

DISORDERED EATING SYMPTOMS AND  
EMOTIONAL REGULATION IN  
FEMALE COLLEGIATE  
ATHLETES AND  
NON-ATHLETES

By

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**Abstract:**

**Background:** Eating disorders (EDs) are some of the most challenging mental disorders to treat. Thus recognizing the early signs and symptoms of eating disorders is critical for prevention efforts. Disordered eating is a term used to recognize dysregulated eating patterns that serve as a risk factor for EDs. Risk factors for disordered eating need further investigation in female college students including emotional regulation that has been only partly examined in this unique population. **Purpose:** To explore the prevalence of disordered eating in female collegiate athletes and examine differences by type of athlete (lean and non-lean sports). Additional purposes are to compare the prevalence of disordered eating symptoms between female collegiate athletes and their non-athletic counterparts; to explore the relationship between the individual domains of disordered eating and emotional regulation strategies; to examine emotional regulation, athletic status and family history of eating disorders as potential predictors of disordered eating behaviors in female college students. **Methods:** A convenience sample of females was recruited at a NCAA Division I University in Midwest of the US. Survey-based data was collected in the classrooms and during athletic team meetings. Prevalence of disordered eating was measured by the Eating Attitudes Test and the Minnesota Eating Behavior Survey. Emotional regulation was measured by the Difficulties in Emotional Regulation Scale (DERS). **Results:** A total of 527 females participated in this study (151 athletes and 376 non-athletes). The prevalence of disordered eating in athletes was 10.6%, with no differences by type of sport. The prevalence of disordered eating was significantly higher in non-athletes (16.5% vs. 6.6%;  $p < .001$ ). Disordered eating measured by the MEBS also showed a higher prevalence in non-athletes (22.1% vs. 10.6%;  $p < .001$ ). Non-athletes also showed greater difficulties regulating emotions than athletes ( $p < .01$ ). The athletic status and greater difficulties with accepting negative emotions significantly predicted disordered eating ( $p < .001$   $R^2 = .15$ ). **Conclusions:** College females are at risk for disordered eating regardless of sport participation, with difference in the prevalence by type of assessment tool used. Emotional regulation was associated with disordered eating behaviors in our sample. Future research on disordered eating in female college students should focus on further exploring dimensions of emotional regulation as well as congruency in methodology used to examine disordered eating.

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## CHAPTER I

### INTRODUCTION

An estimated 1-3% of the general U.S. population struggles with a clinically diagnosed eating disorder (ED), with the prevalence increasing in female college students to 7-10% (Blackmer, Searight, & Ratwik, 2011). Family history of an eating disorder, body image dissatisfaction, abuse, social pressure to be thin, excessive exercise and personality traits such as perfectionism represent the most common risk factors for the development of eating disorders (Barker & Galambos, 2007; Greenleaf, Petrie, Carter & Reel., 2009). The personality trait known as type A is associated with increased risk for eating disorders and has been observed among athletes (Rome & Ammerman, 2003).

Some athletes engage in unhealthy eating behaviors to maintain a high level of physical fitness and performance. Isolated evidence exists that female athletes might be at a higher risk for developing eating disorders than their non-athletic counterparts (Barrack, Ackerman & Gibbs, 2013; Holm-Denoma, Scaringi, Gordon, Van Orden & Joiner, 2009; Sundgot-Borgen & Torstveit 2004). A number of factors may increase such risk of unhealthy eating patterns among athletes. For example, the competitive culture of athletics and athletes' personality traits may be favorable to the development of eating disorders (Becker, McDaniel, Bull, Powell & McIntyre, 2012; Greenleaf et al., 2009; Johnson, Powers & Dick, 1999) . Furthermore, pressure to present a particular body image may also be a contributing factor, with pressure being applied by coaches,



teammates, friends, and media. The athletic environment, combined with Western societal norms of thinness and beauty, present a unique challenge for female athletes (Barker & Galambos 2007; Becker et al., 2012; Greenleaf et al., 2009). Signs of disordered eating in female athletes can be difficult to determine (Torstveit et al., 2008). One example of disordered eating is excessive exercise. Within the general population, engagement in excessive exercise represents a risk factor for eating disorders but the definition of excessive exercise is harder to detect in the case of elite female athletes (Becker et al., 2012; Torstveit et al., 2008).

Eating disorders may lead to a variety of health consequences that may become life-threatening if untreated. The consequences include, but are not limited to, a decrease in essential body fat, cardiac muscle wasting, cardiac arrhythmia, amenorrhea and osteopenia (Beals, 2000; Bonci et al., 2008; Rome & Ammerman, 2003). Female athletes are particularly vulnerable to these negative impacts of disordered eating. A combination of three distinct conditions including disordered eating, amenorrhea, and osteoporosis is known as the Female Athlete Triad (FAT). These conditions are relatively common among female athletes (Thompson & Gabriel 2004). These FAT conditions are interrelated and have been extensively discussed elsewhere (Beals, 2000; Bonci et al., 2008). Because female athletes are exposed to even greater pressures to adhere to the current standards of beauty and performance standards, they represent a population that could potentially be at a greater risk of disordered eating. The Female Athlete Triad is typically initiated by the development of disordered eating. Studies suggest that a substantial proportion of females engage in disordered eating behaviors that are subclinical and thus do not meet the current eating disorder criteria outlined in the DSM-

IV (Anderson & Petrie 2012; Blackmer et al., 2011). Disordered eating is defined as any form of irregular eating patterns and can include a wide range of eating and physical activity behaviors (Torstveit, Rosenvinge & Sundgot-Borgen, 2008). Previous studies indicate that females with disordered eating are at an increased risk for developing clinical eating disorders (Fortes, Paes, Amaral & Ferreira, 2012). Recently, attention has been focused on the importance of identifying potential factors that may trigger or influence the development and maintenance of disordered eating patterns among females (Anderson & Petrie 2012; Becker et al., 2012; Blackmer et al., 2011). While specific personality traits and a family history of eating disorders have been identified as important correlates of eating disorders, there is little research on the relationship between disordered eating patterns and emotional well-being of female college students.

One of the emerging themes in the area of EDs among young individuals is the potential role of emotional regulation in the development of disordered eating. Emotional regulation refers to the control of emotional experience and expressions (Garner & Spears, 2000). Others have defined emotional regulation as having the ability to monitor and evaluate emotional experiences, in addition to controlling and modifying them (Stewart, Zvolensky & Eifert, 2002; Thompson & Calkins, 1996). College students have additional risk factors for experiencing emotional regulation. They are transitioning to the college environment that is associated with increased stress and anxiety due to greater personal responsibility, perceived loss of social support, and higher academic standards (Barker & Galambos, 2007; Montgomery & Côté, 2008). Research in the area of emotional regulation has typically focused on three components: negative affect, emotional awareness, and coping (Saarni, 1999; Sim & Zeman, 2006; Thompson &

Calkins, 1996). The few existing studies of samples from general population have concluded that high levels of negative affect can lead to disordered eating (Jones & Crowther, 2012; Killen et al., 1996; Stice & Agras, 1998; Stice & Whitenton, 2002). Negative affect and high levels of stress also influence “binge-like” behaviors. It is important to have emotional awareness and healthy coping mechanisms to regulate emotions that could possibly lead to “binge-like” or other disordered eating behaviors. Thus, emotional regulation represents a promising area of research as it could potentially serve as an important factor that influences the development of disordered eating in various populations (Lavender & Anderson, 2010; Polivy & Herman, 2002).

Early detection and prevention of disordered eating is critical for the physical and emotional well-being of individuals. If disordered eating is recognized before it is diagnosed as an eating disorder, the long-term negative health consequences can be significantly reduced. When an eating disorder is diagnosed early, 33% of young females show improvements in health and well-being with full recovery rates just below 50% (Steinhausen, 2009). Alarming, 20% of those diagnosed can be chronically affected by eating disorders (Steinhausen, 2009). Given the serious health consequences of eating disorders and the challenging nature of eating disorder treatment, it is essential to better understand potential risk factors and identify approaches that may positively influence individuals’ eating patterns, thus limiting their risk of developing disorder eating.

The main purpose of this study was to examine differences in psychological traits and behaviors related to disordered eating between female college athletes and their nonathletic counterparts. We compared the prevalence of disorder eating in the two target populations using two existing validated tools developed for disordered eating

assessment, the Eating Attitude Test-26 (EAT-26)(Garner et al., 1982) and the Minnesota Eating Behavior Survey (MEBS)(Klump, McGue & Iacono, 2000). The second purpose was to examine the relationship between disordered eating and emotional regulation strategies used by female college athletes and their non-athletic counterparts. Finally, differences in disordered eating and emotional regulation were compared by type of sports female college athletes engage in (lean vs. non-lean sports).

### **Research Questions**

*Research Question #1:* Are female college athletes more vulnerable to disordered eating than their non-athletic counterparts? Are there differences in disorder eating by type of athletes?

*Research Question #2:* Is emotional regulation associated with disordered eating patterns among young college females and if so, what is the nature of the association?

*Research Question #3:* What are potential predictors of disordered eating among female college students?

### **Limitations**

1. The sample used in the study was a convenience sample and thus the findings of this study may not be generalized to other groups or populations of females.
2. Geographical, cultural, ethnic and other differences were not accounted for in this study.
3. Some subjects with known eating disorders might have opted out of the study or may not have been practicing with the team at time of data collection.

4. Many of the non-athletic subjects surveyed were part of a nutrition or health and fitness major.

### **Definitions of Terms**

**Eating Disorders** – A group of disorders including: anorexia nervosa, bulimia nervosa and eating disorders not otherwise specified. These must be clinically diagnosed (APA, 2009; Torstveit, Rosenvinge & Sundgot-Borgen, 2008).

**Disordered eating** – Any form of irregular eating patterns. These patterns of behavior are often referred to as pathogenic or dysregulated eating (Bonci et al., 2008; Depalma et al., 2002).

**Collegiate athlete-** an enrolled student who participates in one of the 23 organized competitive sports sponsored by the college/university in which he or she is enrolled.

**Non-athlete-**a student enrolled in a Division I school not involved in a competitive sport sponsored by the school. If the student plays sports they are intramural sports. The student does not have to maintain eligibility to play sports. Scholarships are not offered for participation in team sports.

**Emotional regulation-** is the emotional experience and expression of emotions. It is the process of monitoring, evaluating and modifying emotional reactions in different situations (Thompson & Calkins, 1996).

**Lean Sports-** Sports where leanness or body weight are considered important for performance (endurance, aesthetic, weight-class) (Torstveit, Rosenvinge & Sundgot-Borgen, 2008).

**Non-Lean Sports-** Sports where leanness is considered less important for overall athletic performance (ball game, technical and power sports) (Torstveit, Rosenvinge & Sundgot-Borgen, 2008).

### **Abbreviations**

**ADA-** American Dietetic Association

**APA-** American Psychiatric Association

**ED-** Eating Disorders

**DE-** Disordered Eating

**DERS-** Difficulties in Emotional Regulation

**EAT-26-** Eating Attitudes Test

**FAT-** Female Athlete Triad

**MEBS-** Minnesota Eating Behavior Survey

**NCAA-** National Collegiate Athletic Association

## CHAPTER II

### LITERATURE REVIEW

#### **Definition and Prevalence of Eating Disorders Among Females**

Clinical eating disorders are defined by The *Diagnostic and Statistical Manual of Mental Disorders*, sixth edition (DSM-IV); American Psychiatric Association (APA, 2009). Clinical eating disorders are divided into three categories: anorexia nervosa (AN), bulimia nervosa (BN), and eating disorders not otherwise specified (EDNOS) (Torstveit et al., 2008). Because the diagnostic criteria for AN and BN are very stringent, the EDNOS category was included so clinicians could diagnose individuals with serious eating disorder patterns that do not meet the strict criteria for either AN or BN. Individuals with a wide range of restrictive and excessive behaviors are included in the EDNOS category.

Eating disorders (EDs) represent a public health problem and it is estimated that 1-3% of the general U.S. population struggles with a clinically diagnosed eating disorder (Hudson, Hirpi, Pope, & Kessler, 2007). Individuals tend to get diagnosed with eating disorders in adolescence or young adulthood (Hood & Corsica, 2011; Neumark-Sztainer, Wall, Larson, Eisenberg & Loth, 2011). The prevalence is believed to be as high as 7-10% among college students (Ragvavan & Gates, 2007). In addition, 12-20% of college females report disturbed weight control behaviors and eating attitudes (Nelson & Hughes, 1999; Sira & Pawlak, 2010). Recent literature indicates that the onset of eating disorders

occurs between the ages 10 and 21, with a median age ranging from 12 to 13 years (Hudson et al., 2007; Swanson, Crow, Le Grange, Swendsen & Merikangas, 2011). Eating disorders also occur more frequently among young adult women, affecting 3.2% of women between the ages of 18 and 30 (Ghaderi & Scott, 2001). Given the well-documented consequences of eating disorders (e.g., cardiac arrhythmias, decreased immune function, death) early detection is vital (Rome & Ammerman, 2003; Swanson et al., 2011).

### **Risk Factors of Eating Disorders**

While the etiology of EDs is not fully understood, it is clear that the causes of the disorders are multifactorial (Ghaderi & Scott, 2001; Striegel-Moore & Bulik, 2007). Risk factors for the development of eating disorders have been well researched and include gender, body dissatisfaction, having a parent with an eating disorder, low self-esteem, stress level and dieting (Jacobi, Hayward, de Zwaan, Kraemer & Agras, 2004; Striegel-Moore & Bulik, 2007). Other risk factors include: adverse childhood experiences (e.g., sexual abuse), parental influences, depression, personality traits (e.g., perfectionism), and repeated exposure to negative comments about body shape, weight, and eating behaviors (Stice & Whitenton, 2002)

Cultural and environmental factors account for additional risk factors. For example, in Western culture the media often idealizes a slim physique as beautiful which can influence body dissatisfaction and low self-esteem. (Polivy & Herman, 2002). Low self-esteem is an important aspect leading to EDs. Further research shows self-esteem also as a risk factor for relapse in ED therapy (Korrelboom, de Jong, Huijbrechts & Daansen, 2009; Polivy & Herman, 2002). Any increase in stress can influence eating



behaviors as well. Transitioning to the college environment and increase in daily demand can both lead to increased stress and be deemed as risk factors for EDs (Epel et al., 2001; Greenleaf et al., 2009).

In addition to the risk factors of the general population, female athletes also experience pressure to be athletic and thin especially in aesthetic “visual sports” like ballet, gymnastics and cheerleading (Rome & Ammerman, 2003; Williams, Sargent & Larry, 2003; Ziegler et al., 2001). Female athletes often report feeling pressured from teammates and coaches to achieve an ideal body weight (Thompson & Gabriel, 2004). Manore and colleagues (2007) state that female athletes are preoccupied with their body weight and shape and it is not unusual for them to want to lose 5 to 10 pounds although they are often at a normal weight or even underweight by all assessment standards. Previous research shows that female athletes are at a higher risk of clinical and subclinical eating disorders due to weight, performance, and body image pressures they experience (Anderson & Petrie, 2012). The high pressures of the athletic environment combined with social pressures that thin is attractive increases the risk of disordered eating among female athletes (Greenleaf et al., 2009).

The number of female athletes participating in sports has increased in the last several decades (Beals, 2000; Reinking & Alexander, 2005). The passage of Title IX legislation in 1972 had a specific positive effect on the participation of females in college athletics (Cheslock, 2007). The Title IX legislation allowed females the same opportunity to participate in college athletics as males. Thus, female collegiate athletic participation has increased since 1972 (Beals, 2000; Reinking & Alexander, 2005). Cheslock (2007) found that 26,000 more women participated in college athletics in 2005 than in 1995.

