i.e., registered dietician, exercise physiologist, therapist specialized in working with eating disorders, etc.). This is especially important since approximately 1/3 of coaches have not received formal training in nutrition. Additionally, 44% of the coaches weighed their athletes, 30% suggested losing weight by restricting food intake, and 29% suggested losing weight by

extra practices or workouts. Coaches play an influential role and need to carefully consider the comments and suggestions they give to their athletes, particularly those that struggle with eating and weight issues.

In a similar study, Trattner-Sherman and Thompson (2005) surveyed 2,894 coaches of 23 women's sports from NCAA Division I, II, III programs regarding the identification and management of athletes disordered eating. Approximately 74% of the coaches had at least 5 years of experience coaching. Athletic teams were divided into high-risk and low-risk. High-risk sports included cross-country, gymnastics, rowing, and swimming/diving. Low-risk sports were compromised of the following sports: basketball, bowling, equestrian, fencing, field hockey, golf, ice hockey, lacrosse, rifle/pistol, sailing, softball, skiing, soccer, squash, synchronized swimming, tennis, track, volleyball, and water polo.

Coaches answered a 31-item questionnaire regarding their coaching careers, as well as perceptions of eating attitudes and behaviors of their athletes (Trattner-Sherman & Thompson, 2005). The results demonstrated that coaches identified an average of 2.89 (SD = 4.18) athletes with symptomatic eating behaviors. Furthermore, coaches of high-risk sports were more likely to know when their athletes missed more than three consecutive menstrual cycles, χ^2 (1, n = 2,772) = 61.00, p < .0001. These coaches also talked with their athletes about amenorrhea, χ^2 (1, n = 2,869) = 203.10, p < .0001, and were more likely to refer amenorrheic athletes for a medical evaluation, χ^2 (1, n = 2,846) = 181.04, p < .0001.

Twenty-six percent of coaches reported having awareness of an athlete with symptomatic eating behavior and not identifying the athlete (Trattner-Sherman & Thompson, 2005). In other words, these coaches were aware of their athletes' unhealthy attitudes and behaviors regarding food, yet they did nothing. Coaches of high-risk sports identified more eating disorder symptomatology compared to coaches of low-risk sports, $t(2640) = 8.25$, $p < .0001$, $d = .48$. Ninety-two percent of the coaches who identified an athlete with symptomatic eating behaviors refereed the athlete to a professional (i.e., sports medicine personnel, dietician, general therapist, or eating disorder specialist), with the most frequent referral being to sports medicine personnel (i.e., athletic trainer or physician). Although the majority of coaches have attended trainings and educational seminars on eating disorders, 60.2% would like the NCAA to provide training materials and 59.1% need referral information.

Overall, these findings indicated that coaches were aware of the seriousness of symptomatic eating behaviors in athletes. Although coaches are often criticized for caring more about an athlete's performance than an athlete's health, the majority of the coaches surveyed identified and refereed athletes with eating-related problems to trained health care professionals. Coaches play a vital role in identifying athletes' symptomatic eating behaviors, especially coaches in high-risk sports.

Preventative Measures

Prevention is the first line of defense against disordered eating among female collegiate athletes. Coaches, athletic staff, and healthcare professionals play a vital role in preventing unhealthy eating attitudes and behaviors among athletes.

Athlete specific eating disorder measures. The primary preventative measure involves creating eating disorder/disordered eating measurements specific to athletes (Beals, 2000). Thompson and Trattner-Sherman (1999) discussed the overlap of traits associated with a "good athlete" and traits of anorexia nervosa (i.e., asceticism/mental toughness, excessive exercise/ commitment to training, perfectionism/pursuit of excellence, overcompliance/coachability, selflessness/ unselfishness, and denial of discomfort/performance despite pain). Thus, it is important to understand the overlap of symptoms and recognize when these traits are taken to the extreme and become a risk factor.

Identifying athletes at risk of an eating disorder or disordered eating. Secondary prevention involves identifying athletes at risk of developing disordered eating habits. Thus, it is important for coaches and athletic staff to familiarize themselves with potential warning signs. Additionally, athletic departments have a legal responsibility to take the appropriate preventative steps and, when necessary, steps towards treatment (Bickford,1999). The above-mentioned studies demonstrated that coaches have been recognizing athletes at risk and making proper referrals; however coaches also expressed a desire for more education about eating disorders/disordered eating. The more coaches are informed, the more equipped they will be to handle their athletes' eating-related problems.

