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A LONGITUDINAL EXAMINATION OF EATING DISORDERS AND
ASSOCIATED RISK FACTORS IN DIVISION I STUDENT-ATHLETES

BY

NICOLE COURT-MENENDEZ

A thesis submitted in partial fulfillment of the requirements for the

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South Dakota State University

2018

A LONGITUDINAL EXAMINATION OF EATING DISORDERS AND
ASSOCIATED RISK FACTORS IN
DIVISION I STUDENT-ATHLETES

Nicole Court-Menendez

This thesis is approved as a creditable and independent investigation by a candidate for the Master of Science degree and is acceptable for meeting the thesis requirements for this degree. Acceptance of this thesis does not imply that the conclusions reached by the candidate are necessarily the conclusions of the major department.

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ABSTRACT

A LONGITUDINAL EXAMINATION OF EATING DISORDERS AND
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NICOLE COURT-MENENDEZ

2018

CONTEXT: Eating disorders represent a significant concern across multiple populations including collegiate athletes. Risk factors for eating disorders may be amplified in athletes because of internal and external performance and image expectations. Little is known about how these risk factors change over time in collegiate student-athletes.

OBJECTIVE: To longitudinally examine select eating disorder risk factors in National Collegiate Athletic Association (NCAA) Division I student-athletes.

DESIGN: Descriptive longitudinal study.

SETTING: NCAA Division I collegiate athletics.

PARTICIPANTS: Retired Division I collegiate athletes (n=204), ages 18-22, who competed in football, women's soccer, women's volleyball, baseball, men's and women's track and field, men's and women's cross-country, golf, equestrian, tennis, wrestling, men's and women's swimming, men's and women's basketball, and softball.

INTERVENTION(S): All participants completed an annual medical history questionnaire comprised of health information recommended by the National Athletic Trainers' Association (NATA) and NCAA.

MAIN OUTCOME MEASURE(S): Medical health history data was retrospectively analyzed to determine longitudinal changes in mental health, body weight satisfaction,

and social pressure to change weight. The association between these risk factors and self-reported eating disorders was also examined.

RESULTS: Participants were more likely to feel stressed or under pressure their sophomore year compared to their freshman year. Females were more likely to feel stressed than males. Males were less likely to be satisfied with their body weight and more likely to change weight, receive a recommendation to change body weight or eating habits, and have a target weight set. There was no association between body weight satisfaction, mental health, or social pressure to change weight and self-reported eating disorders.

CONCLUSIONS: Eating disorder risk factors including body weight satisfaction, mental health dysfunction, and social pressure to change weight affect males and females differently and can vary based on year in school. Coaches and athlete support personnel should be educated on the nature and longitudinal trajectory of eating disorder risk factors as well as signs of unhealthy behaviors. Clinicians should continue to investigate self-reporting eating disorders and validated measurement tools to provide accurate information relative to eating disorders.

KEY WORDS: Eating disorder, depression, stress, weight satisfaction, social pressure

CHAPTER 1

Introduction

Eating disorders, defined as a spectrum of abnormal and harmful eating patterns used in a misguided attempt to lose weight or maintain a lower than normal body weight,¹ constitute a significant public health concern. Although eating disorders occur in both the general public and athletes, Sundgot-Borgen and Torstveit² found a significantly higher prevalence of eating disorders in an athletic population. In contrast, findings from Di Bartolo³ revealed that collegiate athletes reported fewer eating disorders and more positive body image as compared to collegiate non-athletes.

Despite discrepancies in the prevalence of eating disorders between athletes and the general population, research has identified several consistent risk factors including distorted body image or body weight dissatisfaction, and external or social pressure to change body weight. Additionally, although a causal relationship has been difficult to establish, mental health dysfunction including anxiety and depression has been repeatedly associated with eating disorders.⁴⁻⁵ These risks are amplified in college athletes, who have reported higher levels of depression, preoccupation with body image, and external pressures to maintain a particular weight or image.⁶ Interestingly, both gender and sport can play important roles in terms of risk for eating disorders. Peer pressure and weight dissatisfaction have been linked to eating disorders in female athletes in particular.⁷ Paradoxically, females express the need to build muscle for their sport, especially those in high contact sports, yet desire a “feminine looking” physique in order to fit in.⁸ Sport can also serve as a unique risk factor with a higher rate of eating disorders reported in lean sports,⁹ and greater preoccupation with food reported by athletes in sports maintaining competitive weight requirements.¹⁰ Athletes in sports with an optimal body

shape have reported elevated socio-cultural pressure to maintain a certain shape due to spectator expectations; this makes athletes desire thinness even if they have already achieved a low BMI.⁶ However, athletes in sports such as football may desire weight gain and have more positive attitudes towards eating and weight control. Parks and Read¹¹ reported that male adolescent football players expressed a preoccupation with muscularity and obsession with diet and nutritional supplements. In contrast, cross country runners perceived themselves to be skinny yet reported more negative responses about their body image as well as a desire for more upper body musculature.

Research has also indicated how longitudinal changes may be an important factor to consider when evaluating risk for eating disorders. Over a 7 year period, Liechty et al¹² found that the prevalence of dieting and extreme weight loss behaviors increased in both men and women. Although body image distortion appeared to not be a risk factor for extreme weight loss behaviors or binge eating, it was a risk factor for dieting over the seven years. Furthermore, characteristics at the start of the study were associated with a higher prevalence of dieting and eating pathology seven years later, especially among women. Finally, considering the association between mental health dysfunction and eating disorders,³⁻⁵ Yang and colleagues'¹³ finding of decreases in depressive symptoms from the freshman to senior year in collegiate athletes suggests that longitudinal changes in risk for eating disorders warrants careful consideration. Unfortunately, there remains a significant gap in the literature delineating how risk factors for eating disorders change over time or associate with self-reported eating disorders, in particular in college athletes. Therefore, the purposes of this study are to 1) identify longitudinal changes in body weight satisfaction, social pressure to change weight, and mental health status in Division

I student athletes, and 2) identify the association between these risk factors and self-reported eating disorders.