Along with the increase in the participation of females, a greater attention has been placed on potential health and psychological issues related to competitive female athletes (Reinking & Alexander, 2005; Torres-McGehee et al., 2009). Thus, understanding risk factors for eating disorders and disordered eating patterns in female athletes has been gaining greater interest in research (Beals & Manore, 1998; Beals, 2000; Greenleaf et al., 2009). However, relatively few studies have sought to estimate the prevalence of ED in female athletes (Reinking & Alexander, 2005; Torstveit et al., 2008; Greenleaf et al., 2009; Anderson & Petrie, 2012).

Anderson and Petrie (2012) showed that athletes were at a high risk of eating disorders with 6.3% classifying as clinical, and 26.1% as subclinical. Sundgot-Borgen and Torstveit (2004) also found athletes (13.5%) were more likely than non-athletes (4.6%) to show signs of subclinical or clinical eating disorders. Torstveit and colleagues (2008) found more athletes in lean sports had a clinical eating disorder than athletes in non-leanness sports. Greenleaf and colleagues (2009) concluded that female athletes suffer from eating disorders mostly at the subclinical level. Only a few studies have focused on the prevalence of eating disorders in female athletes but those that have conclude that athletes are at risk for eating disorders (Black, Larkin, Coaster, Leverenz & Abood, 2003). Literature on the causes of, and risk factors for, eating disorders is limited (Field, 2004). This is thought to be due to the complexity and multi-factorial nature of the disorders (Jacobi et al., 2004; Striegel-Moore & Bulik, 2007).

### **Consequences of Eating Disorders**

Eating disorders may not only negatively affect performance but also long-term health status. Long-term consequences of eating disorders are well known and include

compromised immune function and delay of wound/injury healing and can result in death (Thein-Nissenbaum, Rauh, Carr, Loud, & McGuine, 2012). Long-term consequences of disordered eating are less obvious and difficult to estimate given the significant differences in severity of disordered eating patterns and behaviors (Position of the American Dietetic Association, 2011).

Female athletes have a tendency to restrict energy intake and sustain high energy-demanding training schedules (Manore, Kam & Loucks, 2007; Sundgot-Borgen & Torstveit, 2004; Ziegler & Jonnalagadda, 2006; Ziegler, Nelson, Barratt-Fornell, Fiveash & Drewnowski, 2001). Energy intake may be as low as 45 kcal/kg of body weight/day (Mullinix, Jonnalagadda, Rosenbloom, Thompson & Kicklighter, 2003). Low energy intake may not be classified as a clinical eating disorder but a risk factor for eating disorders. Eating disorders can have health consequences that continue after an athlete's collegiate career has ended. It is important to understand eating disorders are psychiatric diseases which increases the difficulty in treatment. If long-term inadequate intake continues it may lead to nutrient deficiencies and increases in fatigue (Thein-Nissenbaum et al., 2012; Mullinix et al., 2003). Long-term effects of insufficient nutrients intakes combined with the high levels of physical activity are presently unknown but recognized as part of the Female Athlete Triad (FAT).

### **Consequences of Eating Disorders: Female Athlete Triad**

An eating disorder often triggers a combination of three interrelated conditions known as the Female Athlete Triad (FAT). The FAT consists of eating disorders, menstrual dysfunction and osteoporosis (Thompson & Gabriel, 2004; Manore et al., 2007). The FAT was formally defined in the summer of 1992 due to the growing concern

for female athlete's health status (Morgenthal, 2002).

Menstrual dysfunction can be defined as oligomenorrhea, which is less than eight menstrual cycles per year or amenorrhea which is the loss of the menstrual cycle (Thompson & Gabriel, 2004). Osteoporosis is a serious disease of the bones where they become weak and fragile increasing risk of fracture (National Osteoporosis Foundation, 2012). Amenorrheic athletes have 10-25% lower bone mineral density at the lumbar spine versus the eumenorrheic athlete (Nichols, Sanborn & Essery, 2007). These three interrelated components are all necessary in diagnosing the FAT. However, inadequate dietary intake is a commonality of the components directly affecting each.

Insufficient energy intake is a component of disordered eating that negatively affects all major body systems and organs. Consequences of insufficient energy intake include, but are not limited to, dehydration, intestinal issues (ulcers), heart arrhythmias and difficulty maintaining body temperature (Rome & Ammerman, 2003). Long-term effects of disordered eating can potentially end an athlete's career, drawing attention to eating disorders and disordered eating as initiation of immediate intervention. It is important to understand this disorder is life-threatening but preventable.

Diagnosing an eating disorder as defined by DSM-IV diagnostic criteria may be uncommon in athletes. Based on a large collegiate study only a small percentage of female athletes (1.1%) met the diagnostic criteria for clinical eating disorders, though a relatively large percentage (9.2%-58%) demonstrated disordered-eating patterns (Johnson, Powers & Dick, 1999). Despite having low rates of eating disorders in athletes, disordered eating is commonly observed.

It is well understood that eating disorders represent a serious mental and physical

condition; unfortunately, many females exhibit one or multiple signs of eating disorders without meeting the clinical diagnostic criteria for AN, BN or EDNOS (Anderson & Petrie, 2012, Greenleaf et al., 2009). However, nutritional status, overall health and athletic performance can be compromised because athletes may exhibit a variety of behaviors and traits associated with eating disorders.

### **Disordered Eating**

Disordered eating or dysregulated eating encompass a wide range of behaviors such as: dieting, concern about body weight or shape, food restriction, bingeing and vomiting that are not clinically diagnosed as eating disorders (Torstveit et al., 2008). In literature, the terms “eating disorders” and “disordered eating” are sometimes used interchangeably therefore it can be difficult to clearly distinguish the prevalence and risk factors of eating disorders from those of disordered eating (Anderson & Petrie, 2012; McNulty, Adams, Anderson & Affenito, 2001). Disordered eating is not a clinically diagnosed term although it is a risk factor for clinical eating disorders (Torstveit et al., 2008).

There are three types of dysregulated eating patterns: emotional eating, external eating and restrained eating (van Strien & Oosterveld, 2008). Emotional eating is characterized by dietary intake as a result of emotional arousal such as anxiety, fear or stress. A “normal” eating response to anxiety or fear might be decreased appetite although some may experience excessive eating with these emotions (van Strien & Oosterveld, 2008; Epel et al., 2001). External eating is characterized by dietary intake in response to cues from the environment like sight or smell of food. Restrained eating can be defined as overeating after a period of dieting (Striegel-Moore & Bulik, 2007; Striegel-Moore, Silberstein & Rodin, 1986; van Strien & Oosterveld, 2008). Many

individuals experience behaviors classified within these categories but are seldom, if ever, diagnosed with an eating disorder.

### **Emotional Regulation**

In addition to well-known risk factors for ED, other potential factors that may contribute to the development of disordered eating among females have been identified. One such factor is emotional regulation (Gupta, Rosenthal, Mancini, Cheavens & Lynch, 2008; Harrison, Sullivan, Tchanturia & Treasure, 2010) which refers to the ability of an individual to recognize and control their expressions of emotion (Harrison et al., 2010).

Three components of emotional regulation have been identified in the previous research: negative affect, emotional awareness and coping. Negative affect may be defined as subjective distress and unpleasant moods which can negatively impact one's emotional status and self-concept (Thompson, 2007). Emotional awareness is the understanding and management of emotions, including possessing the skills and strategies to deal with uncomfortable emotions (Saarni, 1999). Emotional awareness is one of the basic skills required for competent emotional functioning (Saarni, 1999). Interestingly, there could be a link between disordered eating and trouble identifying emotions. Sim and Zeman (2006) found that females diagnosed with bulimia nervosa exhibited lower emotional awareness and identification skills than those without bulimia. Coping is critical to the emotional function of a person because one must possess the skills to generate adequate coping strategies for many different situations (Saarni, 1999). Gratz and Roemer (2004) focused on the difficulties in emotional regulation and stated one must be aware of their emotions, accept emotions, engage in goal-directed behavior and have strategies to cope with emotions.

Harrison and colleagues (2010) found that those with eating disorders had poor emotional regulation compared to those without eating disorders. While some studies have examined the relationship between emotional regulation and eating disorders among females few, if any, have examined this link among female athletes. Given the intense stress of the athletic environment, demanding academic and training schedules, homesickness and pressures for perfection, athletes are dealing with a high level of stressors (Anderson & Petrie, 2012; Greenleaf et al., 2009). Many athletes suffer from “time poverty” and may externally eat in the presence of food simply because of their demanding schedules.

Previous research focusing on the link between emotional regulation and disordered eating has been performed with non-athletic populations (Lavender and Anderson, 2010). Despite health risk posed to athletes by disordered eating and the FAT, there have been few studies focusing on disordered eating risk factors and no studies to date on emotional regulation as a risk factor for ED in female athletes (Gratz & Roemer, 2004; Gupta et al., 2008; Harrison et al., 2010). Understanding the risk factors for disordered eating would allow intervention strategies to start before disordered eating became a clinical eating disorder.

### **Assessment of Disordered Eating**

Disordered eating may not be recognized due to the lack of diagnostic criteria and testing abilities. Although some research suggests there is a significantly higher rate of disordered eating in college female athletes versus their non-athlete counterparts, to date there is not a validated screening tool specifically tailored to female athletes (Anderson & Petrie, 2012; Black et al., 2003; McNulty et al., 2001). Disordered eating encompasses a

complex interaction between sociocultural, biological, and environmental factors (Beals, 2000). Testing procedures can differ in subscales but will all provide information relating to the domains of interest in disordered eating (body weight, binge eating and compensatory behavior, over concerned with shape and weight, dietary restraint, body image disturbance and affective disturbance) (Anderson & Petrie, 2004). Common assessment tools include EAT-26, Bulimia Test-Revised (BULIT-R), The Minnesota Eating Behavior Survey (MEBS), The Female Athlete Screening Tool (FAST) and Eating Disorder Inventory-2 (EDI-2).

Emotional regulation has been examined in many studies with children using a variety of validated scales, such as the Global Negative Emotionality, Emotional Expression Scale for Children and the Children's Emotion Management Scale (Sim & Zeman, 2006). In adults, the Difficulties in Emotional Regulation Scale (DERS) is frequently used (Gratz & Roemer, 2004; Gupta, et al., 2008; Harrison et al., 2010).

The EAT-26 is the updated version of the EAT-40 developed by Garner and Garfinkel (1979) which is a widely used, standardized, self-reported survey assessing pathological eating behaviors, attitudes and feelings (Fortes et al., 2014; Vardar, Vardar & Kurt, 2007). The MEBS is a self-reported inventory for assessing attitudes and behaviors of disordered eating. This is a method used as a screening and assessment tool for disordered eating. The survey includes eating subscales (Bulimia, Drive for Thinness, Body Dissatisfaction, Interceptive Awareness, Ineffectiveness, Perfectionism, Interpersonal Distrust, and Maturity Fears). von Ranson and colleagues (2005) found good internal consistency and test-retest reliability for the MEBS. The MEBS is used as a screening tool to assess eating-related pathology in children and adults with and without



clinical eating disorders (Klump, Suisman, Burt, McGee & Iacono, 2010; von Ranson, Klump, Iacono & McGee, 2005). A test developed specifically for the female athletic population is The Female Athlete Screening Tool (FAST). It is a self-administered questionnaire consisting of 33 items generating a risk score from 33-130 (healthy to high risk, respectively) (Quatromoni, 2008). The FAST has been tested and validated in two published studies to date (Affenito, Yeager, Rosman, Ludemann, Adams & Welch, 1998; McNulty et al., 2001). However, the FAST is criticized for validation with a small sample and using insensitive risk factors for diagnosing eating disorders (Cheney, 2000; McNulty, et al., 2001).

The EDI-2 is a 91-item questionnaire consisting of 11 subscales to assess attitudes regarding body image, eating and dieting, as well as other clinical traits of disordered eating (Clausen, Rosenvinge, Friborg & Rokkedal, 2011; Williams, Sargent & Larry, 2003). EDI is known for its validity in distinguishing eating disordered patients from non-eating disordered controls in a general population (Clausen et al, 2011; Keel, Heaterton, Dorer, Joiner & Zalta, 2006). The EDI-2 has been noted to have less accuracy in nonclinical samples due to the variability in factor congruency (Von Ranson et al., 2005). The EDI-3 is an expansion of the EDI-2 including the same 97 questions as well as the same 3 subscales of eating disorder symptoms but added 12 non-overlapping subscales and six composite scores were added. Both the EDI-2 and EDI-3 are time demanding and used in clinical samples. Female athletes make up a non-clinical sample. The MEBS was developed due to concerns that the EDI-2 may not be an appropriate tool for use in non-clinical samples (von Ranson et al., 2005). Thus, methods that are the

reliable for non-clinical subjects include the Minnesota Eating Behavior Survey and the EAT-26.

### **Assessment of Emotional Regulation**

Three aspects of emotional regulation can be tested with individual scales to provide information regarding emotional health. Negative affect has been tested in previous studies with the Global Negative Emotionality Scale from the Differential Emotions Scale-IV (DES-IV) (Blumberg & Izard, 1986; Sim & Zeman, 2006). This questionnaire includes 36-items focused on 12 emotions (interest, joy, sadness, anger, disgust, contempt, fear, shame, embarrassment, guilt, surprise, self-directed hostility).

Emotional awareness can be tested in children and adolescents with the Emotional Expression Scale for Children (EESC) (Penza-Clyve & Zeman, 2002; Sim & Zeman, 2006). This is composed of 16 items assessing poor emotional awareness and expressive reluctance. Coping can be measured with Children's Emotion Management Scale-Coping factor (CEMS) (Sim & Zeman, 2006; Zeman, Shipman & Penza-Clyve, 2001). These 9 items focused on what actions one takes to deal with emotions.

The Difficulties in Emotional Regulation Scale (DERS) is used with adults and includes 36 self-reported items (Gratz & Roemer, 2004). It assesses multiple aspects of emotional dysregulation including: awareness, acceptance, ability to participate in goal-directed behavior, use of emotional regulation strategies (Gratz & Roemer, 2004).

### **Current Research Needs**

Current literature reports on the prevalence of disordered eating in the female athlete population and research focusing on risk factors associated with the development of disordered eating is limited (Berry & Howe, 2000; Thompson & Gabriel, 2004).

Furthermore, emotional regulation as a risk factor for disordered eating has been studied to a limited extent and only in the non-athletic population. Understanding the risk factors for disordered eating is important before effective interventions can be developed to prevent disordered eating patterns and development of clinical EDs in young females.

### **Conclusion**

Some researchers suggest that female athletes are at a greater risk of disordered eating compared to other females (Black et al., 2003; Greenleaf et al., 2009; Sundgot-Borgen & Torstveit, 2004). However, there is limited research on the prevalence of disordered eating using samples of female college athletes. Only a few studies have compared the rates of disordered eating between female college athletes and non-athletes (Berry & Howe, 2000). Furthermore, the existing knowledge on emotional regulation as a risk factor leading to disordered eating in this population is limited. To date, no studies have examined possible associations between emotional regulation strategies of female athletes as they potentially link to disordered eating and whether the emotional regulation strategies of female college athletes differ from those not involved in college sports.

Given the perceived pressure female athletes face within their athletic environment and the detrimental effect disordered eating has on health and athletic performance, it is important to identify potential factors that are associated with the development and maintenance of disordered eating in this population. This research is critical to better understand the prevalence and risk factors that play a role in the development of disordered eating in this unique population.