Suggestions for coaches and athletes. Beals (2004) and Thompson (1987) suggested some preventative measures that coaches can take. Coaches should deemphasize weight (Beals). In other words, coaches should not be involved in the

monitoring of an athlete's weight and should refrain from commenting on an athlete's weight. If an athlete's weight becomes an issue, it should be addressed with trained professionals (i.e., physician, athletic trainer, or dietician), rather than the coach, and the athlete should be an active participant in deciding how much weight to gain or lose (Thompson; Beals). Coaches should also eliminate group weigh-ins (Beals). If an athlete is weighed at all, there should be a specific purpose, such as weighing football players before and after practice in hot weather to assess for dehydration. If an athlete is to be weighed, he or she should be provided rationale and asked their feelings about being weighed. The athlete should then be weighed in private. Additionally, coaches should treat each athlete as an individual in regards to issues of weight, weight loss, and performance (Beals; Thompson). Coaches should minimize "competitive thinness," that is, being aware of dieting/weight-loss methods which become contagious on a team (Beals, p. 114). To combat this Beals suggested that coaches should provide an environment deemphasizing weight, and focusing on overall health and optimal performance.

Preventative measures are not only aimed at coaches, but they are also targeted at athletes (Beals, 2004). Coaches and athletes alike need proper education regarding the following topics: nutrition, dieting, body composition, menstrual functioning, disordered eating attitudes and behaviors, as well as the impact of all these factors on athletic performance. Beals added that "coaches, trainers, and athletic administrators must make it clear that they place the athletes' health and well-being ahead of athletic performance" (p. 112). Athletes may engage in unhealthy eating and/or weight loss methods as an

attempt to improve their performance, and it is important that both coaches and athletes recognize the damage these unhealthy habits can cause.

Intervention/Treatment

When preventative measures have proven unsuccessful, it then becomes important to intervene (Beals, 2004). The sooner a coach or other professional is able to intervene, the better the prognosis. The treatment goal for an athlete with an eating disorder is to manage unhealthy eating habits while addressing underlying psychological issues contributing to the etiology with the goal of getting the athlete back into a competitive arena as soon as possible (Trattner-Sherman & Thompson, 2001). Eating disorders are complicated to work with in and of themselves; when sports are added to the equation, treatment can become further complicated. The difficulty of working with an athlete who has an eating disorder is the number of people involved in the treatment. Although coaches are usually the ones who make the referrals for these athletes, a psychologist should lead the treatment team (Thompson, 1987; Trattner-Sherman & Thompson). This team operates under the following provisions: the athlete agrees to the involvement of each member, the psychologist coordinating treatment should direct involvement of each member, and sport personnel involvement (i.e., coach and athletic trainer) should be therapeutic and occur within acceptable ethical guidelines.

To further assist coaches and other sport personnel, the International Olympic Committee Medical Commission (IOCMC) created a task force to investigate eating disorders among collegiate athletes (Trattner-Sherman & Thompson, 2006). Trattner-Sherman and Thompson discussed the IOCMC's stand on the female athletic triad, and

specifically, eating disorders. The committee placed a high emphasis on an athlete's overall health rather than simply focusing on weight or body composition. The committee also suggested withholding/reinstating sport participation as a motivation for treatment, relying "on the belief that sport participation is of such importance to an athlete that she can be motivated for treatment by withholding (or reinstating) sport participation" (p. 1999). When sport participation is suspended, the athlete gets the message that his or her overall health is more important than the sport itself. The IOCMC emphasized the importance of communicating with the athlete that nonparticipation is not a means of punishment, rather that his or her health is of paramount importance, and therefore he or she is considered injured. Injured athletes are required to participate in proper rehabilitative treatment to ensure their optimal performance when they return to their respective sport. It is also irresponsible and unethical of coaches to allow athletes to compete while injured without receiving treatment for their injury. The IOCMC recommended that if an athlete does not comply with the agreed upon treatment, training and competition should be immediately suspended. Additionally, Trattner-Sherman and Thompson discussed the importance of considering the athlete's wishes regarding the coach's involvement, recommending that the involvement of the coach should be carefully considered.

