

Spring 5-5-2016

# Disordered eating behaviors in collegiate athletes

Kelly M. Schatzlein  
*James Madison University*

Follow this and additional works at: <https://commons.lib.jmu.edu/master201019>



Part of the [Dietetics and Clinical Nutrition Commons](#)

---

## Recommended Citation

Schatzlein, Kelly M., "Disordered eating behaviors in collegiate athletes" (2016). *Masters Theses*. 120.  
<https://commons.lib.jmu.edu/master201019/120>

This Thesis is brought to you for free and open access by the The Graduate School at JMU Scholarly Commons. It has been accepted for inclusion in Masters Theses by an authorized administrator of JMU Scholarly Commons. For more information, please contact [dc\\_admin@jmu.edu](mailto:dc_admin@jmu.edu).

Disordered Eating Behaviors in Collegiate Athletes

Kelly Schatzlein

A thesis submitted to the Graduate Faculty of

JAMES MADISON UNIVERSITY

In

Partial Fulfillment of the Requirements

for the degree of

Master of Science and Health Sciences Concentration in Nutrition & Physical Activity

Health Sciences

May 2016

---

FACULTY COMMITTEE:

Committee Chair : Dr. Janet Gloeckner

Committee Members/ Readers:

Dr. Connie Peterson

Dr. Michelle Hesse

## Table of Contents

List of Tables.....	iii
Abstract .....	iv
I. Introduction.....	1
a. Nutrition Standards for athletes.....	2
b. Prevalence of Eating Disorders and Disordered Eating Among Collegiate Athletes.....	4
c. Prevalence of Eating Disorders and Disordered Eating Among Elite Athletes.....	5
d. Sports at Risk for Eating Disorders.....	6
II. Methods and Materials.....	9
a. Procedures.....	9
b. Participants.....	9
c. Demographics and Sports Participation.....	10
d. Disordered Eating.....	11
e. Body Dissatisfaction.....	11
III. Data Analysis.....	12
IV. Results.....	12
V. Manuscript.....	17
VI. References.....	31

## List of Tables

Table 1. Demographic characteristics of athletes representing the different sports groups.....	13,22
Table 2. Scores: high performing and low performing athletes.....	14,23
Table 3. Male and Female scores.....	15,24

## **Abstract**

***Intervention(s):*** Data was collected using an online Qualtrics survey with a number of questions on demographics, sports participation, disordered eating and body dissatisfaction.

***Main Outcome Measure(s):*** Means, standard deviations, and frequencies for all demographic information. Independent t-tests were conducted to compare: differences in disordered eating and body dissatisfaction between higher and lower performers.

***Results:*** Higher performing athletes were not at greater risk of disordered eating or eating disorders ( $P > .05$ ). No significant difference was found between higher and lower performers on EDE-Q average score, BSQ average score, or EDE-Q subscales. There was no difference found among cross-country athletes or swimming athletes. Females had higher scores in each area compared to males. Although gender differences were significantly different, alone, neither female nor male results reported a higher risk for disordered eating in the higher performing athletes.

***Conclusions:*** Based on our findings, sport medicine departments should stress the importance of identifying eating disorders and disordered eating and make every attempt to identify athletes suffering. Future studies should examine which specific athletes in this subgroup are most at risk to provide the care they need.

***Key Words:*** disordered eating, eating disorder, athletes, performance

## Introduction

Eating disorders and disordered eating among athletes has been a topic of growing health concern due to high prevalence rates.<sup>1,2</sup> The reported prevalence of disordered eating and eating disorders in athletic populations ranges from 18 to 45 percent in female athletes and up to 28 percent in male athletes.<sup>3</sup> An eating disorder is a psychological mental disorder characterized by abnormal or disturbed eating behaviors as well as extreme concerns towards body shape or weight.<sup>4</sup> Conceptually and clinically, eating disorders may be described as a continuum ranging from milder forms, disordered eating, to subclinical eating disorders.<sup>5</sup> The four most common subclinical eating disorders as defined by the Diagnostic Statistical Manual of Mental Disorders (DSM-5) are Anorexia Nervosa, Bulimia Nervosa, Binge Eating Disorder, and Other Specified Feeding or Eating Disorders (OSFED).<sup>4</sup>

Most eating disorders typically begin with disordered eating behaviors such as voluntary restriction of food intake. This pattern can progress to chronic dieting and frequent weight fluctuations leading to more pathological eating and weight-control behaviors with or without excessive exercise.<sup>3</sup> The majority of athletes are not clinically diagnosed with an eating disorder but present clinical and subclinical behaviors including body dissatisfaction, distressing preoccupation with weight, use of pathological weight loss methods, and distortions in body shape perception.<sup>6</sup> Risk factors arise when athletes become preoccupied with achieving a low body weight or a perceived “ideal body composition” to compensate for a strong dissatisfaction with body image or discrepancy from the “ideal” sport specific body image.<sup>3</sup> Female athletes not only face the typical social pressures to be thin, which all women in Western culture are exposed to, but they

are also immersed in social context that focuses on their bodies' appearance and performance.<sup>6</sup> The sports environment can heighten body and weight related concerns because of factors such as pressure from coaches, social comparisons with teammates, team weigh-ins, performance demands, physique-revealing uniforms, and competition judging criteria.<sup>6</sup>

For athletes, adequate nutrition is important, not only for maintaining good health and nutritional status, but also for maximizing their athletic performance.<sup>7</sup> Athletes are constantly pushing their bodies to the limit and require a higher energy intake than the general population. Athletes, therefore, may be at high risk for nutritional deficiencies, body image discrepancies, and weight management problems.<sup>7</sup> Hence, it would be important to identify who is at a high risk among collegiate athletes to help provide early intervention and treatment.