The main purpose of this study was to examine differences in psychological traits and behaviors related to disordered eating between female college athletes and their non-

athletic counterparts. A second purpose was to explore the relationship between the individual domains of disordered eating and emotional regulation strategies in female college athletes and their non-athletic counterparts. Additionally, to compared the prevalence of disorder eating in the two target populations using two existing validated research tools developed for disordered eating assessment, the EAT-26 and the Minnesota Eating Behavior Survey. Further analyses were utilized to compare disordered eating patterns and emotional regulations skills by type of athletes.

## CHAPTER III

### METHODS

#### **Research Design and Subject Selection**

A convenience sample of collegiate female athletes and female non-athletes was recruited from a Division I NCAA school in a Midwestern state of the U.S. The study was reviewed and approved by the university's Institutional Review Board prior to any subject recruitment and data collection. The study was also reviewed and approved by the university's sports physician who oversees the medical and athletic care of all athletes at the university.

Female athletes were recruited with the assistance of certified athletic trainers working with individual women's teams. Subjects were recruited from all women's athletic teams at the university which included the following nine sports: soccer, cross-country, track and field, basketball, cheer/pom/dance, equestrian, tennis, golf, and softball. Athletes were informed about the purpose and details of the study by the athletic trainers during a team meeting, in the absence of the coaching staff. A written informed consent form was used as a script by the PI or athletic trainers to explain the study to potential study participants. The PI or trainers also answered questions or addressed concerns about the study during the meetings. At the end of the meeting, a waiver of documented consent for participation was administered to the athletes and interested volunteers were asked to read the study disclaimer. This informed the athletes of their

rights and ensured they understood that participation was voluntary and by completing the surveys and returning them in the provided envelope showed their willingness to participate in the study. The inclusion criteria for this sample of subjects included: 1) being a member of an official university women's athletic team; 2) being 18 or older; and 3) currently, practicing with the team.

The sample of female non-athletes (not participating in division I sports but attending division I school) was recruited from several undergraduate classes in the College of Human Sciences and College of Education (i.e., NSCI 2114, NSCI 3133, NSCI 3223, HHP 2553, HHP 2602). First, the following recruitment procedures were utilized in the study. The primary investigator (PI) obtained an approval from the instructors of the individual courses from which subjects were recruited. Second, a waiver of documented consent for participation was administered to the subjects and interested volunteers were asked to read the study disclaimer. This informed the subjects of their rights and ensured they understood that participation was voluntary and by completing the surveys and returning them in the provided envelope showed their willingness to participate in the study. The inclusion criteria for this sample included: 1) being only recreationally active (i.e., no training for a significant event such as marathon or half-marathon; 2) being 18 or older; 3) not being a member of an official university women's athletic team.

### **Research Instruments and Data Collection**

After subject recruitment was completed and a waiver of documented consent was provided to all subjects, the data collection phase of the study was initiated. The PI or athletic trainers administered a questionnaire to the athletes during the next team meeting

(i.e., meeting times varied due to the needs and schedules of each team). Subjects were given approximately 45 minutes to complete the questionnaire and they were asked to place their completed questionnaires in a large sealed envelope when finished. No personal identifiers linking individual subjects to their responses were included in the questionnaire. Instructors of the undergraduate classes were contacted and informed of the study. Permission from the instructors was obtained and a date for data collection was established. The PI administered the questionnaire and non-athlete subjects were given approximately 45 minutes to complete the questionnaires. Subjects were asked to place their completed questionnaires in a large sealed envelope when finished. No personal identifiers linking individual subjects to their responses were included in the questionnaire.

The questionnaire used in the study contained several components. First, behaviors and symptoms associated with disordered eating were assessed utilizing the Eating Attitudes Test (EAT-26) and the Minnesota Eating Behavior Survey (MEBS) (Garner & Garfinkel, 1979; Klump, McGue & Iacono, 2000). Second, emotional regulation was assessed in both samples of individuals using the Difficulties in Emotional Regulation Scale (DERS) (Gratz & Roemer, 2004). Lastly, subjects answered demographic questions and were asked to self-report their actual weight, desired weight, height, menstrual history, exercise habits, history of an eating disorder, if applicable and a family history of eating disorders. Additional questions include: 1.) Have you had more than 3 periods in the last 12 months? 2.) Have you ever been diagnosed with an eating disorder? 3.) Has your mother, father or sibling ever been diagnosed or received counseling for an eating disorder? 4.) Do you participate in intramural sports? If so,

which one(s)? 5.) Do you exercise more than 8 hours/week? 6.) Are you training for an endurance event?

The EAT-26 contains three subscales and yields both a global score or individual subscale scores for Dieting, Bulimia and Food Preoccupation, and Oral Control (Garner & Garfinkel, 1979). All questions are given the answer choices of always, usually, often, sometimes, rarely and never. Questions 1-25 are scored 3, 2, 1, 0, 0, 0, respectively and question 26 is scored 0,0,0,1,2,3. A score above 20 on the EAT-26 indicates a high level of concern about dieting, body dissatisfaction or problematic eating behaviors (Garner et al., 1982). The Cronbach's alpha was .88 for the total scale, .87 for the Dieting subscale, .68 for the Bulimia subscale and .60 for the Oral subscale. The MEBS is a 30-item self-reported questionnaire with four subscales including Body Dissatisfaction, Compensatory Behavior, Binge Eating, and Weight Preoccupation (von Ranson et al., 2005). The questions are in a true/false format, with questions answered as *yes* receiving 1 point and questions answered as *no* receiving 0 points. The total score ranges from 0 to 30 with the higher score reflecting a greater degree of disordered eating (von Ranson et al., 2005). The Cronbach's alpha was .89 for the total scale, .82 for the Body Dissatisfaction subscale, .67 for the Compensatory Behavior subscale, .72 for the Binge Eating subscale and .80 for the Weight Preoccupation subscale.

Emotional regulation of the subjects was assessed using the DERS, a 36-item self-reported questionnaire with 12 themes including Anger, Disgust, Contempt, Interest, Joy, Surprise, Sadness, Fear, Shyness, Guilt, Shame, and Self-hostility (Gratz & Roemer, 2004). The questions are answered on a 5-point Likert frequency scale (1- almost never, 2-sometimes, 3-about half the time, 4- most of the time, 5-almost always). DERS has



reverse scoring on the following questions: 1, 2, 6, 7, 8, 10, 17, 20, 22, 24 and 34. The questionnaire yields a total score and individual scores for each of the 6 subscales: Non-acceptance of emotional responses (Non-accept), Difficulties engaging in goal directed behaviors (Goals), Impulse control difficulties (Impulse), Lack of emotional awareness (Aware), Limited access to emotional regulation strategies (Strategies), and Lack of emotional clarity (Clarity) (Gratz & Roemer, 2004). Individual response ranges from 1 to 5 with a total sum score range from 36-180. Subscale range scores include: Non-accept 6 to 30, Goals 5 to 25, Impulse 6 to 30, Aware 6 to 30, Strategies 8 to 40 and Clarity 5 to 25. Individuals with higher scores have greater difficulties with emotional regulation compared to others with lower scores (Gupta et al., 2008; Harrison et al., 2010). The Cronbach's alpha was .91 for the total DERS, .89 for the Non-accept subscale, .84 for the Goals subscale, .82 for the Impulse subscale, .48 for the Clarity subscale, .81 for the Aware subscale and .80 for the Strategies subscale.

### **Statistical Analysis**

The statistical analysis in this study was performed using the Statistical Package for Social Sciences (SPSS for PC; 20.0). The level of significance was set at  $p < 0.05$ . Descriptive statistics, including means and standard deviations, frequencies and ranges were computed to describe the athletic and non-athletic sample in terms of demographic and anthropometric characteristics. Furthermore, descriptive statistics served to summarize the prevalence of disorder eating behaviors and symptoms and emotional regulation characteristics of both samples. Pearson's bivariate correlations were utilized in preliminary stages of the analyses to explore relationships between the variables and identify important correlates of disordered eating and emotional regulation in the samples

of athletes and non-athletes. The proportion of individuals at-risk for disordered eating (using the EAT-26 cut off score of 20 and answer of “yes” to the supplemental questions) was compared between athletes and non-athletes using Chi-square statistics.

Analysis of Covariance (ANCOVA) was performed to identify potential differences in disordered eating and emotional regulation (i.e., overall score and scores for each emotional regulation subscale) between the athletic and non-athletic sample of females, while controlling for a family history of eating disorders. Differences in emotional regulation between the samples were also explored using ANCOVA. In addition, the prevalence of disordered eating assessed by EAT-26, using a cut off score of 20, was compared to the scores on the MEBS using independent t-test.

For further analysis, subjects in the athletic sample were categorized into 2 groups: Lean sports (cross-country, track and field, cheer/pom/dance, equestrian) and Non-lean sports (soccer, basketball, tennis, golf, and softball) (Anderson & Petrie, 2012; Reinking & Alexander, 2005; Torstveit et al., 2008). The potential differences in the prevalence of disordered eating between lean and non-lean sports were determined using Chi-square test. Potential differences in disordered eating, as well as emotional regulation, were examined within this sample by sport-type utilizing ANCOVA to control for a family history of eating disorder.

A linear regression model was utilized to identify potential predictors of disordered eating in the combined sample of subjects. The independent variables in the regression models included a family history of eating disorders, the 6 DERS subscales, and the female student status (athletes vs. non-athletes). The student status was dummy-coded and dichotomized in order to be included in the regression model (0=athletes;

1=non-athletes). The overall score on the EAT-26 served as the dependent variable in all of the regression models. The level of significance was set at  $p < .05$ .

## CHAPTER IV

### PREVALENCE OF DISORDERED EATING AND EMOTIONAL REGULATION IN FEMALE COLLEGIATE ATHLETES

#### **Abstract**

**Background:** Previous research suggests that female athletes may be at a higher risk for developing disordered eating compared to other females, especially when participating in sports where an emphasis is placed on aesthetics. Given the extra pressures female athletes face due to various academic and athletic demands, emotional regulation may play a significant role in their eating and exercise habits. Yet, emotional regulation, as a potential risk factor of disordered eating, has not been closely investigated.

**Purpose:** The purpose of this study was to examine the prevalence of disordered eating in a sample of NCAA Division I female athletes, further categorized into lean and non-lean subgroups. Secondary purpose was to explore potential associations between disordered eating and emotional regulation in this sample.

**Methods:** Prevalence of disordered eating was measured by the Eating Attitudes Test (EAT-26) and the Minnesota Eating Behavior Survey (MEBS). Emotional regulation was measured by the Difficulties in Emotional Regulation Scale (DERS).

**Results:** A total of 151 athletes participated in this study. The prevalence of disordered eating was 6.6% (EAT-26) and 10.6% (MEBS). There were no significant differences in disordered eating by type of sports (as measured by EAT-26,  $p=.875$ ) (as measured by MEBS,  $p=.907$ ). For analyses involving emotional regulation, only MEBS scores were utilized. The total disordered eating scores were positively correlated with the total emotional regulation scores  $r=.40$  ( $p<.001$ ).

**Conclusions:** The prevalence of disordered eating varies by type of research instrument used and was higher when utilizing the MEBS. Emotional regulation difficulties were directly related to disordered eating. Thus, further examination of emotional regulation in the area disordered eating in female athletes is warranted in future research.

**Key Words:** Disordered eating, female athletes, collegiate, emotional regulation, EAT-26

## **Introduction**

Clinical eating disorders (ED) are defined by the Diagnostic and Statistical Manual of Mental Disorders DSM-IV of the American Psychiatric Association (APA, 2009). The EDs include anorexia nervosa, bulimia nervosa, and eating disorders not otherwise specified (Torstveit, Rosenvinge & Sundgot-Borgen, 2008). The prevalence of these conditions has been reported to be approximately 1-3 % among U.S. women, with research largely focusing on prevalence, risk factors and development of only clinically diagnosed disorders (Blackmer, Searight & Ratwik, 2011). However, studies suggest that a substantial proportion of females engage in disordered eating behaviors that are subclinical and thus do not meet the current EDs criteria outlined in the DSM-IV (Anderson & Petrie 2012; Blackmer et al., 2011). In literature, the terms “EDs” and “disordered eating” are sometimes used interchangeably and therefore it can be difficult to clearly distinguish the prevalence and risk factors of EDs from those of disordered eating (Anderson & Petrie, 2012; McNulty, Adams, Anderson & Affenito, 2001).

Disordered eating is defined as any form of irregular eating patterns (Torstveit, Rosenvinge & Sundgot-Borgen, 2008). These patterns of behavior are often referred to as pathogenic or dysregulated eating (Bonci, Bonci, Granger, Johnson & Maline, 2008; DePalma, Koszewski, Romani, Case & Zuiderhof, 2002). A wide range of eating and physical activity behaviors may be exhibited by individuals with disordered eating symptoms, such as dieting, excessive exercise and body weight or shape concerns (Torstveit et al., 2008). The prevalence of disordered eating among young female adults has been reported by a handful of studies and is estimated to be between 12 and 20% (Nelson, Gortmaker, Subramanian, Cheung & Weshler, 2007; Sira & Pawlak, 2010).

The etiology of EDs is not well understood but a substantial amount of research evidence suggests that these conditions are multifactorial (Ghaderi & Scott, 2001; Striegel-Moore & Bulik, 2007). In addition to being a female and having body size and/or weight concerns, EDs risk factors include having low self-esteem, high stress and engaging in frequent dieting (Jacobi, Hayward, de Zwaan, Kraemer & Agras, 2004; Striegel-Moore & Bulik, 2007). Behaviors such as frequent dieting and binge eating are signs of dysregulated or disordered eating that may put individuals with these symptoms at a higher risk of developing a clinically diagnosed ED (Torstveit et al., 2008). Additional risk factors for EDs include cultural and environmental factors, such as living in Western societies that idealize a slim physique of females (Polivy & Herman, 2002). Cultural risk factors are closely associated with frequent dieting and body image disturbances among women living in Western countries and represent well-known risk factors of EDs (Ghaderi & Scott, 2001). Because disordered eating has been linked to a wide range of adverse health effects, such as poor nutritional status, low body esteem and higher risk for development of a clinical ED, further research examining disordered eating behaviors among young females is much warranted in current literature (Becker, McDaniel, Bull, Powell & McIntyre, 2012; Berry & Howe, 2000; Swanson, Crow, Le Grange, Swendsen & Merikangas, 2011).

Female athletes represent a unique population with specific characteristics and culture surrounding them on a daily basis (Torres-McGehee et al., 2009). In recent years, nearly 200,000 females have participated in National Collegiate Athletic Association (NCAA) sports and the number continues to rise annually (NCAA.com, 2011). While female athletes are exposed to the same risk factors for disordered eating as the general

female population (Cafri, Yamamiya, Brannick & Thompson, 2005), they also experience additional pressures related to either their athletic performance, appearance or both. This is especially true for female athletes in aesthetic sports such as cheerleading, and some endurance sports such as cross-country running where low body fat is often emphasized as one of the characteristics that is key for success (Rome & Ammerman, 2003; Williams, Sargent & Larry, 2003; Ziegler et al., 2001). Previous research has reported that female athletes often feel strong internal pressures from themselves, but also external pressure from their teammates and coaches to achieve the “ideal” body weight (Thompson & Gabriel, 2004). In literature these sports are referred to as lean sports, where emphasis is placed on aesthetics and leanness. These sports include, for example, distance running, swimming, gymnastic, dance and diving (Bonci et al., 2008; Sundgot-Borgen & Torstveit, 2004).