Conclusion

Female athletic participation has increased tremendously since the institution of Title IX in 1972. A rising concern of sport participation for women has been the

prevalence of eating disorders among athletes, particularly at the collegiate level. Thus, this paper examined the relationship among eating disorders/disordered eating and female collegiate athletes. The current literature review demonstrates that generally athletes and non-athletes have comparable eating disordered symptomatology (Schwarz et al., 2005; Kirk et al., 2001; Krane et al., 2001; Reinking & Alexander, 2005). However, female collegiate athletes are generally more likely to display disordered eating behavior and have a diagnosis of an eating disorder compared to male collegiate athletes and non-athletes (Johnson et al., 2004). Despite the fact that Sanford-Martens et al. (2005) found that female collegiate athletes were not at a significantly greater risk of an eating disorder compared to male athletes, female athletes still exhibited eating disorder symptomatology. Furthermore, Caucasian female collegiate athletes appeared to be more at risk compared to males and other ethnicities (Johnson et al., 2004).

Due to the prevalence of comparable eating disorder symptomatology among athletes and non-athletes, it does not appear that the athletic environment, as a whole, places athletes at a greater risk of disordered eating symptomatology, but rather it is particular types of sport that may place an athlete at a greater risk. According to Engel et al. (2003), the type of sport in which an athlete participates produced the most variance in the eating disorder indices. This was especially noted with wrestlers and gymnasts in regards to food restriction.

The studies were inconsistent as to whether lean and non-lean sports differed in disordered eating symptomatology. Sanford-Martens et al. (2005) and Kirk et al. (2001) did not find a significant difference among lean and non-lean sports, while Reinking and

Alexander (2005) found lean sport athletes were at a greater risk for disordered eating symptomatology than non-lean-sport athletes. Furthermore, judged sport athletes were more likely to display disordered eating behavior compared to refereed sport athletes and non-athletes (Schwarz et al., 2005; Zucker et al., 1999). Female athletes participating in judged sports who also had perfectionistic tendencies may be at an increased risk of disordered eating compared to other athletes.

The current review of literature includes two meta-analyses. Smolak et al. (2000) found several groups of athletes at a higher risk of eating disorder symptomatology than non-athletes. These included college women, dancers, lean sport athletes, elite athletes, and elite lean sport athletes. Hausenblas and Carron (1999) found that female athletes reported more bulimic and anorexic symptomatology compared to female controls; and female athletes competing in aesthetic sports reported the most eating disorder indices (i.e., anorexia and Drive for Thinness symptomatology) compared to athletes in other categories. The meta-analytic findings were consistent with the above-mentioned studies that were examined.

Overall, the research has demonstrated that athletes have reported disordered eating symptomatology comparable to non-athletes. Participation in athletics in and of itself does not predispose an individual to an eating disorder, rather it is the particularities of sport teams and the athletic environment that have been associated with higher incidence of disordered symptomatology. Female athletes competing in lean and judged sports have a higher incidence of disordered eating compared to athletes in other sports.

Also, the prevalence of disordered eating among female athletes is greater than the presence of clinical eating disorders among female athletes.

Female athletes are at an increased risk of disordered eating, and as female athletic participation continues to rise, this risk also increases. Therefore it is of paramount importance for coaches and other sports personnel to promote awareness and prevention among their athletes. Coaches can be very influential in an athlete's life, and consequently they play an important role in the identification and facilitation of treatment of eating disorders.

REFERENCES

American Psychiatric Association (2000). *Diagnostic and Statistical Manual of Mental Disorders,* Fourth Edition, Text Revision. Washington, DC,

Beals, K. A. (2000). Subclinical eating disorders in female athletes. *Journal of Physical Education, Recreation, & Dance, 71*(7), 23-30.

Beals, K. A. (2004). Disordered eating among athletes: A comprehensive guide for health professionals. Champaign, IL: Human Kinetics.

Beck, A., Ward, C., Mendelson, M., Mock, J., & Erbaugh, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry, 4,* 561-571.

Berry, T. R., & Howe, B. L. (2000). Risk factors for disordered eating in female university athletes. *Journal of Sport Behavior, 23*(3), 207-218.

Bickford, B. (1999). The legal duty of a college athletic department to athletes with eating disorders: A risk-management perspective. *Marquette Sports Law Journal, 10*(1), 87-116.