### **Nutrition standards for athletes**

Due to the high demands that are placed upon athletes on a daily basis, Dietary Reference Intake values (DRI) for athletes differ from the recommendations set forth for the general healthy population.<sup>7</sup> For athletes, a total of 6-10 g/kg of dietary carbohydrate is suggested to maintain adequate glycogen stores and support training.<sup>8</sup> Protein recommendations range from 1.2 g/kg for endurance athletes to >2.0 g/kg for strength athletes and help to build and repair tissue.<sup>7</sup> Fat guidelines for athletes are consistent with the DRI for healthy people at 20-35% of total energy intake.<sup>7</sup> These are the general guidelines, which can vary depending on the athlete's total energy expenditure, type of sport, sex, and environmental conditions.<sup>8</sup>

Many athletes struggle with meeting the nutritional guidelines for athletes. A recent study found a majority (89%) of athletes fail to meet their estimated energy needs and three-quarters fail to meet their carbohydrate needs.<sup>7</sup> Further a majority reported not consuming breakfast regularly, consuming less than five meals per day, and not monitoring their hydration levels. The results from the study identified that the majority of athletes were not supporting the high physical and nutritional demands needed. As a consequence, athletes are at risk for multiple nutritional inadequacies such as vitamin D, calcium and phosphorous.<sup>9</sup>

A study was done to assess the need in providing nutrition services for college athletes and examined nutritional risks that affect individuals across a variety of athletic teams.<sup>12</sup> A service program with three components: creation of a Sports Medicine Wellness Team, provision of team-based nutrition education programs, and referral of “at risk” student-athletes for individualized counseling and services lasting two years was conducted to respond to the prevalence of nutritional risk and disordered eating among college athletes. Results indicated that in year one almost half of the athletes referred for individualized counseling and services were female with one-third being among lean sports and, over half consisting of disordered eating behavior. In year two 82% were women, and 70% of all visits were for disordered eating.<sup>12</sup>

Although there are nutrition guidelines available for college athletes, they remain vulnerable to nutritional risk because of the rigorous demands of their sport and due to the realities of a college lifestyle.<sup>12</sup>



## **Prevalence of Eating Disorders and Disordered Eating Among Collegiate Athletes**

The literature, to date, is in question as to whether the prevalence of disordered eating and eating disorders is higher in athletes compared to non-athletes.<sup>3, 11,12,13</sup> In a study of 204 female NCAA Division 1 college athletes, about half of the women (54.4%) reported being dissatisfied with their current weight and 88.2 percent believed that they were overweight and wanted to lose weight.<sup>14</sup> Consistent with previous research the most common weight control behavior used was exercise.<sup>13</sup> Further, over one-quarter of athletes were identified as either symptomatic or as having a clinical eating disorder.<sup>14</sup> It is suggested that sport environments, with an emphasis on body size and shape, weight, and physical training, may camouflage disordered eating problems among athletes making identification challenging.<sup>14</sup>

However other studies have not found higher rates of disordered eating and eating disorders among collegiate athletes. On the other hand, when stratified by sport, female athletes in lean sports had greater disordered eating symptoms compared to female athletes in non-lean sports. Differing results may arise from study limitations such as selection bias and assessing only one school, which does not allow for generalizability of findings to other athletes.<sup>12</sup>

Although current literature is mixed regarding the prevalence of eating disorders among collegiate athletes, there is sufficient research suggesting they are at greater risk for eating disorders and disordered eating compared to the general population.<sup>6,11,14,15</sup> Thus, college health professionals should be aware of the frequency athletes develop eating issues and have supports put in place to prevent disordered eating from developing into a more serious mental health condition such as diagnosis of an eating disorder.

## **Prevalence of Eating Disorders and Disordered Eating Among Elite Athletes**

Research indicates that eating disorders are high amongst elite level athletes.<sup>5,6,11,16,17</sup> Elite athletes may be subject to particularly intense pressure to conform to an ideal body shape. Athletes exist in a highly competitive culture, and more and more pressure is being placed on them to manipulate their eating and weight in order to maximize their performance.<sup>16</sup>

A recent study compared body dissatisfaction and disordered eating symptomatology among 320 elite, recreational, and non-competitive female athletes.<sup>6</sup> Results showed elite athletes had significantly greater discrepancies between their current weight and perceived ideal weight, and had a preference for leaner figures compared to non-competitive athletes. Overall, elite athletes had a higher level of body dissatisfaction and greater disordered eating symptomatology compared to non-competitive athletes regardless of the type of sport played.<sup>6</sup> These findings are consistent with prior studies indicating a large proportion of female athletes competing at elite levels experience pressure from coaches to maintain low body weight and lean physiques.<sup>6,11</sup>

Another study examined the percentage of female elite athletes and controls with disordered eating behavior and clinical eating disorders to investigate what characterizes the athletes with eating disorders.<sup>17</sup> Subjects represented the national teams at the junior and senior level and were interviewed face to face. Results showed that more elite athletes in leanness sports, 46.7%, had clinical eating disorders versus athletes in non-leanness sports, 19.8% and controls.<sup>17</sup> Further, a study done by Sundgot-Borgen & Torstveit examined the prevalence of eating disorders in both male and female Norwegian elite athletes and a sample of the general Norwegian population using both a

self-reported questionnaire and clinical interview.<sup>5</sup> Results reported that more athletes than controls, 13.5% versus 4.6%, had subclinical or clinical eating disorders. Further, the study concluded that eating disorders were more prevalent in female than male athletes and among those competing in leanness-dependent and weight-dependent sports.<sup>5</sup>

A study done by Bryne & McLean also examined the prevalence of eating disorders in both male and female elite athletes compared to a control group of non-athletes.<sup>16</sup> A total of 263 Australian elite athletes and 263 non-athletes participated and were interviewed and completed a number of self-report questionnaires. Male and female athletes competing in leanness emphasized sports showed significantly higher prevalence rates of eating disorders and disordered eating habits than the non-athletes. It was concluded that elite athletes do have a higher prevalence rate of eating disorders, however it is not just being an athlete that creates this risk but rather it is athletes competing in sports that emphasize a thin body shape or low body weight who appear to be vulnerable.<sup>16</sup>

### **Sports at Risk for Eating Disorders**

Athletes participating in specific sports may be at an increased risk for disordered eating. According to research, sports such as cross-country, gymnastics and swimming where lean appearance is emphasized are considered to be at high eating disorder risk.<sup>3</sup> In these sports there is often pressure to achieve and maintain low body weights as athletes are under the constant scrutiny of judges.<sup>3</sup> Also, the fact that a thin build promotes better performance causes these athletes to have and want lower weights.<sup>3</sup>