A relatively small number of studies have closely examined the prevalence and nature of disordered eating symptoms among female athletes (Torres-McGehee et al, 2009). Torstveit and colleagues (2008) found that 46.2% of athletes showed signs and symptoms of disordered eating. In this study, athletes were defined as elite athletes ranging from 13-39 years old and representing 66 different sports (technical, endurance, aesthetic, weight class, ball game, and power sports) (Torstveit et al., 2008). In a large study by Sundgot-Borgen and Torstveit (2004), female athletes were more likely than non-athletes to exhibit signs of both subclinical and/or clinical eating disorders (13.5% vs. 4.6%). The athletes in this study were between ages of 15-39 and classified as elite athletes with 34% placing among the top 10 in the Olympics, World Cup, or World



Championships. Similarly, Anderson and Petrie (2012) reported that 26.1% of female collegiate athletes (mean age of 19 years) were found to show signs of disordered eating.

The assessment tools utilized to examine the prevalence of disordered eating in girls and/or women have included the Eating Attitude Test-26 (EAT-26), Eating Disorder Inventory-2 (EDI-2), the Survey for Eating Disorders (SED), Minnesota Eating Behavior Survey (MBES), and the Female Athlete Screen Tool (FAST) (Ghaderi & Scott, 2001; McNulty, et al., 2001; Torres-McGehee et al, 2009). The EAT-26 is a standardized assessment tool with demonstrated reliability and validity used to identify risk factors associated with disordered eating (Berland, Thompson & Linton, 1986; Garner, Olmsted, Bohr & Farfinkel, 1982).

The MEBS assessment tool has also been shown to have good internal consistency in adolescent females in recent studies (Klump, McGue & Iacono, 2000; von Ranson, Klump, Iacono & McGee, 2005). To our knowledge, these two assessment tools have not been used to compare signs and symptoms of disordered eating in samples of females. Additionally, no assessment tools have been validated for use with various subpopulations, such as female athletes (Black, Larkin, Coster, Leverenz & Abood, 2003; McNulty et al., 2001). Although these surveys were constructed and validated using samples primarily of white middle class females aged 11 to adulthood, they represent the few existing assessment measures of disordered eating (Garner & Garfinkel, 1979; Klump, McGue & Iacono, 2000) and have been utilized with a variety of athletic samples in previous research (Shriver, Betts & Payton, 2009; Torres-McGehee et al., 2009). Given these methodological issues, there is a need to further investigate the nature and performance of the existing assessment tools within the same samples of females and

closely evaluate their performance for comparison across research studies (Bonci et al., 2008; McNulty et al., 2001).

Emotional regulation refers to the ability of an individual to recognize and control their expressions of emotion (Harrison, Sullivan, Tohanturia & Treasure, 2010). In recent years, few research studies have proposed a link between eating disorders and difficulties with identifying emotions (Berry & Howe, 2000; Han & Pistole, 2014; Lavender & Anderson, 2010; Sim & Zeman, 2006). For instance, Sim and Zeman (2006) found that females diagnosed with bulimia nervosa exhibited low emotional awareness and had poor skills in emotion identification compared to their counterparts. Coping skills, critical for the emotional function of an individual, help generate adequate coping strategies for many different life situations on a daily basis (Saarni, 1999). Han and Pistole (2014) found subjects that experienced difficulties regulating emotions were more vulnerable to binge eating. The Difficulties in Emotional Regulation Scale (DERS) has been used in previous research exploring emotional regulation in young individuals (Han & Pistole, 2014; Gratz & Roemer, 2004; Lavender & Anderson, 2010).

Given the extra pressures female athletes face on a daily basis due to various academic and athletic demands and expectations, emotional regulation may play a significant role in their eating, exercise and other lifestyle habits. Yet, emotional regulation, as a potential factor influencing the risk of disordered eating, has not been investigated closely in research with females athletes (Harrison et al., 2010; Striegel-Moore & Bulik, 2007).

In summary, there is currently very limited knowledge on risk factors of disordered eating behaviors in female collegiate athletes (Becker et al., 2012; Ghaderi &

Scott, 2001; Torstveit et al., 2007). Furthermore, there is a lack of studies examining factors that may potentially serve as valuable predictors, or markers, of increased risks for disordered eating in this population. Given the competitive nature of the athletic environment and societal pressures to look thin coupled with academic demands, effective emotional regulation strategies may play an important role in the management and regulation of disordered eating practices in female athletes.

The main purpose of this study was to examine the prevalence of disordered eating in a sample of NCAA Division I female athletes using two commonly utilized assessment tools for disordered eating symptoms, the EAT-26 and the MEBS. A secondary purpose was to explore potential associations between disordered eating behaviors and emotional regulation characteristics in this unique sample. Finally, the study examined the prevalence of disordered eating in female athletes by type of sport.

## **Methods**

### Study Design and Subjects

A convenience sample of female athletes for this descriptive study was recruited between September and October of 2013 from a division I NCAA University in a Midwestern state of the U.S. The study protocol was reviewed and approved by the university's sports physician who oversees the medical and athletic care of all athletes as well as by the University's Institutional Review Board. Subjects were recruited with the assistance of certified athletic trainers who worked with individual women's teams on a daily basis. Subjects were recruited from all women's athletic teams and included the following nine sports: soccer, cross-country, track and field, basketball, cheer/pom/dance, equestrian, tennis, golf and softball. Subjects were categorized into lean and non-lean

sports with 1) Lean Sports (n=87) (cheer/pom/dance, equestrian, track and field, and cross country) and 2) Non-lean Sports (n=64) (basketball, softball, golf, soccer and tennis).

Subjects were informed about the purpose, nature and details of the study by the primary investigator or the athletic trainers during a team meeting. Coaching staff was not present during the meeting to minimize any possibility of perceived coercion for study participation by the athletes. A written informed consent was used as a script to explain the study to the subjects. The primary investigator and/or athletic trainers addressed any questions and concerns about the study during the meeting. Interested subjects were asked to sign the written informed consent forms at the end of the meeting or bring the signed form back to the athletic trainers before the next practice or team meeting. The inclusion criteria for the study subjects included: 1) being a member of an official university women's athletic team; 2) being 18 or older; and 3) participating in team practices and activities.

#### Data Collection and Research Instruments

Disordered eating and emotional regulation data were collected using a questionnaire format with the following items included: the Eating Attitudes Test (EAT-26), the Minnesota Eating Behavior Survey (MEBS) and the Difficulties in Emotional Regulation Scale (DERS). Subjects were also asked to answer additional questions related to their self-reported weight, desired weight, height, menstrual history, history of an eating disorder and family history of eating disorders. Subjects were asked to place their completed questionnaires in a sealed envelope that was provided to them. No personal identifiers linking individual subjects to their responses were included in the

questionnaires or additional questions. If administered by the team's athletic trainers, the envelopes were sealed and returned with the completed questionnaires to the primary investigator on the same day.

### Eating Attitudes Test-26

The EAT-26 serves as a screening tool to identify individuals at risk for disordered eating. The EAT-26 has been widely used and validated in previous research with various populations ( $\alpha = .90$ ) (Garner et al., 1982). It is a 26-item self-administrated survey consisting of 3 subscales: dieting, bulimia and food preoccupation, and oral control. Four supplemental questions identifying risky behaviors such as purging, suicidal thoughts, binge eating, weight loss supplements, laxatives and diagnosis of previous eating disorders were also included. EAT-26 is scored using six answer options with the following scores: 0 = never, rarely, or sometimes, 1 = often, 2 = usually, and 3 = always. Item number 26 (i.e., "I enjoy trying new foods.") is scored using reverse scoring. A score of 20 or greater or a "yes" answer to 1 supplemental question identifies the individual at risk for an eating disorder and a score of less than 20 and "no" answers to all of the supplemental questions identifies an individual as not at risk for an eating disorder (Garner et al., 1982). The Cronbach's alpha was .88 for the total scale, .87 for the Dieting subscale, .68 for the Bulimia subscale and .60 for the Oral subscale.

### Minnesota Eating Behavior Survey

Disordered eating in this study was also assessed with the 30-item self-reported Minnesota Eating Behaviors Survey (MEBS) (Klump, McGue & Iacono, 2000; von Ranson, Klump, Iacono & McGue, 2005). The MEBS includes a total score of disordered

eating and also includes four subscales: 1) body dissatisfaction (6 items addressing size and/or shape of one's body); 2) weight preoccupation (8 items addressing dieting, weights and the pursuits of thinness); 3) binge eating (7 items addressing the tendency to engage in overeating and thoughts of binge eating); 4) compensatory behavior (6 items addressing the tendency to use or to contemplate using inappropriate compensatory behaviors such as self-induced vomiting and laxatives to control weight) (Klump et al., 2000; Klump, Suisman, Burt, McGee & Iacono, 2009).

The scoring of the MEBS is based on the 30-item true/false questions. Questions answered with "true" received 1 point and questions answered with a "false" received 0 points. Four items required reverse scoring to enable interpretation of the total score. The total score comprised the sum of scores with a total high score of 30. The subscales are scored by summing the individual item scores within each subscale. Subscale scoring include: weight preoccupation 0-8, binge eating 0-7, compensatory behavior 0-5, and body dissatisfaction, 0-6. The MEBS protocol has three additional questions included in the total MEBS score that are not part of a subscale (Klump et al., 2000; Klump et al., 2009). Based on previous studies of women with known eating disorders (Klump et al., 2000; von Ranson et al., 2005), subjects with a score of 15.55 or greater were classified as "at risk for disordered eating". Subjects with a score of 15 or less were classified as not at risk for disordered eating. The Cronbach's alpha was .89 for the total scale, .82 for the Body Dissatisfaction subscale, .67 for the Compensatory Behavior subscale, .72 for the Binge Eating subscale and .80 for the Weight Preoccupation subscale.

## Emotional Regulation

The Difficulties with Emotional Regulation Scale (DERS) is a 36-item, self-reported questionnaire developed to assess difficulties in emotional regulation (Gratz & Roemer, 2004). The DERS includes 6 subscales: 1) Non-acceptance of emotional responses (i.e., “When I’m upset, I feel guilty for feeling that way”). This subscale score can range from 6-30. 2) Difficulties engaging in goal directed behavior (i.e., “When I’m upset, I have difficulty concentrating”). This subscale score can range from 5-25. 3) Impulse control difficulties (i.e., “When I’m upset, I lose control over my behaviors”). This subscale score can range from 6-30. 4) Lack of emotional awareness (i.e., “I am attentive to my feelings”). This subscale score can range from 6-30. 5) Limited access to emotional regulation strategies (i.e., “When I’m upset, I believe that I’ll end up feeling very depressed”). This subscale score can range from 8-40. 6) Lack of emotional clarity (i.e., “I have difficulty making sense out of my feelings”). This subscale score can range from 5-25. The DERS is scored using five answer options with the following scores: 1 = almost, 2 = sometimes, 3 = about half the time, 4 = most of the time, 5 = almost always. Reverse-scoring was used for eleven items as appropriate. The total possible score of 36 items ranged from 36 to 180. Higher scores on DERS suggest a higher risk of poor emotional regulation (Gratz & Roemer, 2004). The DERS scores are compared to average scores from female population. There is not a standardized cut off score for the DERS (Gratz & Roemer, 2004). The Cronbach’s alpha was .91 for the total DERS, .89 for the Non-accept subscale, .84 for the Goals subscale, .82 for the Impulse subscale, .48 for the Clarity subscale, .81 for the Aware subscale and .80 for the Strategies subscale.

## Statistical Analysis

The statistical analysis for this study was performed using the Statistical Package for Social Sciences (SPSS 20.0). The level of significance for all tests was set at  $p < 0.05$ . Descriptive statistics, including means and standard deviations, frequencies, ranges and percentages were computed to describe the sample in terms of the subjects' demographic and anthropometric characteristics. Percentage statistics served to estimate the prevalence of disordered eating symptoms based on EAT-26 and MEBS, and emotional regulation characteristics based on DERS. Preliminary analyses were conducted using the Pearson's bivariate correlations to explore associations between the variables of interest.

The prevalence of disordered eating and specific behaviors in the sample was determined using the total scores and subscale scores of EAT-26, and also utilizing the MEBS total and subscale scores. The potential differences in the prevalence of disordered eating between lean and non-lean categories were determined using Chi-square test (EAT-26 cut off value of 20; MEBS cut off value of 15.5). To detect potential differences in disordered eating symptoms and emotional regulation characteristics by type of sport, athletes were categorized into two groups: 1=Lean Sports (cross-country, track and field, cheer/pom/dance, equestrian); and 2= Non-lean Sports (soccer, basketball, tennis, golf, and softball) (Anderson & Petrie, 2012; Reinking & Alexander, 2005; Torstveit et al., 2008). Analysis of Covariance (ANCOVA) was utilized to examine potential differences in the prevalence of disordered eating between lean athletes and non-lean athletes when controlling for a family history of eating disorder.



## Results

A total of 183 university female athletes were eligible for the study, with 151 athletes volunteering to participate (response rate of 83%). The mean Body Mass Index (BMI) of the subjects was within a healthy weight range (Table 1). Approximately 69% of the athletes expressed a desire to have a lower body weight compared to their current body weight (Ideal Body Weight). The proportion of athletes in each of the 9 sports reporting a lower desired weight than actual weight is shown in Table 2. The prevalence of disordered eating was 6.6% as measured by EAT-26 and 10.6% as assessed by MEBS (Table 3). Disordered eating as measured by the three EAT-26 subscales and the four MEBS subscales did not show a significant difference between lean and non-lean athletes (Table 4). There were no significant differences in the prevalence of disordered eating by type of sports (lean vs. non-lean), regardless of the type of assessment measure used (Tables 3). Additionally, when controlling for family history of eating disorders, there were no significant differences in the prevalence of disordered eating by type of sport ( $p = .69$  as measured by EAT-26;  $p = .57$  as measured by MEBS).

Analyses of emotional regulation showed that subjects scored higher on the “awareness” and “strategies” subscales and lowest on “impulse” and “clarity” (Table 5). This means that athletes had more difficulties accepting emotional responses and had limited access to emotional regulation strategies. Athletes had less difficulties remaining in control of their feelings and understanding their feelings. Athletes in lean versus non lean sports did not report significantly different overall emotional regulation scores or the subscales scores (Table 5). Total scores on the EAT-26 and MEBS were positively correlated (Table 6;  $r = .72$ ;  $p < .001$ ). The 3 subscales of EAT-26; dieting, bulimia and

oral control positively correlated with the total MEBS score (Table 6). Each subscale of EAT-26 was significantly positively correlated with the subscales of the MEBS with the exception of the oral subscale on EAT-26 (Table 6).

The total disordered eating score as measured by the MEBS positively correlated with the total emotional regulation score at  $r = .40$  (Table 6;  $p \leq .001$ ). The non-accept subscale of the DERS was positively correlated with the total MEBS score  $r = .40$  (Table 6;  $p \leq .001$ ).

## **Discussion**

The purpose of this study was to examine the prevalence of disordered eating in female collegiate athletes using two assessment tools from existing research and explore the potential associations between disordered eating and emotional regulation strategies utilized by this unique population of young females. The EAT-26 and MEBS scores for disordered eating symptoms in our sample were strongly and positively correlated with each other, suggesting that the items measure similar dimensions of disordered eating behaviors.

While the prevalence of disordered eating in our sample of female collegiate athletes was relatively high based on MEBS, our findings indicate that the prevalence of disordered eating may vary significantly depending on the type of the assessment tool used for the analysis. In our study, a much smaller proportion of female athletes showed disordered eating symptoms when the sample was analyzed using the EAT-26 scores. Torres-McGehee and colleagues (2009) found 29.7% of their athlete population was at risk for disordered eating utilizing the EAT-26 scores. In contrast Williams, Sargent and Larry (2003) found only 1.7% of female student-athletes were at risk for disordered

eating as measured by the EAT-26.