Committee on Sports Medicine and Fitness. (2000). Medical concerns in the female athlete. *Pediatrics, 106*(3), 610-613.

Cooper, P. J., Taylor, M. J., Cooper, Z., & Fairburn, C. G. (1987). The development and validation of the body shape questionnaire. *International Journal of Eating Disorders, 6,* 485-494.

Corcoran, K. J. (1989) Is competitive anxiety an observable behavior? A sociometric validity study of the SCAT. *Journal of Personality Assessment, 53*(4), 677-684.

DiBartolo, P. M., & Shaffer, C. (2002). A comparison of female collegiate athletes and nonathletes: eating disorder symptomatology and psychological well-being. *Journal of Sport & Exercise Psychology, 24,* 33-41.

DiBartolo, P. M., Lin, L., & Shaffer, C. (2001). The Reasons for Exercise Scale (RFES): *Development of a measure of exercise motivations related to eating disorder symptomatology*. Unpublished manuscript, Smith College, Northampton, MA.

Engel, S. G., Johnson, C., Powers, P. S., Crosby, R. D., Wonderlich, S. A., Wittrock, D. A., et al. (2003). Predictors of disordered eating in a sample of elite Division I athletes. *Eating Behaviors, 4*(4), 333-343.

Eysenck, H. J., & Eysenck, S. B. G. (1975). *Manual of the Eysenck Personality Questionnaire.* San Diego, CA: Educational and Industrial Testing Services.

Fallon, A. E., & Rozin, P. (1985). Sex differences in perceptions of desirable body shape. *Journal of Abnormal Psychology, 94,* 102-105.

Fairburn, C. G., & Beglin, S. J. (1994). Assessment of eating disorders: Interview of self-report questionnaire? *International Journal of Eating Disorders, 16,* 363-370.

Fairburn, C. G., & Cooper, P. J. (1983). The epidemiology of bulimia nervosa: Two community studies. *International Journal of Eating Disorders, 2,* 61-67.

Garner, D. M. (1991). *Eating Disorders Inventory-2.* Odessa, FL: Psychological Assessment Resources.

Garner, D., & Olmstead, M. (1984). *The Eating Disorder Inventory manual*. Odessa, FL: Psychological Assessment Resources.

Garner, D. M., Olmstead, M. P., Bohr, Y., & Garfinkel, P. E. (1982). The Eating Attitudes Test: Psychometric features and clinical correlates. *Psychological Medicine, 12,* 871-878.

Garner, D. M., Olmstead, M. P., & Polivy, J. (1983). Development and validation of a multi-dimensional eating disorder inventory for anorexia nervosa and bulimia. *International Journal of Eating Disorders, 2,* 15-34.

Godin, G., Jobin, J., & Bouillon, J. (1986). Assessment of leisure-time exercise behavior by self-report: A concurrent validity study. *Canadian Journal of Public Health, 77,* 359-361.

Hart, E. A., Leafy, M. R., & Rejeski, W. J. (1989). The measurement of social physique anxiety. *Journal of Sport and Exercise Psychology, 11,* 94-104.

Hausenblas, H. A., & Carron, A. V. (1999). Eating disorder indices and athletes: An integration. *Journal of Sport & Exercise Psychology, 21,* 230-258.

Hausenblas, H. A., & McNally, K. D. (2004). Eating disorder prevalence and symptoms for track and flied athletes and nonathletes. *Journal of Applied Sport Psychology, 16,* 274-286.

Heffner, J. L., Ogles, B. M., Gold, E., Marsden, K., & Johnson, M. (2003). Nutrition and eating in female college athletes: A survey of coaches. *Eating Disorders, 11,* 209-220.

Henderson, M., & Freeman, C. P. L. (1987). A self-rating scale for bulimia. The 'BITE.' *British Journal of Psychiatry, 150,* 18-24.

Hughes, C. S., & Hughes, S. (2004). The female athlete syndrome. *Orthopedic Nursing. 23*(4), 252-260.

Johnson, C., Crosby, R., Engel, S., Mitchell, J., Powers, P., Wittrock, D., et al. (2004). Gender, ethnicity, self-esteem and disordered eating among college athletes. *Eating Behaviors, 5,* 147-156.