Kong and Harris compared lean vs. non-lean sports among elite, recreational, and non-competitive female athletes.<sup>6</sup> Leanness focused sports included: gymnastics, cheerleading, cycling, long distance running, lightweight boxing, and lightweight rowing. Non-leanness sports were categorized as: ball sports, bat/stick sports, racquet sports, water polo, and heavyweight rowing. Results were as expected indicating that significantly more female athletes competing in leanness focused sports reported engaging in disordered eating patterns compared to female athletes competing in non-leanness sports.<sup>6</sup> Melin, et al looked to explain why eating disorders are more prevalent among lean focused sports.<sup>3</sup> Concentrating solely on aquatic sports: swimming and diving, the study identified risk factors associated with disordered eating including: intense exercise patterns, pressure to achieve a low body weight from coaches, as well as pressure due to vulnerability of tight and revealing swim suits.<sup>3</sup> The study identified that these risk factors led to energy deficiency, reproductive dysfunction, impaired bone health, decreased metabolic rate and increased cardiovascular problems.<sup>3</sup>

Contradictory to the previous two studies, Sanford-Martens, et al, found lean sports were not at greater eating disorder risk.<sup>13</sup> The study examined the prevalence of both clinical and subclinical eating behaviors among NCAA division 1 collegiate athletes as compared to their non-athlete peers and compared prevalence rates between athletes in lean versus non-lean sports. Sports included in the lean category were: cross country, gymnastics, swimming and diving, and wrestling and showed that there was no difference between the lean and non-lean sports. However, there were several limitations to this study that could have affected results. For one, all of the athletes were tested at the same time; which meant the sports were all in different parts of their seasons (offseason vs. in-

season). Further, the questionnaire did not ask non-athletes if they engaged in competitive sports outside of the university. Third, athletes and non-athletes did not match in terms of age, with the mean non-athlete age being older.<sup>13</sup>

Although there is current conflicting research regarding whether lean or non-lean sports are at greater risk for eating disorders, most of the literature supports the notion that lean sports are at an increased eating disorder risk.<sup>6,13</sup>

Currently, research suggests that eating disorders are higher in athletes compared to non-athletes as well as being higher in athletes of lean sports (e.g., cross-country and swimming) versus non-lean sports (e.g., ball sports such as basketball and football).<sup>3,14</sup> However, inconsistent results from the limited research in this area indicates that more research is needed to examine the prevalence of disordered eating and eating disorders in this population. Thus, the purpose of this study was to examine the prevalence of disordered eating amongst higher performing collegiate athletes versus lower performing collegiate athletes. It is hypothesized that due to the high demands placed on high performing athletes, they will be at greater risk for developing eating disorders.

## **Methods and materials:**

### **Procedures**

This research study was approved by the Institutional Review Board at JMU. Using a convenience sample, sixteen Division 1 Universities with cross-country and/or swim teams were contacted. Initial correspondence was conducted by emailing sixteen Division 1 Universities' Athletic Trainers. The recruitment email explained that this cross-sectional study was examining Division 1 cross country and swim athletes nutrition and performance. Athletic Trainers were asked if they would be willing to send the website URL for the online survey to their student-athletes. If Athletic Trainers were on board with their team(s) participating, they were sent directions with how to send the web URL to student athletes in order to complete the online survey.

Data collection took place at the beginning of the fall semester from mid-September and October 2015. Universities that agreed to participate were sent the email with the link to the online survey at this time with instructions to forward the email to their student athletes and encourage participation. The online Qualtrics survey took participants less than 15 minutes to complete. Two weeks after sending the initial email as well as a month after sending the initial email, follow-up emails were sent out.

### **Participants**

Due to the high prevalence rates of disordered eating and eating disorders in lean physique sports, cross-country and swim Division 1 collegiate athletes were chosen to participate in this study.<sup>3,6</sup> Athletes were recruited from 16 Division 1 Universities around the United States using a convenience sample. Athletes ranged from 18-23 years

of age. In the end, 15 Universities participated in the study as one school dropped out. Eighty-eight responses were received, 50 competed in cross-country (n = 30 female, n = 20 male), and 21 competed in swim (n = 18 female and n = 3 male). Seventeen athletes listed “other” for their sport and were excluded from the study. Of the 88 total responses, 26 athletes did not list times for either cross-country or swim, which included all 17 of the “other” sport responses and all were excluded from the study. Further, three athletes did not answer all questions for the EDE-Q and were excluded when analyzing EDE-Q results. A total of 59 athletes were included when analyzing the EDE-Q. Five athletes did not answer all of the BSQ questions and were excluded for the BSQ results. A total of 57 athletes were included to analyze the BSQ.

**Demographics and Sports Participation.** The Qualtrics survey contained a section on demographic information including participant age, gender, ethnicity, and self-reported height and weight. Self-reported height and weight was used to calculate body mass index (BMI) as defined by Center for Disease Control and Prevention.<sup>18</sup> Items also included type of sports participation (cross country or swim), years of participation at the collegiate level, and hours of training in and out of season. To assess performance level, cross-country athletes were instructed to enter their best 5k and 10k times. To assess swim performance level athletes were split into two groups: long distance and short distance. Athletes who competed in short distance races were instructed to enter their best race times for the 100-yard sprint and athletes who competed in long distance races were informed to enter their best race time for the 500-yard race. From this data, the median time for the 5k for cross-country runners and the 100-yard for swimmers was

calculated and used to represent higher and lower performers within each sport. The 5k and 100 yard were chosen because more athletes recorded times for those two respective races and all athletes who listed a 10k or 500 yard time also listed their best 5k and 100-yard time. Athletes were then placed arbitrarily, with those below the median time being the higher performer group and those above the median time being the lower performers.