Our study did not identify a significant difference in the prevalence of disordered eating risk between lean and non-lean athletes, which is inconsistent with some previous studies. Reinfinig and Alexander (2005) found that athletes in lean sports had a higher risk for disordered eating than those in non-lean sports (25% vs. 2.9%). However, these results may be explained by the type of disordered eating assessment tools and procedures used for classification of sports (McNulty et al., 2001; Nagel, Black & Leverenz, 2000). Future research in this area should use consistent techniques and methodologies in order to detect potential differences in disordered eating and emotional regulation by type of sports. The current state of literature clearly shows there is a strong need for congruency of measurement tool used for establishing risk of disordered eating within the female athlete population.

This study also looked at emotional regulation as a risk factor for disordered eating. Due to the large number of females that may be affected by disordered eating (12-20%) (Nelson et al., 2007), it is important to identify potential risk factors associated with development of disordered eating among females (Sira & Pawlak, 2010). We found that emotional regulation did have a significant and positive correlation with disordered eating in this sample of female college athletes. The link between disordered eating and emotional regulation was also found in Lavender and Anderson's (2010) study where they found emotional regulation as a significant predictor of disordered eating and body dissatisfaction. In another study by Han and Pistole (2014), emotional regulation difficulties increased the likelihood of subjects binge eating. Therefore, the topic of emotional regulation may be particularly applicable in the attempt to understand the risk

factors associated with disordered eating. Many risk factors have been identified as they related to disordered eating: self-esteem, body dissatisfaction and pressures of the athletic environment (Sundgot-Borgen & Torstveit, 2004). However, emotional regulation as it relates to disordered eating in female athletes needs to be further explored, especially as young female athletes face additional challenges of college life compared to other college-aged females (Lavender & Anderson, 2010; Sundgot-Borgen & Torstveit, 2004).

### Limitations

The current study has several strengths that include a large sample of female collegiate athletes from a Division I University, a high participation rate of eligible subjects (83%) and inclusion of two different assessment tools for identification of individuals with disordered eating symptoms. However, the study also has several limitations that should be noted in the light of the reported findings. First, the study utilized a convenience sample of female collegiate student athletes at a Midwestern university. Although this is a relatively large sample, it does not represent all female collegiate athletes in the U.S. Geographical, cultural, ethnic and other differences were not accounted for in our study. Second, informed consent was obtained after the initial informational meeting. Thus, some students with known eating disorders might have opted out of study participation. Third, the surveys were collected during a team meeting or a team practice and those with known eating disorders may have been excluded from team activities at the time of data collection due to eating disorder diagnosis. Finally, data was self-reported and thus, some athletes may have been subjects of social desirability bias and/or other influences that may have influenced the results of the study.

## **Conclusion**

Disordered eating in female athletes, as a recognized risk factor for clinical ED, can compromise performance on and off the field, increase risk for injury and have lasting effects after their athletic careers have ended (Berry & Howe, 2000; Johnson, Powers & Dick, 2009). Identifying the prevalence of disordered eating and potential factors of disordered eating among young female athletes is a timely topic and is much needed in current literature. Although the prevalence of disordered eating in our sample was lower than rates reported in some of the previous studies (Thompson & Gabriel, 2004), a relatively high proportion of the female athletes in our sample reported a variety of disordered eating symptoms. Our study did not find a significant difference in the prevalence of disordered eating by type of sport; however, further research in this area is warranted. Because early detection of disordered eating symptoms and potential risk factors for disordered eating is critical to successful prevention and treatment, our study contributes significantly to the existing knowledge of disordered eating in female athletes. In our study, emotional regulation did have a positive correlation with disordered eating. Thus, further research in the area of emotional regulation as it relates to disordered eating in female collegiate athletes is warranted. Building on the results of the current study, development of new assessment tools specifically for female athletes will be possible after potential risk factors of disordered eating, such as emotional regulation, are further investigated in future studies.

Table 1: Demographic and Anthropometric Characteristics of the Female Athletes

<b>Variables</b>	<b>Mean ± SD</b>
Age (year)	19.50 ± 1
Height (inch)	65.76 ± 3
Weight (lb)	136.35 ± 22
BMI <sup>a</sup> (kg/m <sup>2</sup> )	22.11 ± 3
Perceived IBW <sup>b</sup> (lb)	131.62 ± 19
BMI based on IBW(kg/m <sup>2</sup> )	21.35 ± 2

<sup>a</sup>BMI, body mass index measured by self-reported height and weight

<sup>b</sup>IBW, ideal body weight (weight subject felt that would be ideal for them)

Table 2: The Proportion of Athletes Reporting a Lower Desired Weight Than Actual Weight

<b>Sport</b>	<b>Subjects desiring lower body weight</b>
Basketball (n=15)	11 (69%)
Softball (n=18)	14 (78%)
Golf (n=7)	4 (57%)
Cheer/pom/dance (n=32)	25 (78%)
Soccer (n=16)	13 (81%)
Equestrian (n=17)	12 (71%)
Tennis (n=8)	6 (75%)
Track (n=13)	9 (69%)
Cross country (n=25)	10 (40%)

Table 3: Prevalence of Disordered Eating by Eating Attitudes Test-26 and Minnesota Eating Behavior Survey

	<b>Athlete (n=151)</b>	<b>Lean (n=87)</b>	<b>Non-lean (n=64)</b>
<b>EAT-26<sup>a</sup></b>			
Under 20	141 (93.4%)	81 (93.1%)	60 (93%)
Over 20	10 (6.6%)	6 (6.9%)	4 (6.3%)
<b>MEBS<sup>b</sup></b>			
Under 15.55 <sup>c</sup>	135 (89.4%)	78 (90%)	57 (89%)
Over 15.55	16 (10.6%)	9 (10%)	7 (11%)

<sup>a</sup>Chi-square .875- no significance difference between lean and non-lean athletes' scores on the EAT-26

<sup>b</sup>Chi-square .907- no significance difference between lean and non-lean athletes' scores on the MEBS

<sup>c</sup>A score of  $\geq 15.55$  classifies as at risk for disordered eating

Table 4: Comparison of Disordered Eating Scores Based on EAT-26 and MEBS by Type of Sports

	<b>Athletes (n=151)</b>	<b>Non-Lean (n=64)</b>	<b>Lean (n=87)</b>	<b>p-value</b>
<b>EAT-26<sup>a</sup></b>	6.86 ± 7.72	6.75 ± 6.51	6.94 ± 8.54	.880
Dieting <sup>b</sup>	4.95 ± 6.01	5.05 ± 5.61	4.89 ± 6.45	.873
Bulimia <sup>c</sup>	0.55 ± 1.31	0.44 ± 1.01	0.63 ± 1.50	.370
Oral Control <sup>d</sup>	1.35 ± 1.80	1.27 ± 1.52	1.43 ± 1.98	.591
<b>MEBS<sup>e</sup></b>	6.96 ± 5.37	6.86 ± 5.37	7.03 ± 5.39	.844
Weight Preoccupation <sup>f</sup>	2.90 ± 2.44	2.73 ± 2.40	3.02 ± 2.47	.474
Binge Eating <sup>g</sup>	1.44 ± 1.44	1.47 ± 1.38	1.43 ± 1.50	.856
Compensatory Behavior <sup>h</sup>	0.23 ± 0.63	0.27 ± 0.62	0.20 ± 0.07	.503
Body Dissatisfaction <sup>i</sup>	1.63 ± 1.74	1.63 ± 1.76	1.63 ± 1.73	.980

<sup>a</sup> Range of scores for total EAT-26: 0-78. <sup>b</sup> Range of scores for EAT subscale of dieting: 0-39.

<sup>c</sup> Range of scores for EAT subscale of bulimia: 0-6. <sup>d</sup> Range of scores for EAT subscale of oral control: 0-7.

<sup>e</sup> Range of scores for total MEBS:0-30. <sup>f</sup> Range of scores for the MEBS subscale of weight preoccupation: 0-8. <sup>g</sup> Range of scores for the MEBS subscale of binge eating: 0-7. <sup>h</sup> Range of scores for the MEBS subscale of compensatory Behavior: 0-5. <sup>i</sup> Range of scores for the MEBS subscale of body dissatisfaction: 0-6.

Table 5: Difficulties in Emotional Regulation Scores for Lean and Non-lean Athletes

	<b>Athletes (n=151)</b>	<b>Non-Lean (n=64)</b>	<b>Lean (n=87)</b>	<b>p-value</b>
	M ± SD %	M ± SD %	M ± SD %	---
<b>DERS<sup>b</sup></b>	70.92 ± 17.88 (39%)	72.22 ± 19.8 (40%)	69.96 ± 16.37 (39%)	.446
Non-accept <sup>c</sup>	11.52 ± 4.77 (38%)	11.68 ± 4.99 (39%)	11.39 ± 4.61 (38%)	.707
Goals <sup>d</sup>	11.96 ± 4.44 (48%)	11.76 ± 4.28 (47%)	12.10 ± 4.57 (48%)	.646
Impulse <sup>e</sup>	9.83 ± 3.53 (33%)	9.84 ± 3.61 (33%)	9.82 ± 3.48 (33%)	.978
Aware <sup>f</sup>	14.70 ± 4.40 (50%)	15.47 ± 4.14 (52%)	14.14 ± 4.52 (47%)	.066
Strategies <sup>g</sup>	13.33 ± 5.08 (33%)	13.47 ± 5.54 (34%)	13.23 ± 4.73 (31%)	.776
Clarity <sup>h</sup>	9.58 ± 3.30 (38%)	9.98 ± 3.77 (39%)	9.28 ± 2.90 (37%)	.194

(%) is mean as % of maximum score <sup>b</sup> Range of scores for total DERS: 36-180. <sup>c</sup> Range of scores for the DERS subscale of non-accept: 6-30. <sup>d</sup> Range of scores for the DERS subscale of goals; 5-25. <sup>e</sup> Range of scores for the DERS subscale of impulse; 6-30. <sup>f</sup> Range of scores for the DERS subscale of aware, 6-30. <sup>g</sup> Range of scores for the DERS subscale of strategies: 8-40. <sup>h</sup> Range of scores for the DERS subscale of clarity: 5-25.

Table 6: Correlations Between the Minnesota Eating Behavior Survey, the Eating Attitudes Test and the Difficulties in Emotional Regulation Survey

	MEBS <sup>l</sup>	Body dissatisfaction <sup>m</sup>	Weight preoccupation <sup>n</sup>	Binge <sup>o</sup>	Compensatory <sup>p</sup>
<b>EAT26<sup>a</sup></b>	.72**	.51**	.66**	.35**	.51**
Diet <sup>b</sup>	.74**	.52**	.68**	.33**	.55**
Bulimia <sup>c</sup>	.53**	.41**	.37**	.42**	.37**
Oral <sup>d</sup>	.19*	.13	.23*	.08	.04
<b>DERS<sup>e</sup></b>	.40**	.33**	.27*	.36**	.31**
Non-accept <sup>f</sup>	.40**	.25*	.30**	.26*	.29**
Goals <sup>g</sup>	.31**	.31**	.22*	.22*	.19*
Impulse <sup>h</sup>	.27*	.27	.17	.26*	.18*
Aware <sup>i</sup>	.12	.10	.05	.15	.17*
Strategies <sup>j</sup>	.31**	.28*	.23	.25*	.25*
Clarity <sup>k</sup>	.24*	.19*	.10	.38**	.20*

<sup>a</sup>Total EAT-26 scores; <sup>b</sup>Diet, EAT-26 subscale of dieting; <sup>c</sup>Bulimia, EAT-26 subscale of bulimia;

<sup>d</sup>Oral, EAT-26 subscale of oral control. <sup>e</sup>DERS, total scores of DERS; <sup>f</sup>Nonaccept, DERS subscale of non-accept; <sup>g</sup>Goals, DERS subscale of goals; <sup>h</sup>Impulse, DERS subscale of impulse; <sup>i</sup>Aware, DERS subscale of aware; <sup>j</sup>Strategies, DERS subscale of strategies;

<sup>k</sup>Clarity; DERS subscale of clarity. <sup>l</sup>Total MEBS scores; <sup>m</sup>Body Dissatisfaction, MEBS subscale of body dissatisfaction;

<sup>n</sup>Weight preoccupation, MEBS subscale for weight preoccupation; <sup>o</sup>Binge, MEBS subscale binge eating; <sup>p</sup>Compensatory, MEBS subscale of compensatory behavior. \*significance  $\leq 0.05$ \*\*significance  $\leq .001$



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## CHAPTER V

### DISORDERED EATING SYMPTOMS AND EMOTIONAL REGULATION IN FEMALE COLLEGE ATHLETES AND THEIR NON-ATHLETIC COUNTERPARTS

#### **Abstract**

**Background:** Literature indicates that symptoms of eating disorders (EDs) are common in the college population. Females represent an at-risk population due to higher rates of body dissatisfaction. Female athletes may experience disordered eating due to the additional pressures they face within the athletic environment. However, risk factors associated with disordered eating in college population need further investigation, including the potential role of emotional regulation on disordered eating behaviors.

**Purpose:** To compare the prevalence of disordered eating symptoms between female college athletes and their athletic counterparts. Emotional regulation, athletic status and family history of eating disorders were examined as potential predictors of disordered eating behaviors among female college students.

**Methods:** A convenience sample of female college students was recruited from a Division I NCCA University. Survey-based approach was utilized to collect demographic, emotional regulation and other information. Prevalence of disordered eating was measured by the Eating Attitudes Test-26. Emotional regulation was measured by the Difficulties in Emotional Regulation Scale (DERS).

**Results:** A total of 527 females participated in this study (151 athletes and 376 non-athletes). The prevalence of disordered eating was higher in non-athletes, 16.5%, compared to athletes 6.6% ( $p < .001$ ). Non-athletes had greater difficulties regulating emotions (DERS scores: non-athletes:  $75.77 \pm 21.75$ ; athletes:  $70.92 \pm 17.88$ ) ( $p < .01$ ). Hierarchical regression showed non-athletic status and poor ability to accept emotional responses (Non-accept) were found to significantly predict higher disordered eating scores ( $p < .01$ ).

**Conclusions:** Non-athletes in our study had higher rates of disordered eating and showed greater difficulties regulating their emotions compared to athletes. Thus, athletic status may be somewhat protective against disordered eating symptoms in college students. Future research should focus on further exploring emotional regulation in relation to disordered eating in this vulnerable population of young females.

**Key Words:** disordered eating, emotional regulation, female college athletes, non-athletes

## **Introduction**

Frequent dieting and binge eating are common examples of dysregulated eating behaviors, otherwise known as disordered eating (DePalma et al., 2002; Torstveit, Rosenvinge & Sundgot-Borgen, 2008). Previous studies indicate that women with disordered eating are at an increased risk for clinical eating disorders (ED) and thus represent an at-risk group for these conditions (Fortes, Paes, Amaral & Ferreira, 2012). Currently, the rate of disordered eating among young females is reported to be between 12 to 20% (Nelson & Hughes, 1999; Sira & Pawlak, 2010). However, the true prevalence is unclear because the term “disordered eating” is often used interchangeably with clinically diagnosed EDs and different assessment tools are used to estimate the prevalence (McNulty, Anderson & Affenito, 2001; Torres-McGehee et al., 2009; Torstveit et al., 2008). Although the etiology of EDs is still not well understood, the risk factors include frequent dieting, low self-esteem, concerns about body size and/or weight, and high stress (Jacobi, Hayward, de Zwaan, Kraemer & Agras, 2004; Striegel-Moore & Bulik, 2007). The term “dieting” includes a variety of unhealthy dysregulated eating patterns such as excluding foods, skipping meals and/or replacing meals with supplements (Brownell & Rodin, 1994; Lowry et al., 2000). A substantial amount of research suggests that EDs are multifactorial, with unique interactions between genetic and environmental factors that influence individuals’ risks (Ghaderi & Scott, 2001; Striegel-Moore & Bulik, 2007).