Johnson, C., Powers, P. S., & Dick R. (1999). Athletes and eating disorders: The National Collegiate Athletic Association Study. *International Journal of Eating Disorders, 26*, 179-188.

Karlson, K. A., Black- Becker, C., & Merkur, A. (2001). Prevalence of eating disordered behavior in collegiate lightweight women rowers and distance runners. *Clinical Journal of Sport Medicine, 11*, 32-37.

Keen, A. D., & Drinkwater, B. L. (1997). Irreversible bone loss in former amenorrheic athletes. *Osteoporosis International, 7,* 311- 315.

Kirk, G., Singh, K., & Getz, H. (2001). Risk of eating disorders among female college athletes and nonathletes. *Journal of College Counseling, 4*(2), 122-132.

Krane, V., Stiles-Shilpley, J. A., Waldron, J., Michalenok, J. (2001). Relationships among body satisfaction, social physique anxiety, and eating behaviors in female athletes and exercisers. *Journal of Sport Behavior, 24*(3), 247-263.

Kutlesic, V., Williamson, D. A., Gleaves, D. H., Barbin, J., & Murphy-Eberenz, K. P. (1998). The interview for the diagnosis of eating disorders-IV: Application to DSM-IV diagnosis criteria. *Psychological Assessment, 10,* 41-48.

Littlefield, K., Zuercher, J., Daberkow, R., Hazel, J., & Woods, B. K. (2006). Athletes and eating disorders. *Remuda Review: The Christian Journal of Eating Disorders, 5*, 2-8.

Luce, K. H., & Crowther, J. H. (1999). The reliability of the eating disorder examination-self-report questionnaire version (EDE-Q). *International Journal of Eating Disorders, 25,* 349-351.

Malinauskas, B. M., Cucchiara, A. J., Aeby, V. G., & Bruening, C. C. (2007). Physical activity, disordered eating risk, and anthropometric measurement: A comparison of college female athletes and non athletes. *College Student Journal, 41*(1), 217-222.

Martens, R. (1977). *Sport competition anxiety test*. Champaign, IL: Human Kinetics.

Mintz, L. B., O'Holloran, M. S., Mulholland, A. M., & Schneider, P. A. (1997). Questionnaire for eating disorder diagnosis: Reliability and validity of operationalizing DSM-IV into a self-report format. *Journal of Counseling Psychology, 44*, 63-79.

National Collegiate Athletic Association. (2008). *Achieving gender equity: A basic guide to Title IX and gender equity in athletics for colleges and universities.* Overland Park, KS: National Collegiate Athletic Association. Retrieved May 15, 2008 from http://www1.ncaa.org/membership/ed_outreach/gender_equity/resource_materials/index.html.

National Osteoporosis Foundation. (2008). *Fast facts on osteoporosis.* Washington DC: National Osteoporosis Foundation. Retrieved February 8, 2009 from http://www.nof.org/osteoporosis/diseasefacts.html.

Neeman, J., & Harter, S. (1986). *Manual for the self-perception profile for college students.* Denver, CO: University of Denver Press.

Neumark-Sztainer, D., Beutler, R., & Palti, H. (1996). Personal and socioenviromental predictors of disordered eating among adolescent females. *Journal of Nutritional Education, 28*, 195-201.

Ogilive, B. C. (1968). Psychological consistencies within the personality of high-level competitors. *The Journal of the American Medical Association, 205*, 156-162.

Orlick, T. (1990). *In pursuit of excellence: How to win in sport and life through mental training* (2nd ed.). Champaign, IL: Human Kinetics.

Reinking, M. F., & Alexander, L. E. (2005). Prevalence of disordered eating behaviors in undergraduate female collegiate athletes and nonathletes. *Journal of Athletic Training, 40*(1), 47-51.

Rosen, J. C., Jones, A., Ramirez, E., Waxman, S. (1996). Body Shape Questionnaire: Studies on validity and reliability. *International Journal of Eating Disorders, 20*(3), 151-158.

Rosen, J. C., & Reiter, J. (1996). Development of the Body Dysmorphic Disorder Examination. *Behavior Research and Therapy, 34,* 755-766.

Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton, NJ: Princeton University Press.

Sanford-Martens, T. C., Davidson, M. M., Yakushko, O. F., Martens, M. P., Hinton, P., & Beck, N. (2005). Clinical and subclinical eating disorders: An examination of collegiate athletes. *Journal of Applied Sport Psychology, 17,* 79-86.