**Disordered Eating.** Disordered eating was assessed on the survey by using the Eating Disorder Examination-Questionnaire (EDE-Q).<sup>19</sup> The EDE-Q is a self-report version of the Eating Disorder Examination (EDE).<sup>20</sup>, a well-established semi-structured interview for diagnosing eating disorders, and performs similarly well.<sup>20</sup> The EDE-Q focuses on eating disorder symptoms and attitudes from the past 28 days and contains four subscales: restraint, eating concern, shape concern, and weight concern. The subscale scores are averaged to get a total score with higher scores reflecting greater pathology. In addition, the measure includes questions about the frequency of symptoms including binge eating and compensatory behaviors for the past 28 days.<sup>21</sup> A study on the reliability of the Eating Disorder Examination-Questionnaire indicated excellent internal consistency and two-week test-retest reliability for the four subscales of the EDE-Q: Restraint, Weight Concern, Shape Concern, and Eating Concern.<sup>22</sup> Overall, results support good psychometric properties of the EDE-Q.<sup>22</sup>

**Body Dissatisfaction.** Body dissatisfaction was assessed on the survey by using a shortened version of the Body Shape Questionnaire (BSQ). Version 8d consisted of eight total questions. The BSQ is a self-report measure of the body shape preoccupations



typical of bulimia nervosa and anorexia nervosa.<sup>23</sup> All questions are based on a scale of 1-6 with the following interpretations: 1 – never, 2 – rarely, 3 – sometimes, 4 – often, 5 – very often, 6 – always. The higher the score the greater the levels of symptomology. The 8 question shortened versions of the BSQ have been shown to have little loss of internal reliability.<sup>23</sup>

### **Data analysis**

Data was exported from Qualtrics Software 2013 Version of the Qualtrics Suite: the industry-leading provider of Online Survey Software.<sup>24</sup> Statistical Package for the Social Sciences (SPSS) Version 22 was used for data analysis.<sup>25</sup> A probability value of  $p < .05$  for differences between groups was considered statistically significant.

Descriptive statistics were used to describe the sample population.

Means, standard deviations, and frequencies were found for all demographic information. Independent T-test's were conducted to compare: differences in disordered eating behaviors among higher and lower cross-country performers as well as body dissatisfaction between higher and lower performers.

### **Results:**

Descriptive statistics on all athletes in each sport are provided in Table 1. The survey was completed by 88 swim and/or cross-country runners amongst the 15 teams that participated. Ages ranged from 18 years old to 23 years old with a mean of 19.56 +/- 1.35 years old. Athletes were excluded from the study if they did not report a cross-country or swim race time or if they did not complete all questions to the EDE-Q or

the BSQ. A total of 29 athletes were excluded for EDE-Q analysis and 31 athletes were excluded for BSQ analysis. Twenty-six of these athletes were not included due to failing to report swim or cross-country race times. The additional three excluded for the EDE-Q failed to answer all 28 of the EDE-Q questions and the additional five that were excluded for the BSQ failed to complete all eight questions of the BSQ.

**Table 1. Characteristics of athletes representing the higher and lower performing sports groups**

Sport	N	Male	Female	Age	Height (inches)	Weight (pounds)	Years of College
High Performers XC	23	16	9	19.98	67.80	137	2.79
Low Performers XC	23	4	17	19.68	68.51	146.81	2.38
High Performers Swim	8	2	6	18.42	67.38	150.38	1.38
Low Performers Swim	5	1	4	18.38	68.6	155	1.6

Results showed higher performing athletes were not at greater risk of disordered eating or eating disorders compared to lower performing athletes ( $P > .05$ ). No significant difference was found between higher and lower performers on EDE-Q average score, BSQ average score, EDE-Q subscales including: restraint average score, eating concern average score, shape concern average score, or weight concern average score (Table 2). The mean EDE-Q score among all athletes was  $1.74 \pm .69$  and mean BSQ score was  $1.72 \pm .85$ , both considered low risk for an eating disorder.

**Table 2. Scores: high performing and low performing athletes**

<b>SCALE</b>	<b>HIGH PERFORMERS +/- SD</b>	<b>LOWER PERFORMERS +/- SD</b>	<b>P-VALUE</b>
AVERAGE BSQ	1.72 +/- .85	2.27 +/- 1.26	.070
AVERAGE EDE-Q	1.74 +/- .69	2.08 +/- 1.15	.180
RESTRAINT	2.09 +/- 1.18	2.37 +/- 1.68	.465
EATING CONCERN	1.33 +/- .64	1.77 +/- 1.21	.094
SHAPE CONCERN	1.93 +/- .93	2.39 +/- 1.36	.142
WEIGHT CONCERN	1.73 +/- .86	2.14 +/- 1.24	.161

Due to the lack of significance found, further testing was completed. First, sports were evaluated separately. No difference was found between higher and lower performing cross-country athletes on EDE-Q average score, BSQ average score, or EDE-Q subscale scores. The same was found to be true among swimming athletes, no significant difference within any of the scores.

Next athletes were separated by gender, male and female. Differences were found between genders in regards to score differences on questionnaires and subscales (Table 3). It was found that females had higher scores in each area including average BSQ score, average EDE-Q score, weight concern average score, eating concern average score, and shape concern average score compared to males. No significant difference was found between gender and restraint average score.

Due to the lack of significant difference, gender was examined alone to see if within a certain gender, either male or female, scores on the questionnaires were still

significantly different and if females were more prone to disordered eating. It was found that females did not have any significant differences among scores on the questionnaire or subscale of the EDE-Q. The same was found amongst male athletes. Although gender differences were significantly different, alone, neither female nor male results reported a higher risk for disordered eating or eating disorders based on performance level.

**Table 3. Male vs. Female scores**

Scale	Gender	N	Mean	Std. Deviation	P-Value
Average BSQ	Male	21	1.32	.37	.000
	Female	48	2.20	1.13	
Average EDE-Q	Male	28	1.55	.54	.004
	Female	49	2.07	1.02	
Weight concern average	Male	26	1.42	.70	.002
	Female	49	2.10	1.11	
Eating concern average	Male	28	1.21	.49	.014
	Female	47	1.66	1.04	
Shape concern average	Male	27	1.68	.75	.002
	Female	49	2.41	1.22	
Restraint average	Male	28	1.99	1.13	.175
	Female	49	2.46	1.63	

\*Note: N values are different for males and female for each average questionnaire or subscale due to athletes not completing all questions in the survey

Loss of menstruation is often seen in eating-disordered clients. Females who have missed a menstrual cycle scored no different on the EDE-Q, BSQ, and subscales of the EDE-Q. Females with greater missed cycles were not found to be at greater risk for eating disorders.

In terms of BMI and EDE-Q average, BSQ average, eating concern average, weight concern average, shape concern average, and restraint average, no differences were found. The lower the BMI did not relate to a higher score on questionnaires.

In conclusion, higher performers did not report a higher risk of disordered eating/eating disorders versus lower performers. Neither group was at a high risk. Significant difference was found among genders in terms of scores on questionnaires, however, when females and males were separated and observed alone, neither females nor males were found to be more prone to eating disorders or disordered eating.