The incidence of EDs among females can appear in adolescence and young adulthood with the mean range from 18-21 years (Hudson, Hiripi, Pope & Kessler 2007; Neumark-Sztainer, Wall, Larson, Eisenberg & Louth, 2011). A relatively small

percentage of female college students meet the clinical diagnostic criteria for EDs (Greenleaf, Petrie, Carter & Reel, 2009, Torstveit et al., 2008; Martinsen, Brantland-Sandra, Eriksson & Sundgot-Borgen, 2010). However, research suggests that this population is vulnerable to unhealthy eating practices and disordered eating. Hoerr and others (2002) found that as many as 11% of 1,198 college-aged women were at risk for disordered eating. Disordered eating in this population could be due to a variety of factors including young age, cultural pressures to look thin, media influences, living in a new environment and being home sick (Arnett, 2000; Cooley & Toray, 2001; Fitzsimmons-Craft, Harney, Brownstone, Higgins & Bardone-Cone, 2012). A study by Ackard and colleagues (2002) found that dieting frequency among normal weight college females was strongly associated with symptoms of disordered eating behaviors.

Several studies suggest that female athletes are at an even greater risk for engaging in disordered eating behaviors than their non-athletic counterparts (Barrack, Ackerman & Gibbs, 2013; Holm-Denoma, Scaringi, Gordon, Van Orden & Joiner, 2009). With the passage of Title IX legislation in 1972 (Cheslock, 2007), the number of women participating in collegiate sports has increased tremendously (Beals, 2000; Reinking & Alexander, 2005). Cheslock (2007) found that 26,000 more women participated in collegiate athletics in 2005 compared to 1995. Thus, greater attention has been placed on potential health and psychological issues of female athletes (Reinking & Alexander, 2005; Torres-McGehee et al., 2009). Over the last few years, the importance of EDs has been gaining greater interest among health care professionals working with female athletes on a regular basis

To date, however, the number of studies examining disordered eating in this



unique population is scarce (Haase, 2011; Holm-Denoma et al., 2009; Fortes & Ferreire, 2011). Even fewer studies have attempted to compare the prevalence of disordered eating between female collegiate athletes and their non-athletic counterparts. Sundgot-Borgen and Torstveit (2004) found female athletes to be more likely than non-athletes to show signs of subclinical and clinical eating disorders (13.5 vs. 4.6%). In contrast, Reinking and Alexander (2005) found no differences in the prevalence of eating disorders between female collegiate athletes and non-athletes. It should be noted that lack of consistency in methodology and selection of diverse samples across studies is a major issue in this area of research (Melin et al., 2014; Mitchell & Robert-McComb, 2014). Nonetheless, the Eating Attitude Test (EAT-26) represents the most commonly utilized instrument for examining disordered eating symptoms in both female and male college-aged populations (Bighetti, Santos, Santos & Ribeiro, 2004; Fortes et al., 2014; Williams et al., 2003; Shriver, Betts & Payton, 2009)

Emotional regulation represents an emerging theme in the area of prevention and early detection of dysregulated eating patterns (Han & Pistole, 2014; Costarelli, Demerzi & Stamou, 2009). Sim and Zeman (2006) were among the first to publish data identifying emotional status as a potential predictor of disordered eating in a sample of young females. Lavender and Anderson (2010) found difficulties in emotional regulation to be significant predictors of disordered eating among male college students. In their study, two specific subscales of the difficulties in emotional regulation, non-acceptance of emotional responses and limited access to emotional regulation strategies, significantly predicted subjects' disordered eating scores. Low access to emotional regulation strategies also significantly predicted binge-eating behaviors in another study of female

and male college students (Whiteside, Chen, Neighbors, Hunter & Larimer, 2007).

Given the current limited understanding of disordered eating behaviors in the female college population and the emerging topic of emotional regulation in this area, the main purpose of this study was to compare the prevalence of disordered eating symptoms between female college students and their athletic counterparts. The second purpose was to examine emotional regulation, athletic status and family history of eating disorder as potential predictors of disordered eating behaviors in the same sample.

## **Materials and Methods**

### Subject Recruitment and Study Procedures

The study protocol was reviewed and approved by the university's Institutional Review Board as well as by the sports physician who oversees the medical and athletic care of all athletes at the university. Data were collected from a sample of female college students, including athletes and non-athletes in a NCAA Division I University in a Midwestern state of the U.S. between September and November 2013.

Non-athletes (students who were not members of the university official athletic teams) were recruited from six undergraduate classes across campus. The Primary Investigator (PI) obtained approval from the individual instructors prior to subject recruitment. The PI informed interested subjects about the nature of the study criteria during classroom visits. Written informed consents were collected from subjects before data collection began. There was no penalty or incentives to participate in the study. The inclusion criteria for non-athletes included: 1) not being a member of an official university women's athletic team; 2) being recreationally active only (i.e., no training for a significant event, including marathon or half-marathon; 3) being 18 or older.

Female athletes were recruited through certified athletic trainers working with the individual teams. Subjects were informed about the purpose, nature and details of the study by the athletic trainers during a team meeting, without the presence of the coaching staff. A written informed consent form was obtained from each athlete prior to any data collection. Subjects were recruited from all women's athletic teams at the university and included the following nine sports: soccer, cross-country, track and field, basketball, cheer/pom/dance, equestrian, tennis, golf and softball. The inclusion criteria for this sample of subjects included: 1) being a member of an official university women's athletic team; and 2) being 18 or older; and 3) participating in regular team practices and activities at the time of the study (i.e., no recent injuries and illnesses).

The data related to disordered eating behaviors and emotional regulation were collected in a survey format utilizing the Eating Attitudes Test (EAT-26) and the Difficulties in Emotional Regulation Scale (DERS). Subjects also answered demographic questions and were asked to self-report their actual weight, height, and desired weight. Additional questions included topics about the subjects' menstrual cycle, previous ED diagnosis, family history of ED, and exercise-related questions to determine whether subjects met inclusion criteria for the study.

The PI and/or athletic trainers provided an envelope containing the survey and subjects were given approximately 30 minutes to complete it. No personal identifiers linking individual subjects to their responses were included in the survey. Subjects were instructed to place the completed survey in a sealed envelope and return it to the PI or the team athletic trainers. If the PI could not be present during data collection the sealed

envelopes were collected by the athletic trainers or instructors and given to the PI within 24 hours of data collection.

### Research Instruments

The EAT-26 contains three subscales and yields both a global score and individual scores for three subscales: 1) Dieting; 2) Bulimia and Food Preoccupation, and 3) Oral Control (Garner & Garfinkel, 1979). The EAT-26 has been widely used and validated in previous research with various populations ( $\alpha = .90$ ) (Garner, Olmsted, Bohr & Farfinkel, 1982). EAT-26 is scored using six answer options (0 = never, rarely, or sometimes, 1 = often, 2 = usually, and 3 = always). Item number 26 (i.e., “I enjoy trying new foods.”) is analyzed using reversed scoring. A total score of 20 or greater or a “yes” answer to 1 supplemental question identifies the individual at risk for an eating disorder. No risk for eating disorder is identified by a score of less than 20 and “no” answers to all of the supplemental questions (Haase, 2011; Fortes et al., 2014). The Cronbach’s alpha was .88 for the total scale, .87 for the Dieting subscale, .68 for the Bulimia subscale and .60 for the Oral subscale.

Emotional regulation was assessed using the Difficulties with Emotional Regulation Scale (DERS). It is a 36-item self-reported questionnaire developed to assess different dimensions of emotional regulation (Gratz & Roemer, 2004). The DERS includes 6 subscales: 1) Non-acceptance of emotional responses (i.e., “When I’m upset, I feel guilty for feeling that way;” score range of 6-30; 2) Difficulties engaging in goal directed behavior (i.e., “When I’m upset, I have difficulty concentrating;” score range of 5-25; 3) Impulse control difficulties (i.e., “When I’m upset, I lose control over my behaviors;” score range of 6-30; 4) Lack of emotional awareness (i.e., “I am attentive to

my feelings;” score range of 6-30; 5) Limited access to emotional regulation strategies (i.e., “When I’m upset, I believe that I’ll end up feeling very depressed,” score range of 8-40; 6) Lack of emotional clarity (i.e., “I have difficulty making sense out of my feelings,” score range of 5-25. The DERS is scored using five answer options with the following scores (1 = almost, 2 = sometimes, 3 = about half the time, 4 = most of the time, 5 = almost always). Reversed-scoring is used for eleven items as appropriate (Gratz & Roemer, 2004). The total possible score ranges from 36 to 180, with higher scores indicating poorer emotional regulation (Han & Pistol, 2014). Because currently there is no standardized cut off score for emotional regulation, the DERS score is used as a continuous variable or may be compared to mean scores of females from previous research studies (Gratz & Roemer, 2004). The Cronbach’s alpha was .91 for the total DERS, .89 for the Non-accept subscale, .84 for the Goals subscale, .82 for the Impulse subscale, .48 for the Clarity subscale, .81 for the Aware subscale and .80 for the Strategies subscale.

### Statistical Analysis

Descriptive statistics, including means and standard deviations, frequencies and ranges were computed to describe the athletic and non-athletic sub-sample in terms of their demographic and anthropometric characteristics. Furthermore, descriptive statistics served to summarize the prevalence of disorder eating behaviors and symptoms characteristics in the entire sample and within each subsample (athletes vs. non-athletes). The proportion of individuals at-risk for eating disordered (using the EAT-26 cut off score of 20 and answer of “yes” to the supplemental questions) was compared between athletes and non-athletes using Chi-square statistics.

For preliminary analyses, Pearson's bivariate correlations were utilized to explore associations between disordered eating scores (i.e., total and subscale EAT scores) and emotional regulation (total and subscale DERS scores). Analysis of Co-variance (ANCOVA) was conducted to identify potential differences in disordered eating between athletes and non-athletes, while controlling for a family history of eating disorders. Independent t-tests were performed to explore differences between athletes and non-athletes in anthropometric characteristics, disordered eating and emotional regulation.

A linear regression model was utilized to examine potential predictors of disordered eating in the entire sample of female college students. The independent variables in the regression model included a family history of eating disorders, the 6 individual DERS subscales, and the female athletic status (athlete vs. non-athlete). The student status was dummy-coded and dichotomized in order to be included in the regression model (0=athletes; 1=non-athletes). The overall score on EAT-26 served as the dependent variable in this analysis. The statistical analysis for this study was performed using the Statistical Package for Social Sciences (SPSS for PC; 20.0). The level of significance was set at  $p < .05$ .

## **Results**

A total of 572 female college students participated in the study (389 non-athletes and 183 athletes). Thirteen non-athletes returned incomplete surveys and thus were not included in the final analyses (97% completion rate). The participation rate for all eligible female athletes for the study was 83% (151 out of 183 female athletes). The final analyses included 527 subjects with complete data. Female athletes were significantly taller but weighed less than the non-athletes (Table 1). The mean Body Mass Index

(BMI) of both subgroups was within a healthy weight range of 18.5-24.99, but athletes had a significantly lower mean BMI than non-athletes. The detailed characteristics of the subjects are presented in Table 1.

Non-athletes scored significantly higher on the EAT-26 as well as on its three subscales (Table 2). A significantly greater proportion of non-athletes were categorized as “at-risk” for eating disorders compared to athletes (16.5% vs. 6.6%;  $p < .05$ ) (Table 3). ANCOVA revealed that non-athletes scored significantly higher on EAT-26 than athletes even after controlling for a family history of eating disorders ( $p < .001$ ). Non-athletes had greater overall difficulties regulating their emotions than athletes. They scored higher on the total DERS and on the Goals and Strategies subscales (Table 4).

In the entire sample, there was a significant positive correlation between total disordered eating scores and overall emotional regulation scores (Table 5). The DERS subscales, except Aware, were significantly correlated with the Dieting, Bulimia and Food Preoccupation, and Oral Control subscales of the EAT-26. Clarity was not significantly correlated with the Oral scale of EAT-26 but was significantly correlated with the Diet and Bulimia scales.

Family history of eating disorders, emotional regulation (including the six individual subscales) and student status (athlete vs. non-athlete) were tested as potential predictors of disordered eating in a linear regression model. The regression model was significant and predicted 15.4% of total variance in subjects’ EAT-26 scores ( $R^2 = .15$ ;  $F = 11.75$ ;  $p < .001$ ). The athletic status (athletes or non-athletes) and the emotional regulation subscale of Non-accept were found to be significant predictors of disordered eating in the sample ( $p < .001$ ) (Table 6).

## **Discussion**

The purpose of this study was to compare the prevalence of disordered eating between female college athletes and their non-athletic counterparts and to explore emotional regulation as one of the potential predictors of disordered eating in this population. Our findings dispute the hypothesis that female athletes experience a greater rate of disordered eating patterns compared to their non-athletic counterparts (Fortes et al., 2014; Sundgot-Borgen & Torstveit, 2004). The current study is consistent with findings of a handful of previous studies in this area that found the prevalence of disordered eating higher among non-athletes than athletes (Litchfield & Westberg, 2003; Rosendahl, Bormann, Aschenbrenner & Strauss, 2008; Martinsen et al., 2010). Athletes in our sample reported their ideal body weight to be closer to their actual body weight than non-athletes. This study supports the idea that athletes may have lower body dissatisfaction and have overall higher self esteem than non-athletes (Armstrong & Oomen-Early, 2009; Hausenblas & Downs, 2001). Thus, the athletic environment may serve as a protective mechanism against disordered eating.

Emotional regulation was positively associated with disordered eating patterns in our total sample. Our findings are consistent with a few previous studies that have examined emotional regulation in relation to eating patterns. For instance, Han and Pistole (2014) proposed that females who experience trouble identifying emotions are more likely to engage in binge eating behaviors. This study demonstrates that the emotional regulation dimension of Non-accept, which signals individuals' inability to accept emotional responses, may serve as an important predictor of disordered eating in females, especially among non-athletes. A similar trend of emotional regulation



predicting disordered eating was observed in a study of nearly 300 college men (Lavender & Anderson, 2010).

Athletic status served as a significant independent predictor of disordered eating scores in our sample, which indicates that athletic status may be somewhat protective of female college students in regards to disordered eating risks. Although the prevalence of disordered eating in our sample was lower than in some of the previous studies (Thompson & Gabriel, 2004), a relatively high proportion of the female college non-athletes reported a variety of disordered eating symptoms. Because disordered eating behaviors may worsen and may evolve into more serious eating disturbances over time, it is important to identify factors that may serve as protective measures against eating disorders. A study by Scoffier and colleagues (2012) agrees with this statement and explored self-regulation and achievement goals as risk factors for disordered eating.

Given the small number of studies in this area, there is an urgent need to examine specific dimensions of emotional regulation further and identify the mechanisms through which emotional regulation skills may reduce the risk of disordered eating in female college students. The discrepancy in the prevalence of disordered eating in the athletic population versus the non-athletic population could be due to the different assessment methods utilized for measuring disordered eating among studies. Another reason for the discrepancy in literature is the utilization of different samples (i.e., types of sports) (Reinking & Alexander, 2005). Thus, there is a need to further investigate potential correlates and predictors of disordered eating in representative samples of female college students, including athletes and non-athletes (Bonci et al., 2008; McNulty et al., 2001; Smolak, Murnen & Ruble, 2000).