Schwarz, H. C., Gairrett, R. L., Aruguete, M. S., & Gold, E. S. (2005). Eating attitudes, body dissatisfaction, and perfectionism in female college athletes. *North American Journal of Psychology, 7*(3), 345-352.

Secord, P. F., & Jourard, S. M. (1953). The appraisal of body cathexis: Body cathexis and the self. *Journal of Consulting Psychology, 17,* 343-347.

Smolak, L., Murnen, S. K., & Ruble, A. E. (2000). Female athletes and eating problems: a meta-analysis. *International Journal of Eating Disorders, 27,* 371-380.

Spielberger, C. D., Gorsuch, R. L., & Lushene, R. E. (1970). *Manual for the State Trait Anxiety Inventory.* Palo Alto, CA: Consulting Psychologists Press.

Steinhausen, H. C. (2002). The outcome of anorexia nervosa in the 20th Century. *The American Journal of Psychiatry, 159*(8), 1284-1232.

Thompson, R. A. (1987). Management of the athlete with an eating disorder: Implications for the sport management team. *The Sport Psychologist, 1,* 114-126.

Thompson, R. A., & Tattner-Sherman, R. (1999). "Good athlete" traits and characteristics of anorexia nervosa: Are they similar? *Eating Disorders, 7,* 181-190.

Trattner-Sherman, R., & Thompson, R. A. (2001). Athletes and disordered eating: Four major issues for the professional psychologist. *Professional Psychology: Research and Practice, 32*(1), 27-33.

Trattner-Sherman, R., & Thompson, R. A. (2005). NCAA coaches survey: The role of the coach in identifying and managing athletes with disordered eating, *Eating Disorders, 13,* 447-466.

Trattner-Sherman, R., & Thompson, R.A. (2006). Practical use of the International Olympic Committee Medical Commission position stand on the female athlete triad: A case example. *International Journal of Eating Disorders, 39*(3), 193-201.

Van Strein, T., Frijters, J. E. R., Bergers, G. P. A., & Defares, P. B. (1986). Dutch eating behavior questionnaire in normal subjects and women with eating disorders. *Journal of Psychometric Research, 31*, 161-169.

Wardle, J. (1987). Eating style: A validation study of the Dutch Eating Behaviour Questionnaire in normal subjects and women with eating disorders. *Journal of Psychosomatic Research, 31*(2), 161-169.

Watson, D., Clark, L., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*, 1063-1070.

Williams, D. A., Davis, C. J., Bennett, S. M., Goreczny, A. J., & Gleaves, D. H. (1989). Development of a simple procedure for assessing body image. *Behavioral Assessment, 11*, 433-446.

Williams, P. L., Sargent, R. G., & Durstine, L. J. (2003). Prevalence of subclinical eating disorders in collegiate female athletes. *Women in Sport & Physical Activity Journal, 12*(2), 127-138.

Women's Sport Foundation. (2008). Retrieved on May 1, 2008 from http://www.womenssportsfoundation.org.

Zucker, N. L., Womble, L. G., Williamson, D. A., & Perrin, L. A. (1999). Protective factors for eating disorders in female college athletes. *Eating Disorders, 7*, 207-218.

VITA

NAME:

Nicole M. Klasey, MA

EDUCATION:

Rosemead School of Psychology, Clinical Psychology	PsyD	(Cand.)
Rosemead School of Psychology, Clinical Psychology	MA	2006
Biola University, Psychology	BA	2003

INTERNSHIP:

Youth Opportunity Center Muncie, IN	2008 - 2009

PRACTICA:

For the Child (Outpatient Program)	2007 - 2008
Harbor-UCLA Medical Center, Neuropsychological Assessment (Outpatient Program)	2006 - 2007
Biola Counseling Center, Advanced Practicum (Outpatient Program)	2005 - 2006
Whittier Union School District (Outpatient Program)	2005 - 2005
Biola University, Beginning Practicum (Outpatient Program)	2005 - 2005

EMPLOYMENT

Biola Counseling Center, Staff Therapist	2006 - 2008
The Bella Vita, Eating Disorder Program Therapist	2007 - 2008
Center for Discovery and Adolescent Change, Counselor	2005 - 2007