## **Disordered Eating Behaviors in Collegiate Athletes**

Kelly Schatzlein: ATC, Graduate Student; 1134 Meridian Circle, Harrisonburg, VA

(860)841-4974, [schatzkx@dukes.jmu.edu](mailto:schatzkx@dukes.jmu.edu)

Janet Gloeckner: PhD, RD Program Director of Dietetics James Madison University;

Thesis Advisor; [gloeckjw@jmu.edu](mailto:gloeckjw@jmu.edu)

Michelle Hesse: PhD, RD Assistant Professor; Committee Member; [hessemx@jmu.edu](mailto:hessemx@jmu.edu)

Connie Peterson: PhD, ATC, Professor; Committee Member; [peterscl@jmu.edu](mailto:peterscl@jmu.edu)

**Context:** Eating disorders and disordered eating are a topic of growing health concern due to high prevalence rates.<sup>1,2</sup> Literature has identified which teams are most at risk, but has not looked at the dynamics within these at-risk sports to identify athletes who are at greatest risk.

**Objective:** To investigate if higher or lower performers on cross-country and swim teams are more at risk for eating disorders and disordered eating.

**Design:** Cross-sectional study

**Setting:** Online Qualtrics survey

**Patients or Other Participants:** Cross-country and swim Division 1 collegiate athletes.

Athletes were recruited from 16 Division 1 Universities around the United States.

Athletes ranged from 18-23 years of age.

Eating disorders and disordered eating have been a topic of growing health concern due to high prevalence rates.<sup>1,2</sup> An eating disorder is characterized by abnormal or disturbed eating behaviors as well as extreme concerns towards body shape or weight.<sup>4</sup> The reported prevalence in athletic populations ranges from 18 to 45 percent in female athletes and up to 28 percent in male athletes.<sup>3</sup> The sports environment can heighten body and weight related concerns because of factors such as pressure from coaches, social comparisons with teammates, team weigh-ins, performance demands, physique-revealing uniforms, and competition judging criteria.<sup>6</sup>

The literature, to date, is in question as to whether the prevalence of eating disorders is higher in athletes compared to non-athletes.<sup>3, 11,12,13</sup> In a study of 204 female NCAA Division 1 college athletes, about half of the women (54.4%) reported being dissatisfied with their current weight and 88.2 percent believed that they were overweight and wanted to lose weight.<sup>14</sup> Further, over one-quarter of athletes were identified as either symptomatic or as having a clinical eating disorder.<sup>14</sup> In comparison, a study among 146 female athletes at a Division 1 institution found they were not at greater risk of developing disordered eating symptoms compared to female non-athletes. Differing results may arise from study limitations.<sup>12,13</sup>

Although current literature is mixed, there is sufficient research suggesting athletes are at greater risk for eating disorders compared to the general population<sup>6,11,14,15</sup> Further, research indicates that eating disorders are highest amongst elite level athletes and in sports such as cross-country, gymnastics and swimming where lean appearance is emphasized and there is often pressure to achieve and maintain low body weights.<sup>3,5,6,11,16,17</sup> Thus, college health professionals should be aware of the frequency

athletes develop eating issues and have supports put in place to prevent disordered eating from developing into a more serious mental health condition such as diagnosis of an eating disorder.

Inconsistent results from the limited research in this area indicates that more research is needed to examine the prevalence of disordered eating and eating disorders in this population. Thus, the purpose of this study was to examine the prevalence of disordered eating amongst higher performing collegiate athletes versus lower performing collegiate athletes. It is hypothesized that higher performing collegiate athletes will have a higher prevalence rate of disordered eating than lower performing collegiate athletes.

#### **Methods and Materials:**

Due to the high prevalence rates of eating disorders in lean physique sports, cross-country and swim Division 1 collegiate athletes were chosen to participate in this study.<sup>3,6</sup> Athletes were recruited from 16 Division 1 Universities around the United States. Athletes ranged from 18-23 years of age. In the end, 15 Universities participated in the study as one school dropped out.

Participants completed an online Qualtrics survey with a number of questions on demographics, sports participation, disordered eating and body dissatisfaction. Participant age, gender, ethnicity, and self-reported height and weight were collected. Items also included type of sports participation (cross country or swim), years of participation at the collegiate level, and hours of training in and out of season. To assess performance level, cross-country athletes were instructed to enter their best 5k and 10k times. To assess swim performance level athletes were split into two groups: long



distance and short distance. Athletes who competed in short distance races were instructed to enter their best race times for the 100-yard sprint and athletes who competed in long distance races were informed to enter their best 500-yard race time. From this data, the median time for the 5k for cross country runners and the 100 yard for swimmers was calculated and used to represent higher and lower performers within each sport. The 5k and 100 yard were chosen because more athletes recorded times for those two respective races and all athletes who listed a 10k or 500 yard time also listed their best 5k and 100-yard time. Athletes were then placed arbitrarily, with those below the median time being the higher performer group and those above the median time the lower performers.

Disordered eating was assessed by using the Eating Disorder Examination-Questionnaire (EDE-Q).<sup>19</sup> The EDE-Q is a self-report version of the Eating Disorder Examination (EDE)<sup>20</sup> a well-established semi-structured interview for diagnosing eating disorders, and performs similarly well.<sup>20</sup> The EDE-Q focuses on eating disorder symptoms and attitudes from the past 28 days and contains four subscales: restraint, eating concern, shape concern, and weight concern. The subscale scores are averaged to get a total score with higher scores reflecting greater pathology.

Body dissatisfaction was assessed using a shortened version of the Body Shape Questionnaire (BSQ), Version 8d consisted of eight total questions. The BSQ is a self-report measure of the body shape preoccupations typical of bulimia nervosa and anorexia nervosa.<sup>23</sup> The 8-question shortened versions of the BSQ have been shown to have little loss of internal reliability.<sup>23</sup>

The Institutional Review Board at JMU approved this research study. Initial correspondence was conducted by emailing sixteen Division 1 Universities' Athletic Trainers. The recruitment email explained that this cross-sectional study was examining Division 1 cross country and swim athletes nutrition and performance. Athletic Trainers were asked if they would be willing to send the website URL for the online survey to their student-athletes. If Athletic Trainers were on board with their team(s) participating, they were sent directions with how to send the web URL to student athletes in order to complete the online survey.