## **Limitations**

The current study has several strengths that include a large sample of female collegiate athletes and non-athletes from a Division I University, and a high participation rate of eligible subjects. Furthermore, utilization of validated assessment tools for disordered eating symptoms and emotional regulation also serves as one of the strengths of the study. An anonymous survey format allowed subjects to disclose behaviors and feelings they may consider uncomfortable and may not have fully disclosed in a one-on-one interview format. The current study also has several limitations that should be noted. First, we utilized a convenience sample of female college students. Although we successfully recruited a large sample, the subject pool does not represent a nationally representative sample of female college students. Geographical, cultural, ethnic and other differences were not accounted for in our study. Some subjects with known eating disorders might have opted out of study participation. A high proportion of the non-athlete population was recruited from nutrition and health related classes. Also data were self-reported and thus, some subjects may not have disclosed truthful information. It is well known that accurate and consistent data on disordered eating are difficult to obtain because individuals may be guarded, may not seek professional help, or deny possible presence of potential disordered eating (Bratland-Sandra & Sundgot-Borgen, 2013; Williams et al., 2003).

## **Conclusions**

This study finds that all young college-age females experience relatively high prevalence of disordered eating symptoms. Screening for disordered eating behaviors for freshman may be beneficial, regardless of student athletic affiliation. Given the negative

impacts of eating disorders on the physical and mental health of young females, routine screenings for disordered eating should be implemented in university settings wherever feasible. While further research is warranted in this area, health professionals working with college female populations should consider including emotional regulation assessment as part of larger screening in order to identify individuals at potentially greater risk of disordered eating. Also, future research should further explore other possible risk factors for disordered eating in order to develop more effective prevention and treatment programs for this vulnerable population of young female students.

Table 1: Anthropometric Characteristics

	<b>Athletes (n=151) Mean ± SD</b>	<b>Non-Athletes (n=376) Mean ± SD</b>
Age (year)	19.50 ± 1	19.83 ± 3
Height (inch)	65.76 ± 3*	65.11 ± 3
Weight(lb)	136.35 ± 22*	141.39 ± 31
BMI <sup>a</sup> (kg/m <sup>2</sup> )	22.11 ± 3***	23.39 ± 5
Perceived Ideal Body Weight (IBW) <sup>b</sup> (lbs)	131.62 ± 19	129.14 ± 19
BMI based on IBW(kg/m <sup>2</sup> )	21.35 ± 3	21.39 ± 3

<sup>a</sup>BMI, body mass index measured by self reported height and weight

<sup>b</sup>IBW, ideal body weight (weight subject felt that would be ideal for them)

\* Indicates a significant difference between athletes and non-athletes (\*\*\*p ≤ 0.001, \* p ≤ 0.05)

Table 2: Scores on the EAT-26 (including 3 subscales) and Distribution of Subjects in At-risk for Disordered Eating Using EAT-26 by Status

	<b>Athletes (n=151) Mean ± SD</b>	<b>Non-Athletes (n=376) Mean ± SD</b>
<b>EAT-26<sup>a</sup></b>	6.86 ± 7.72***	11.77 ± 10.52
Dieting <sup>b</sup>	4.95 ± 6.01***	8.22 ± 7.68
Bulimia <sup>c</sup>	0.55 ± 1.31***	1.08 ± 2.17
Oral Control <sup>d</sup>	1.35 ± 1.80***	2.46 ± 2.86
<b>Score of under 20</b>	141 (93.4%)	314 (83.5%)
<b>Score of 20 or greater</b>	10 (6.6%) *	62 (16.5%)

\*Indicates a significant difference between athletes and non-athletes (\*\*\*p ≤ 0.001, \*p ≤ 0.05)

<sup>a</sup> Range of scores for total EAT-26: 0-78. <sup>b</sup> Range of scores for EAT subscale of dieting: 0-39. <sup>c</sup> Range of scores for EAT subscale of bulimia: 0-6. <sup>d</sup> Range of scores for EAT subscale of oral control: 0-7. Score of under 20 represent no risk for disordered eating. Score of 20 or greater represents at risk for disordered eating.

Significant difference between athletes and non-athletes score of EAT-26 is reported using Chi-square statistics

Table 3: Difficulties in Emotional Regulation Scores (DERS) Between Athletes and Non-Athletes<sup>a</sup>

	<b>Athletes (n=151)</b>	<b>Non-athletes (n=376)</b>
	M ± SD %	M ± SD %
<b>Difficulties in Emotional Regulation (DERS)<sup>b</sup></b>	70.92 ± 17.88 (39%)	75.77 ± 21.75** (42%)
Non-accept <sup>c</sup>	11.52 ± 4.77 (38%)	12.75 ± 5.48 (43%)
Goals <sup>d</sup>	11.96 ± 4.44 (48%)	13.65 ± 5.07 *** (55%)
Impulse <sup>e</sup>	9.83 ± 3.53 (33%)	10.43 ± 4.25 (35%)
Aware <sup>f</sup>	14.70 ± 4.40 (50%)	13.57 ± 4.43 (45%)
Strategies <sup>g</sup>	13.33 ± 5.08 (33%)	15.23 ± 6.49*** (38%)
Clarity <sup>h</sup>	9.58 ± 3.30 (38%)	10.14 ± 3.42 (41%)

<sup>a</sup> Gratz and Roemer, 2004

(\*\*\*p ≤0.001, \* p ≤0.05)

(%) is mean as % of maximum score <sup>b</sup> Range of scores for total DERS: 36-180. <sup>c</sup> Range of scores for the DERS subscale of non-accept: 6-30. <sup>d</sup> Range of scores for the DERS subscale of goals; 5-25. <sup>e</sup> Range of scores for the DERS subscale of impulse; 6-30. <sup>f</sup> Range of scores for the DERS subscale of aware, 6-30. <sup>g</sup> Range of scores for the DERS subscale of strategies: 8-40. <sup>h</sup> Range of scores for the DERS subscale of clarity: 5-25.

Table 4: Correlations Between the EAT-26 and Difficulties in Emotional Regulation Among Female Students (Including Both Athletes and Non-athletes)

	<b>Total EAT-26<sup>a</sup></b>	<b>Diet<sup>b</sup></b>	<b>Bulimia<sup>c</sup></b>	<b>Oral<sup>d</sup></b>
<b>Difficulties in Emotional Regulation Strategies (DERS)<sup>e</sup></b>	.29***	.26***	.31***	.16***
Non-accept <sup>f</sup>	.32***	.27***	.30***	.24***
Goals <sup>g</sup>	.23***	.21***	.21***	.13*
Impulse <sup>h</sup>	.21***	.18***	.26***	.10*
Aware <sup>i</sup>	.03**	.04	.04	-.05
Strategies <sup>j</sup>	.29***	.25***	.32***	.18***
Clarity <sup>k</sup>	.16***	.15*	.18***	.07

<sup>a</sup>Total EAT-26 scores; <sup>b</sup>Diet-dieting subscale; <sup>c</sup>Bulimia-bulimia subscale; <sup>d</sup>Oral- oral subscale. <sup>e</sup>DERS, total scores of DERS; <sup>f</sup>Nonaccept- non-accept subscale; <sup>g</sup>Goals- goals subscale; <sup>h</sup>Impulse- impulse subscale; <sup>i</sup>Aware- aware subscale; <sup>j</sup>Strategies- strategies subscale; <sup>k</sup>Clarity- clarity subscale. (\*\*\*)p ≤0.001, \* p ≤0.05)

Table 5: Regression Analysis Predicting Disordered Eating as a Function of Family History of EDs, Emotional Regulation Difficulties (DERS total and subscales) and Athletic Status

	<b>B</b>	<b>SE B</b>	<b>β</b>
Athletic status <sup>a</sup>	3.81	.924	.172**
Family history of ED <sup>b</sup>	-3.90	2.24	-.071
Non-accept <sup>c</sup>	.422	.103	.223**
Goals <sup>d</sup>	.084	.109	.041
Impulse <sup>e</sup>	-.031	.145	-.013
Aware <sup>f</sup>	-.078	.109	-.034
Strategies <sup>g</sup>	.206	.113	.126
Clarity <sup>h</sup>	-.057	.163	-.019

<sup>a</sup>Student status- athlete or non-athlete ; <sup>b</sup>Reported Family History of Eating Disorders; <sup>c</sup>Nonaccept- non-accept subscale; <sup>d</sup>Goals- goals subscale; <sup>e</sup>Impulse- impulse subscale; <sup>f</sup>Aware- aware subscale; <sup>g</sup>Strategies- strategies subscale; <sup>h</sup>Clarity- clarity subscale. (\*\*\*) $p \leq 0.001$ , \*  $p \leq 0.05$ )

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## APPENDICES

### **APPENDIX A SCRIPT FOR RECRUITMENT (NON-ATHLETES)**

Hi I'm Gena Wollenberg. I am a registered dietitian that works as a sport dietitian here at OSU. I am also working on my PhD in the department of Nutritional Sciences. My area of research is related to eating behaviors among athletes. I am currently looking at eating patterns of college-aged individuals, both athletes and non-athletes. My study focuses on eating patterns and emotional regulation. I am here to invite you to participate in my study.

If you want to participate, you will be asked to fill out a packet with questions about your age, height, weight, eating behaviors, emotions etc. You can do it right now during class, or you can take it home and return it to me in a sealed envelope at the beginning of the next class period-I will be here to collect the packets. If you want to take part, you will need to read the informed consent form that I will pass around right now. Also, sign up with your name and email address if you want to participate so I can reach you if needed. My contact is on the informed consent form. Feel free to contact me with questions or comments. Those of you who don't want to participate, you can leave now (based on the instructors preference).

The questionnaires are quick and include answering yes/no question and scaled questions. The results of this study will not be linked to you. This will not take more than 45 minutes. When you have completed the questionnaires turn them into me in the sealed envelope. If you feel uncomfortable at anytime you can remove yourself from the study.

**APPENDIX A CONTINUED**  
**SCRIPT FOR RECRUITMENT (ATHLETES)**

Hi I'm Gena Wollenberg. I am a registered dietitian that works as a sport dietitian here at OSU. I am also working on my PhD in the department of Nutritional Sciences. My area of research is related to eating behaviors among athletes. I am currently looking at eating patterns of college-aged individuals, both athletes and non-athletes. My study focuses on eating patterns and emotional regulation. I am here to invite you to participate in my study.

If you want to participate, you will be asked to fill out a packet with questions about your age, height, weight, eating behaviors, emotions etc. You can do it right now, or you can take it home and return it to me in a sealed envelope to Human Sciences 301 (Gena Wollenberg's mailbox) or to your athletic trainer. The envelope must be returned within 5 days. If you want to take part, you will need to read the informed consent form that I will pass around right now. Also, sign up with your name and email address if you want to participate so I can reach you if needed. My contact is on the informed consent form. Feel free to contact me with questions or comments. Those of you who don't want to participate, you can leave now (based on the trainer's preference).

The questionnaires are quick and include answering yes/no question and scaled questions. The results of this study will not be linked to you. This will not take more than 45 minutes. When you have completed the questionnaires turn them into me in the sealed envelope. If you feel uncomfortable at any time you can remove yourself from the study.

**APPENDIX B**  
**WAIVER OF DOCUMENTED CONSENT FOR STUDENT PARTICIPANTS**

**PROJECT TITLE:**

Disordered eating symptoms and emotional regulation in college-aged athletes and non-athletes.

**INVESTIGATORS:**

Gena Wollenberg, PhD candidate & Lenka H. Shriver, PhD; Department of Nutritional Sciences, Oklahoma State University (OSU)

**PURPOSE:**

The main purpose of this study is to examine differences in psychological traits and behaviors related to disordered eating between college athletes and their nonathletic counterparts. The second purpose is to explore the relationship between the individual domains of disordered eating and emotion regulation strategies between the two sub-samples and within the sample of female college athletes and the sample of their non-athletic counterparts. Additional purpose of the study was to compare the prevalence of disordered eating in each sub-sample using two existing validated research tools developed for disordered eating assessment, the EAT-26 and the Minnesota Eating Behavior Survey.

**PROCEDURES:**

We are asking you to volunteer to participate in this study because you are a collegiate athlete representing OSU. You must be 18 years of age or older to participate in the study. You sign up for the study using your name and email address. If you agree to participate in the study, you will be asked to sign a written informed consent form and complete three questionnaires related to food and nutrition practices with an additional 3 questions regarding menstruation, in applicable.

You will then be asked to fill out the survey and return the survey in the sealed envelope to Gena Wollenberg. In some cases where time presents an issue you will be asked to return your questionnaire in a sealed envelope to Humans Sciences 301 to place in Gena Wollenberg's mail box.

**RISK OF PARTICIPATION:**

The risk from participating in this study is minimal.



**BENEFITS OF PARTICIPATION:**

The assessments that will be completed are not medical procedures and no medical diagnoses will be made. We will be able to learn more about factors that influence and contribute to disordered eating among college-aged individuals. The results of the study will help identify important dietary issues that need be addressed in order to optimize long-term health. Moreover, specific nutrition recommendations will be made for individuals based on the results of the study. You will have an opportunity to make appointments with the Sports Dietitian to answers any questions or concerns they may have.

**CONFIDENTIALITY:**

We will protect your confidentiality during the project. No identifiers will be used in this study. Your name or other identifiers will not be linked to your surveys. All surveys will be destroyed after two years. Any manuscripts/reports/presentations we prepare from the study will be presented as group data and no individuals will be identified. None of the individual results of the measurements will be shared with your coaching staff. The OSU Institutional Review Board has the authority to inspect consent records and data files to assure compliance with approved procedures.

The participation in the study is voluntary. If you feel uncomfortable while reporting any information, you can choose not to answer any question, or to withdraw completely from the study at any time. A decision to withdraw from the study will not result in any loss of benefits to which you are otherwise entitled.

**CONTACTS:**

If you have questions about the project, please contact Lenka H. Shriver at (405) 744-8285 or [lenka.humenikova@okstate.edu](mailto:lenka.humenikova@okstate.edu), or Gena Wollenberg at (405) 744-2436 or [gena.wollenberg@okstate.edu](mailto:gena.wollenberg@okstate.edu). If you have any questions about your rights as a research participant, you may contact Dr. Shelia Kennison, Institutional Review Board Chair, 219 Cordell North, Oklahoma State University, Stillwater, OK 74078 at (405) 744-3377 or [irb@okstate.edu](mailto:irb@okstate.edu).

**PARTICIPANTS RIGHT & DOCUMENTATION OF INFORMED CONSENT:**

You are voluntarily making a decision whether or not to participate in the research study.

Returning your completed survey in the envelope provided indicates your willingness to participate in this research study.

**APPENDIX B CONTINUED**  
**WAIVER OF DOCUMENTED CONSENT FOR ATHLETE PARTICIPANTS**

**PROJECT TITLE:**

Disordered eating symptoms and emotional regulation in college-aged athletes and non-athletes.

**INVESTIGATORS:**

Gena Wollenberg, PhD student & Lenka H. Shriver, PhD; Department of Nutritional Sciences, Oklahoma State University (OSU)

**PURPOSE:**

The main purpose of this study is to examine differences in traits and behaviors related to disordered eating between college athletes and individuals not involved in NCAA athletic teams. The second purpose is to explore the relationship between eating behaviors and emotional regulation strategies.

**PROCEDURES:**

We are asking you to volunteer to participate in this study because you are a collegiate athlete representing OSU. You must be 18 years of age or older to participate in the study. You sign up for the study using your name and email address. If you agree to participate in the study, you will be asked to sign a written informed consent form and complete a packet containing questions related to your eating attitudes, nutrition practices, emotions, demographics, weight and heights and other topics.

You will be asked to return the packet in a sealed envelope to your athletic trainer or to Gena Wollenberg. In some cases where time presents an issue you will be asked to return your questionnaire in a sealed envelope to Humans Sciences 301 to place in Gena Wollenberg's mail box.