Data collection took place during the beginning of the fall semester from mid-September through October 2015. Universities that agreed to participate were sent the email with the link to the online survey at this time with instructions asking them to then forward the email to their student athletes and to encourage participation. The online survey took participants less than 20 minutes to complete. Two weeks as well as a month after sending the initial email, follow-up emails were sent out.

Data was exported from Qualtrics Software 2013 Version of the Qualtrics Suite: the industry-leading provider of Online Survey Software.<sup>24</sup> Statistical Package for the Social Sciences (SPSS) Version 22 was used for data analysis.<sup>25</sup> A probability value of  $p < .05$  for differences between groups was considered statistically significant. Descriptive statistics were used to describe the sample population. Means, standard deviations, and frequencies were found for all demographic information. Independent t-tests were conducted to compare differences in disordered eating behaviors and body dissatisfaction between higher and lower performers.

## Results:

Descriptive statistics on all athletes in each sport are provided in Table 1. The survey was completed by 88 swim and/or cross-country runners amongst the 15 teams that participated. Mean age was 19.56 +/- 1.35 years old. Athletes were excluded from the study if they did not report a cross-country or swim race time or if they did not complete all questions to the EDE-Q or the BSQ. A total of 29 athletes were excluded for EDE-Q analysis and 31 athletes were excluded for BSQ analysis. Twenty-six of these athletes were not included due to failing to report swim or cross-country race times. The additional three excluded from the EDE-Q failed to answer all 28 of the EDE-Q questions and the additional five that were excluded from the BSQ failed to complete all eight questions of the BSQ.

**Table 1. Characteristics of athletes representing the higher and lower sports groups**

Sport	N	Male	Female	Age	Height (inches)	Weight (pounds)	Years of College
High Performers XC	23	16	9	19.98	67.80	137	2.79
Low Performers XC	23	4	17	19.68	68.51	146.81	2.38
High Performers Swim	8	2	6	18.42	67.38	150.38	1.38
Low Performers Swim	5	1	4	18.38	68.6	155	1.6

Results showed higher performing athletes were not at greater risk of disordered eating or eating disorders ( $P > .05$ ). No significant difference was found between higher and lower performers on EDE-Q average score, BSQ average score, EDE-Q subscales including: restraint average score, eating concern average score, shape concern average score, or weight concern average score (Table 2). The mean EDE-Q score among all athletes was 1.74 +/- .69 and mean BSQ score was 1.72 +/- .85, both considered low risk for an eating disorder.

**Table 2. Scores: high performing and low performing athletes**

<b>SCALE</b>	<b>HIGH PERFORMERS +/- SD</b>	<b>LOWER PERFORMERS +/- SD</b>	<b>P-VALUE</b>
AVERAGE BSQ	1.72 +/- .85	2.27 +/- 1.26	.070
AVERAGE EDE-Q	1.74 +/- .69	2.08 +/- 1.15	.180
RESTRAINT	2.09 +/- 1.18	2.37 +/- 1.68	.465
EATING CONCERN	1.33 +/- .64	1.77 +/- 1.21	.094
SHAPE CONCERN	1.93 +/- .93	2.39 +/- 1.36	.142
WEIGHT CONCERN	1.73 +/- .86	2.14 +/- 1.24	.161

Due to the lack of significance found, further testing was completed. First, sports were evaluated separately. No difference was found between higher and lower performing cross-country athletes for EDE-Q average score, BSQ average score, or EDE-Q subscale scores. The same was found to be true among swimming athletes, no significant difference within any of the scores.

Next athletes were separated by gender, male and female. Differences were found between the genders in regards to score differences on questionnaires and subscales (Table 3). It was found that females had higher scores in each area including average BSQ score ( $P = 0.000$ ), average EDE-Q score ( $P = 0.004$ ), weight concern average score ( $P = .002$ ), eating concern average score ( $P = .014$ ), and shape concern average score ( $P = .002$ ) compared to males. No significant difference was found between genders on restraint average score.

Higher and lower performers within a single gender were examined. It was found that females did not have any significant differences among scores on the questionnaire

or subscale of the EDE-Q based on performance level. The same was found amongst male athletes.

**Table 3. Male and Female scores**

Scale	Gender	N	Mean	Std. Deviation	P-Value
Average BSQ	Male	21	1.32	.37	.000
	Female	48	2.20	1.13	
Average EDE-Q	Male	28	1.55	.54	.004
	Female	49	2.07	1.02	
Weight concern average	Male	26	1.42	.70	.002
	Female	49	2.10	1.11	
Eating concern average	Male	28	1.21	.49	.014
	Female	47	1.66	1.04	
Shape concern average	Male	27	1.68	.75	.002
	Female	49	2.41	1.22	
Restraint average	Male	28	1.99	1.13	.175
	Female	49	2.46	1.63	

\*Note: N values are different for males and female for each average questionnaire or subscale due to athletes not completing all questions in the survey

Loss of menstruation is often seen in eating disordered clients. Females who have missed a menstrual cycle scored no different on the EDE-Q, BSQ, and subscales of the EDE-Q. Females with greater missed cycles were not found to be at greater risk for eating disorders.

In terms of BMI and EDE-Q average, BSQ average, eating concern average, weight concern average, shape concern average, and restraint average, no differences were found. A lower BMI did not relate to a higher score on questionnaires.

In conclusion, higher performers did not report a higher risk of disordered eating/eating disorders versus lower performers. Neither group was at a high risk. When split up by gender, a significant difference was found among males versus females, however, when females and males were separated and observed alone, neither females

nor males were found to be more prone to eating disorders or disordered eating based on performance level.

**Discussion:**

The purpose of this study was to expand upon the current literature for identifying those at risk for eating disorders and disordered eating among college athletes and to explore performance level as a potential predictor of disordered eating amongst this population. Literature to date has identified which sports teams are most at risk, but has not taken a look at the dynamics within these at-risk sports to identify which of the athletes have the greatest possibility of developing an eating disorder. Are the high performers under such great pressure to perform from coaches, teammates, and parents that they are more at risk? Or are the lower performers, who may not be getting as much attention, more at risk as they so want to get noticed and perform better? Therefore, the aim of this study was to investigate if higher or lower performers on cross-country and swim teams are more at risk for eating disorders and disordered eating. It was hypothesized that the higher performers on the respective sports teams would be at greater chance for developing eating disorders. However, the results of the study did not support this hypothesis. Instead results showed that higher performers are not more at risk. Since there were no significant differences, further outcomes were investigated including studying sports independently and gender independently and again no significant differences were found among higher and lower performers. These results do not agree with the current literature that elite athletes are most at risk and are unique.

Although no athlete was identified as having an eating disorder and no significant difference was found, the lower performers in the study reported lower scores in each category of the eating disorder questionnaires (refer to Table 2). There could be a few explanations for this. First, due to low participant numbers, the means by which higher versus lower performers was determined was to find the mean time for cross-country 5K's as well as swimming 100K times and then basing performance on whether an athlete, male and female grouped together, was above or below the mean, although this is not truly indicative of actual performance. In addition, most studies published in the literature regarding elite athletes report data on athletes that compete at a level above the collegiate level, which is not true in the current study. On the other hand, a possible explanation for why lower performers could be more at risk is the fact that lower performers are under pressure to perform better. These athletes may not be getting the attention from coaches that they want or may be at risk of losing their scholarship due to bad performances, therefore, they try to improve performance by losing and manipulating their weight. Additional research is needed to determine if higher or lower performers on teams are in fact more at risk for disordered eating and eating disorders.

Several interesting observations were found from the current study. It was identified that seven athletes stopped the survey when the EDE-Q questions were reached and seven stopped at the BSQ questions. This could be important since the total number of participants in the study was only eighty-eight. In the end a total of 59 athletes were included in the study from which to draw conclusions from the EDE-Q. Of those, 57 were included in the study for the BSQ. Therefore, having fourteen athletes, which is

16% of total participants, who did not complete the eating disorder questionnaires could have potentially skewed the results leading to different conclusions.

There is a possibility that the athletes who did not answer the eating disorder questions were the ones that in fact may be suffering from disordered eating or eating disorders. These athletes could have already been exposed to and aware of questionnaires such as the EDE-Q and BSQ and may already know the meaning behind them. Therefore, they may have chosen not to disclose that they do in fact have a problem due to fear that it would be revealed. Or, answering the questions could have made athletes realize what they thought was healthy really was not and they were therefore afraid to continue. Secretive mannerisms are a very common occurrence in regards to eating disorders. It is reported that more than five million Americans suffer from eating disorders.<sup>26</sup> However, it could be argued that these values are underestimated greatly due to the many sufferers who never acknowledge their disorder to themselves, let alone to a healthcare provider.<sup>27</sup> In an attempt to protect one's self-identity and public impressions, it has been shown to be a central feature of decision making to withhold information.<sup>28</sup> One study explored the "double life" of a bulimic by taking a look at how the public actually perceives a bulimic person. A bulimic person may seem outgoing and active to everyone but on the inside they are actually full of shame carrying the burden of secrecy for fear of being exposed for who they really are.<sup>29</sup> Another study looked specifically at the shame and secrecy behind eating disorders. The study showed how participants were able to conceal their eating disorder from colleagues, healthcare professionals and family. Due to this shame and secrecy, many individuals remain undiagnosed for long periods of time.<sup>30</sup>



Further complicating matters, the Athletic Trainers of the participating cross-country or swim teams were the first to be contacted and were asked to reach out to their respective teams regarding the survey. Athletic Trainers, AT's, are health care professionals who collaborate with physicians. The services provided by AT's comprise prevention, emergency care, clinical diagnosis, therapeutic intervention, and rehabilitation of injuries and medical concerns.<sup>32</sup> They are often the first person an athlete will come to with a problem. On the other side, however, an AT may also be a person an athlete wishes to hide an injury or illness from for fear of having to sit out. Therefore, due to the approach of the study, which although it was directly stated in both the email and the survey that it is an anonymous survey, an athlete who knows they have a problem and have yet to reveal it may have chosen not to participate. They may also have been the ones who stopped taking the survey when they reached the eating disorder questions in fear that their Athletic Trainer would learn of their problem. It is a possibility that if these subjects that did not answer all of the questions had actually answered them, the results of this study may have been different and could have revealed multiple athletes with eating disorders.

The current study adds to the knowledge of the complexity of disordered eating amongst athletes. With these observations it is clear that more research is needed on how to identify those suffering from disordered eating and eating disorders due to the secrecy and shame behind the disease. A strength of the current study is the use of validated assessment tools for eating disorder symptoms and having athletes from fifteen universities. Further, this study is the first to identify a potential problem gap in the research and point out that there is still a lot of research needed in order to identify eating

disorders. The current study also has several limitations that should be noted. First, the sample size of the study was very small due to two factors, a university dropping out and several athletes that were not included in the analysis due to not reporting race times or not answering all questions. Therefore, the sample of athletes in the study are not representative of the overall population of Division 1 collegiate swim and cross country athletes. Second, due to the small number of participants in the study the manner in which high and low performers were chosen may not be very indicative of true high and low performance times. Third, due to low participant numbers, male and females were grouped together for the majority of the data analysis. This could have skewed the results due to the fact that male high and low performing times are for the most part much different than female athlete high and low performing times. Therefore, our high performers could be mostly males as they often have the faster times overall. Fourth, when defining higher and lower performers all schools were defined as the same level, not taking into consideration that some schools compete in higher division one conferences than other schools that participated in the study. Due to the lack of research in this specific area of eating disorders, it is clear that more research is needed to allow more comparisons and conclusions.

**Conclusions:**

Higher performing athletes in the sample did not report a higher risk for eating disorders or disordered eating versus lower performing athletes. However, due to small sample size and lack of research in this specific area, additional research is needed in order to draw better conclusions. With all the research regarding the effects of eating disorders among athletes, it is imperative to be able to identify which athletes are at

greatest risk. Sport medicine departments working directly with collegiate athletes should stress this importance and make every attempt to identify athletes suffering from eating disorders and disordered eating. There has been significant research and on-going research that draws the conclusion that lean elite athletes are most at risk for disorders. Therefore, future studies should aim to examine which specific athletes in this subgroup are most at risk in order to provide the care they need and to also have the ability to recognize an incoming athlete that may already have an eating disorder. In doing so, these student athletes can get the help they need to not only deal with their disorder but to learn that there is no shame in revealing their problem and in asking for help.