**RISK OF PARTICIPATION:**

The risk from participating in this study is minimal.

**BENEFITS OF PARTICIPATION:**

The assessments that will be completed are not medical procedures and no medical diagnoses will be made. We will be able to learn more about factors that influence and contribute to disordered eating among college-aged individuals. The results of the study will help identify important dietary issues that need be addressed in order to optimize athletic performance of collegiate athletes and their long-term health. Moreover, specific nutrition recommendations will be made for individual types of athletes based on

the results of the study. You will have an opportunity to make appointments with the Sports Dietitian to answers any questions or concerns they may have.

**CONFIDENTIALITY:**

We will protect your confidentiality during the project. No identifiers will be used in this study. Your name will not be linked to your surveys. All surveys will be destroyed after two years Any manuscripts/reports/presentations we prepare from the study will be presented as group data and no individuals will be identified. None of the individual results of the measurements will be shared with your coaching staff. The OSU Institutional Review Board has the authority to inspect consent records and data files to assure compliance with approved procedures.

The participation in the study is voluntary. If you feel uncomfortable while reporting any information, you can choose not to answer any question, or to withdraw completely from the study at any time. A decision to withdraw from the study will not result in any loss of benefits to which you are otherwise entitled.

**CONTACTS:**

If you have questions about the project, please contact Lenka H. Shriver at (405) 744-8285 or lenka.humenikova@okstate.edu, or Gena Wollenberg at (405) 744-2436 or gena.wollenberg@okstate.edu. If you have any questions about your rights as a research participant, you may contact Dr. Shelia Kennison, Institutional Review Board Chair, 219 Cordell North, Oklahoma State University, Stillwater, OK 74078 at (405) 744-3377 or irb@okstate.edu.

**PARTICIPANTS RIGHTS**

You are voluntarily making a decision whether or not to participate in the research study.

Returning your completed survey in the envelope provided indicates your willingness to participate in this research study.

## APPENDIX C

<b>Eating Attitudes Test (EAT-26)</b>						
Age: _____	Current Weight: _____	Highest Weight: _____				
Sex: _____	Lowest Adult Weight: _____	Ideal Weight: _____				
Height: _____						
<b>✓ Please choose one response by marking a check to the right for each of the following statements:</b>	ALWAYS	USUALLY	OFTEN	SOME TIMES	RARELY	NEVER
1. I am terrified about being overweight.	_____	_____	_____	_____	_____	_____
2. I avoid eating when I am hungry.	_____	_____	_____	_____	_____	_____
3. I find myself preoccupied with food.	_____	_____	_____	_____	_____	_____
4. I have gone on eating binges where I feel that I may not be able to stop.	_____	_____	_____	_____	_____	_____
5. I cut my food into small pieces.	_____	_____	_____	_____	_____	_____
6. I am aware of the calorie content of foods that I eat.	_____	_____	_____	_____	_____	_____
7. I particularly avoid foods with high carbohydrate content (e.g. bread, rice, potatoes, etc)	_____	_____	_____	_____	_____	_____
8. I feel that others would prefer if I ate more.	_____	_____	_____	_____	_____	_____
9. I vomit after I have eaten.	_____	_____	_____	_____	_____	_____
10. I feel extremely guilty after eating.	_____	_____	_____	_____	_____	_____
11. I am preoccupied with a desire to be thinner.	_____	_____	_____	_____	_____	_____
12. I think about burning up calories when I exercise.	_____	_____	_____	_____	_____	_____
13. Other people think that I am too thin.	_____	_____	_____	_____	_____	_____
14. I am preoccupied with the thought of having fat on my body.	_____	_____	_____	_____	_____	_____
15. I take longer than others to eat my meals.	_____	_____	_____	_____	_____	_____
16. I avoid foods with sugar in them.	_____	_____	_____	_____	_____	_____
17. I eat diet foods.	_____	_____	_____	_____	_____	_____
18. I feel that food controls my life.	_____	_____	_____	_____	_____	_____
19. I display self-control around food.	_____	_____	_____	_____	_____	_____
20. I feel that others pressure me to eat.	_____	_____	_____	_____	_____	_____

21.	I give too much time and thought to food.	_____	_____	_____	_____	_____	_____
22.	I feel uncomfortable after eating sweets.	_____	_____	_____	_____	_____	_____
23.	I engage in dieting behavior.	_____	_____	_____	_____	_____	_____
24.	I like my stomach to be empty.	_____	_____	_____	_____	_____	_____
25.	I enjoy trying new rich foods.	_____	_____	_____	_____	_____	_____
26.	I have the impulse to vomit after meals.	_____	_____	_____	_____	_____	_____
<b>Behavioral Questions:</b>							
<b>In the past 6 months have you:</b>						<b>Yes</b>	<b>No</b>
A. Gone on eating binges where you feel that you may not be able to stop? (Eating much more than most people would eat under the same circumstances) If you answered yes, how often during the week: _____							
B. Ever made yourself sick (vomited) to control your weight or shape? If you answered yes, how often during the week: _____							
C. Ever used laxatives, diet pills or diuretics (water pills) to control your weight or shape? If you answered yes, how often during the week: _____							
D. Ever been treated for an eating disorder? When: _____							
EAT-26 From: Garner et al. 1982, <i>Psychological Medicine</i> , 12, 871-878; adapted by D. Garner with permission.							

**APPENDIX D**

**Minnesota Eating Behavior Survey (MEBS)**

		TRUE	FALSE
1	I can eat sweets and starches (like potatoes, pasta and bread) without feeling upset or nervous.		
2	I often diet to control my weight.		
3	My stomach is too big.		
4	I eat when I'm upset about things.		
5	I have thought about throwing up (vomiting) to lose weight.		
6	Sometimes I stuff myself with food.		
7	I think a lot about dieting (or losing weight).		
8	My thighs are about the right size.		
9	Sometimes I completely stop eating for more than a day to control my weight.		
10	I feel terribly guilty if I overeat.		
11	I am really afraid of gaining weight.		
12	The shape of my body is fine.		
13	Sometimes I use laxatives (like Ex-Lax or Correctol) to control my weight.		
14	My weight is very important to me.		
15	Sometimes I eat lots and lots of food and feel like I can't stop.		
16	My butt (behind) is too big.		
17	I sometimes use diet pills (Dextrin, dietac or Acutrim) to control my weight.		
18	I'm always wishing I was thinner.		
19	I think a lot about overeating (eating a really large amount of food).		
20	Sometimes I have a hard time telling if I'm hungry or not.		
21	I exercise to control my weight more than other women my age.		
22	My hips are just the right size.		
23	Sometimes, when I'm with other people I won't eat much, but later, when I'm alone, I'll eat a lot.		
24	I feel fat or stuffed even after eating a normal meal.		
25	If I gain a pound I worry that I will keep gaining more and		

	more weight.		
26	Sometimes I make myself throw up (vomit) to control my weight.		
27	Sometimes I eat by myself so that others won't know what I'm eating.		
28	When I get upset, I'm afraid that I will start eating.		
29	I often weigh myself to see if I'm gaining weight.		
30	I sometimes use medicine that makes me lose water (diurectics like Sunril, Aqua-Ban, Pamprin, or Midol PMS) to control my weight.		

## APPENDIX E

### Difficulties in Emotional Regulation Scale (DERS)

1 Almost Never (0-10%)	2 Sometimes (11-35%)	3 About half the time (36-65%)	4 Most of the time (66-90%)	5 Almost Always (91-100%)
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### Difficulties in Emotional Regulation Scale (DERS)

Identifier

Date

Please indicate how often the following 36 statements apply to you by writing the appropriate number from the scale above (1-5) in the box alongside each item.

1	I am clear about my feelings (R)	<input type="checkbox"/>
2	I pay attention to how I feel (R)	<input type="checkbox"/>
3	I experience my emotions as overwhelming and out of control	<input type="checkbox"/>
4	I have no idea how I am feeling	<input type="checkbox"/>
5	I have difficulty making sense out of my feelings	<input type="checkbox"/>
6	I am attentive to my feelings (R)	<input type="checkbox"/>
7	I know exactly how I am feeling (R)	<input type="checkbox"/>
8	I care about what I am feeling (R)	<input type="checkbox"/>



- 9 I am confused about how I feel
- 10 When I'm upset, I acknowledge my emotions (R)
- 11 When I'm upset, I become angry with myself for feeling that way
- 12 When I'm upset, I become embarrassed for feeling that way
- 13 When I'm upset, I have difficulty getting work done
- 14 When I'm upset, I become out of control
- 15 When I'm upset, I believe that I will remain that way for a long time
- 16 When I'm upset, I believe that I'll end up feeling very depressed
- 17 When I'm upset, I believe that my feelings are valid and important (R)
- 18 When I'm upset, I have difficulty focusing on other things
- 19 When I'm upset, I feel out of control
- 20 When I'm upset, I can still get things done (R)
- 21 When I'm upset, I feel ashamed with myself for feeling that way

22 When I'm upset, I know that I can find a way to eventually feel better (R)

23 When I'm upset, I feel like I'm weak

24 When I'm upset, I feel like I can remain in control of my behaviours (R)

25 When I'm upset, I feel guilty for feeling that way

26 When I'm upset, I have difficulty concentrating

27 When I'm upset, I have difficulty controlling my behaviours

28 When I'm upset, I believe there is nothing I can do to make myself feel better

29 When I'm upset, I become irritated with myself for feeling that way

30 When I'm upset, I start to feel very bad about myself

31 When I'm upset, I believe that wallowing in it is all I can do

32 When I'm upset, I lose control over my behaviours

33 When I'm upset, I have difficulty thinking about anything else

34 When I'm upset, I take time to figure out what I'm really feeling (R)

35 When I'm upset, it takes me a long time to feel better

36 When I'm upset, my emotions feel overwhelming

Privacy - please note - this form does not transmit any information about you or your assessment scores. If you wish to keep your results, you must print this document. These results are intended as a guide to your health and are presented for educational purposes only. They are not intended to be a clinical diagnosis. If you are concerned in any way about your health, please consult with a qualified health professional.

Gratz, K.L., & Roemer, E. Multidimensional Assessment of Emotion Regulation and Dysregulation: Development, Factor Structure, and Initial Validation of the Difficulties in Emotion Regulation Scale. *Journal of Psychopathology and Behavioral Assessment*, 26: 1, pp. 41-54

## APPENDIX F

### Oklahoma State University Institutional Review Board

Date: Monday, May 06, 2013  
IRB Application No HE1320  
Proposal Title: Disordered Eating Symptoms and Emotional Regulation in Collegiate Athletes and Non-Athletes  
Reviewed and Processed as: Expedited  
**Status Recommended by Reviewer(s): Approved Protocol Expires: 5/5/2014**

Principal Investigator(s):

Gena Wollenberg 1015 E Franklin Stillwater, OK 74075	Lenka Humenikova Shriver 311 HS Stillwater, OK 74078
--	--

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The IRB application referenced above has been approved. It is the judgement of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

- The final versions of any printed recruitment, consent and assent documents bearing the IRB stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval. Protocol modifications requiring approval may include changes to the title, PI, advisor, funding status or sponsor, subject population composition or size, recruitment, inclusion/exclusion criteria, research site, research procedures and consent/assent process or forms.
2. Submit a request for continuation if the study extends beyond the approval period of one calendar year. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of this research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that the approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect records associated with this protocol at any time. If you have questions about the IRB procedures or need assistance from the Board, please contact Dawnett Watkins 219 Cordell North (phone: 405-744-5700, dawnett.watkins@okstate.edu).

Sincerely,



Shelia Kennison, Chair  
Institutional Review Board

## APPENDIX G

**Table 1 of Appendix G: Difficulties in Emotional Regulation Scores Compared to Average Scores of Women.**

	<b>Athletes (n=151)</b>	<b>Non-Athletes (n=376)</b>	<b>p- value</b>	<b>Athletes &amp; Non-Athletes (n=527)</b>	<b>Average Score of Women<sup>1</sup></b>
<sup>e</sup> <b>DERS</b>	70.92 ± 17.88*	75.77 ± 21.74	.009	74.38 ± 20.81	78
<sup>f</sup> Non-accept	11.52 ± 4.77*	12.75 ± 5.48	.120	12.39 ± 5.30	12
<sup>g</sup> Goals	11.96 ± 4.44***	13.65 ± 5.07	.000	13.17 ± 4.95	14
<sup>h</sup> Impulse	9.83 ± 3.53	10.42 ± 4.25	.103	10.25 ± 4.06	11
<sup>i</sup> Aware	14.70 ± 4.40	13.57 ± 4.43**	.990	13.89 ± 4.44	14
<sup>j</sup> Strategies	13.33 ± 5.08***	15.22 ± 6.50	.000	14.68 ± 6.17	16
<sup>k</sup> Clarity	9.58 ± 3.30	10.14 ± 3.42	.619	9.98 ± 3.40	11

<sup>a</sup>Gratz & Roemer, 2004

(\*\*\*p=≤0.001, \*p=≤0.05)

(%) is mean as % of maximum score <sup>b</sup> Range of scores for total DERS: 36-180. <sup>c</sup> Range of scores for the DERS subscale of non-accept: 6-30. <sup>d</sup> Range of scores for the DERS subscale of goals; 5-25. <sup>e</sup> Range of scores for the DERS subscale of impulse; 6-30. <sup>f</sup> Range of scores for the DERS subscale of aware, 6-30. <sup>g</sup> Range of scores for the DERS subscale of strategies: 8-40. <sup>h</sup> Range of scores for the DERS subscale of clarity: 5-25.

<sup>1</sup>DERS results are compared to mean score of undergraduate women

VITA  
Gena S Wollenberg  
Candidate for the Degree of  
Doctor of Philosophy/Education

**Major Field: Nutritional Sciences**

**EDUCATION**

2014 Ph.D., Nutritional Sciences, Oklahoma State University, Stillwater, OK  
Dissertation Title: *Disordered Eating Symptoms and Emotional Regulation in Female Collegiate Athletes and Non-Athletes*

2008-2009 M.S., Nutritional Sciences, Oklahoma State University, Stillwater, OK

2008 B.A., Nutritional Sciences, Oklahoma State University, Stillwater, OK  
Option: Dietetics and Exercise // Honors Degree // Summa Cum Laude  
Vocational License Completed Concurrently

**POSITIONS HELD**

2013-Present *Consultant*, Professional Referee Organization, New York, New York

2010- Present *Coordinator of Sports Nutrition*, OSU, Stillwater, OK

2012- Present *Adjunct Instructor*, OSU, Stillwater, OK

2007- Present *Nutrition Counselor*, OSU, Stillwater, OK

2013-Present *Clinical Dietician PRN*, Stillwater Medical Center, Stillwater OK

2006- Present *Personal Trainer/Nutrition Counselor*, OSU, Stillwater, OK

2009-2011 *Clinical/Outpatient Dietitian*, Ponca City, OK

**PEER-REVIEWED MANUSCRIPTS**

Shriver LH, Betts NM, **Wollenberg GS**. (2012) Dietary Intakes, and Eating Habits of College Athletes: Are Female College Athletes Following the Current Sports Nutrition Standards? *Journal of American College Health*, 61(1), 10-16.

**PROFESSIONAL MEMBERSHIP**

Academy for Eating Disorders (AED)

Academy of Nutrition and Dietetics

Oklahoma Academy of Nutrition and Dietetics (OkAND)

North Central District Dietetic Association (NCDDA)

Collegiate and Professional Sports Dietitian Association (CPSDA)

Sports, Cardiovascular, and Wellness Nutrition (SCAN)