## References

1. Petrie T.A. (1996). Differences between male and female college lean sport athletes, nonlean sport athletes, and non-athletes on behavioral and psychological indices of eating disorders. *Journal of Applied Sports Psychology*, 8, 218-230.
2. Petrie, T.A., & Rogers, R. (2001). Extending the discussion of eating disorders to include men and athletes. *The Counseling Psychologist*, 29, 743-753.
3. Melin, A., Torstveit, M. K., Burke, L., Marks, S., & Sundgot-Borgen, J. (2014). Disordered eating and eating disorders in aquatic sports. *International Journal of Sport Nutrition & Exercise Metabolism*, 24(4), 450-459.
4. American Psychiatric Association. (2013). Diagnostic and statistical manual of mental disorders (5<sup>th</sup> ed.). Washington, DC.
5. Sundgot-Borgen J. & Torstveit, M.K., (2004). Prevalence of eating disorders in elite athletes is higher than in the general population. *Clinical Journal of Sports Medicine*, 14(1), 25-32.
6. Kong, P., & Harris, L. M. (2015). The sporting body: Body image and eating disorder symptomatology among female athletes from leanness focused and nonleanness focused sports. *Journal of Psychology*, 149(2), 141-160.
7. Shriver, L. H., Betts, N. M., & Wollenberg, G. (2013). 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.  
doi:10.1080/07448481.2012.747526 [doi]
8. Position of the American Dietetic Association, Dietitians of Canada, and the American

College of Sports Medicine: Nutrition and athletic performance.(2009). *Journal of the American Dietetic Association*,109(3), 509-527.

doi:<http://dx.doi.org/10.1016/j.jada.2009.01.005>

9. Tilgner, S.A., & Schiller, M.R. (1989). Dietary intakes of female college athletes: The need for nutrition education. *Journal of the American Dietetic Association*: 89(7), 967-969.
10. Quatromoni, P. A. (2008). Clinical observations from nutrition services in college athletics. *Journal of the American Dietetic Association*, 108(4), 689-694.  
doi:<http://dx.doi.org/10.1016/j.jada.2008.01.008>
11. Muscat, A.C., & Long, B.C. (2008). Critical comments about body shape and weight: disordered eating of female athletes and sport participants. *Journal of Applied Sport Psychology*, 20(1), 1-24. doi: 10.1080/10413200701784833
12. Reinking, M. F., & Alexander, L. E. (2005). Prevalence of disordered-eating behaviors in undergraduate female collegiate athletes and nonathletes. *Journal of Athletic Training (National Athletic Trainers' Association)*, 40(1), 47-51.
13. Sanford-Martens, T., Davidson, M., Yakushko, O., Martens, M., & Hinton, P. (2005). Clinical and subclinical eating disorders: An examination of collegiate athletes. *Journal of Applied Sport Psychology*,17(1), 79-86.

14. Greenleaf, C., Petrie, T. A., Carter, J., & Reel, J. J. (2009). Female collegiate athletes: Prevalence of eating disorders and disordered eating behaviors. *Journal of American College Health* : 57(5), 489-495. doi:10.3200/JACH.57.5.489-496 [doi]
15. Petrie TA, Stoeber S. (1993) The incidence of bulimia nervosa and pathogenic weight control behaviors in female collegiate gymnasts. *Res Q Exerc Sport*;64:238–241.
16. Byrne, S., & McLean, N. (2002). Elite athletes: Effects of the pressure to be thin. *Journal of Science and Medicine in Sport*, 5(2), 80-94.
17. Torstveit, M. K., Rosenvinge, J. H., & Sundgot-Borgen, J. (2008). Prevalence of eating disorders and the predictive power of risk models in female elite athletes: A controlled study. *Scandinavian Journal of Medicine & Science in Sports*, 18(1), 108-118.
18. Center for Disease Control: Healthy Weight, Body Mass Index.  
<http://www.cdc.gov/healthyweight/assessing/bmi/>. Page last reviewed July 1, 2014.
19. Fairburn, C.G., & Belgin, S.J.. (1994). Assessment of eating disorder psychopathology: interview or self-report questionnaire? *International Journal of Eating Disorders*, 16, 363-370.
20. Fairburn C.G., & Copper, Z. (1993). The Eating Disorder Examination (twelfth edition). In: C.G. Fairburn & G.T. Wilson (eds.). *Binge Eating: Nature, Assessment and Treatment*. (pp. 317-360). New York: Guilford Press, 1993.

21. Peterson, C.B., & Mitchell, J.E. (2005). Self-report measures. In J.E. Mitchell & C.B. Peterson (eds.), *Assessment of eating disorders* (pp. 120-128). New York: Guilford Press.
22. Luce, K.H. & Crowther, J.H. (1997). The reliability of the eating disorder examination – Self-Report Questionnaire Version (EDE-Q). *Int J. Eat Disord*: 25(3): 349-51.
23. Cooper, P.J., Taylor, M.J., Cooper, Z., & Fairburn, C.G. (1986). The development and validation of the Body Shape Questionnaire. *International Journal of Eating Disorders* 6: 485-494.
24. Qualtrics software, Version [insert version] of the Qualtrics Research Suite. Copyright © [2015] Qualtrics. <http://www.qualtrics.com>.
25. IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.
26. Academy of Nutrition and Dietetics. Diseases and Conditions. <http://www.eatright.org/resources/health/diseases-and-conditions>. 2016.
27. Jenkins, A (2005). Identifying eating disorders. *British Journal of Nursing*. Vol 14 No. 19. 1034-1038.
28. Afifi, A.W. & Caughlin, J.P. (2006). A close look at revealing secrets and some consequences that follow. *Communication Research*. 33(6): 467-488.
29. Pettersen, G., Rosenvinge, J.H., & Ytterhus, B. (2008). The “Double Life” of Bulimia: Patients’ Experiences in Daily Life Interactions. *The Journal of Treatment & Prevention*. 16:3. 204-211.

30. Ratnaike, D. (2007). Eating Disorders: shame and secrecy. *RCM Midwives*. 11: 43: 156.
31. Lavender, J.M., Anderson, D.A. (2009). Effect of Perceived Anonymity in Assessments of Eating Disordered Behaviors and Attitudes. *International Journal of Eating Disorders*. 42: 546-551.
32. National Athletic Trainers' Association. Athletic Trainers. <http://www.nata.org>. 2015.