We hypothesize that eating disorder risk factors will trend negatively over time and that females will be more likely to report elevated risk factors than males.

Furthermore, athletes who report decreased body weight satisfaction, greater social pressure to change body weight, and/or decreased mental health status will be more likely to self-report an eating disorder.

Research Questions

This longitudinal examination of body weight satisfaction, social pressure to change body weight, and mental health status as they relate to eating disorders is based on the following primary questions:

1a. How do Division I collegiate athletes' risk factors for eating disorders change over time based on the following characteristics:

- a. Gender
- b. Sport

2a. To what extent are self-reported eating disorders in Division I collegiate athletes associated with the following risk factors:

- a. body weight satisfaction
- b. social pressure to change body weight
- c. mental health status

CHAPTER 2

Methodology

Participants

Participants in this study were recently-retired student-athletes who participated in football, women's soccer, women's volleyball, baseball, men's and women's track and field, men's and women's cross country, golf, equestrian, tennis, wrestling, men's and women's swimming, men's and women's basketball, and softball at an NCAA Division I university. All student-athletes who completed their NCAA sport eligibility in the Spring of 2017 (n=204) were eligible and participated in this study. Table 1 indicates the overall number of participants by sport, gender, and year in school.

Table 1. Participant Characteristics

Characteristic	Participants n=204
Year in School	
Freshman	69
Sophomore	34
Junior	17
Senior	68
RSSenior	16
Gender	
Female	86
Male	118
Sport	
Baseball	25
Basketball (M)	6
Basketball (W)	5
Equestrian	16
Football	43
Golf (M)	1
Golf (W)	4
Soccer (W)	12
Softball	8
Swimming (M)	11
Swimming (W)	9
Track (M)	20
Track (W)	20
Track/Cross Country (M)	4
Track/Cross Country (W)	4
Volleyball	8
Wrestling	8

Instrumentation

All student-athletes competing in the Division I athletics program at this institution complete an annual medical history questionnaire prior to the start of pre-season training for their respective sport. This nine-page questionnaire was developed based on best-practice evidence and recommendations from the National Collegiate Athletic

Association (NCAA), National Athletic Trainers' Association (NATA), and the Inter-Association Consensus Statement.¹⁴ The questionnaire is used to collect critical health data related to allergies, current medications, family medical history, mental health, nutrition and diet, and past injuries. The medical history questionnaire also includes questions designed to assess for risk of eating disorders including body weight satisfaction (ie are you happy with your weight), social pressure to change weight (ie has someone ever set a target weight for you or subjected you to routine weigh ins), or mental health dysfunction (ie do you feel stressed or under pressure). Table 2 indicates questions related to eating disorder risk factors and additional relevant information analyzed for purposes of this study. Before analysis of the health history questionnaire the university's Institutional Review Board reviewed the research design and approval was obtained to conduct this study (IRB-1705012-EXM).

Table 2. Eating Disorders and Associated Risk Factors

Condition or Risk Factor	Medical History Question
Mental Health	Are you now or have you ever been under the care of a psychiatrist or psychologist?
	Do you feel stressed or under pressure?
	Do you feel sad or depressed?
Body Weight Satisfaction	Are you happy with your weight?
	Are you trying to gain or lose weight?
	Gain or lose?
Social Pressure to Change Weight	Has anyone ever recommended that you change your weight or eating habits?
	Who?
	Has someone ever set a target weight for you or subjected you to routine weigh-ins?
Eating Disorder	Have you ever been diagnosed with an eating disorder?
	Do you think you might have an eating disorder?

Procedure

Medical history data spanning the 2012-2017 sport seasons was retrospectively analyzed for this study. Institutional Review Board approval was obtained prior to the analysis of this data. Data was retrieved from archived storage where hard copies of medical history questionnaires are kept on all athletes for 10 years' post-sport retirement. Responses to select questions related to the purposes of the study were entered into a

spreadsheet for data analysis. All athletes whose athletic career ended in 2017 were included in the study.

Data Analysis

Logistic regression models were used to determine the associations between the outcome measures and predictors. Associations were reported as odds ratios and their associated 95% confidence intervals. The modeling procedure included initial modeling in a bivariate manner to determine potential significance. All models reaching a significance of $p < 0.2$ were then tested in multivariate models. Those models were then built in a stepwise manner in which the least significant variable was removed each time until all variables in the model reached significance. When this occurred, each variable that was dropped was then added back in one at a time and removed if it did not reach $p < 0.05$. Final interpretation of statistical models included confidence intervals and any confidence interval that did not include 1 was considered significant at $\alpha = 0.05$.

CHAPTER 3

Results

Descriptive statistics

Participants in this study (male n=118; females n=86) represented 17 different sport teams (Table 1). At the time of sport retirement, participants ranged in age from 18-22 years, with participants competing in the athletics program an average 2.64 years (range = 1 to 5).

Risk Factors for Eating Disorders

Relative to mental health, males were less likely to feel stressed than females (OR=0.17, p=0.001, 95% CI = 0.08, 0.32). Participants as a whole were more likely to feel stressed or under pressure their sophomore year compared to their freshman year (OR=1.80, p=0.047, CI = 1.01, 3.22). There were no significant differences in feelings of sadness or depression, or likelihood to be under the care of a psychiatrist or other mental health professional, over time based on gender or sport.

Compared to females, males were less likely to be satisfied with their body weight (OR=1.06, p=0.051, 95% CI = 0.19, 1.00) and were also more likely to be changing their weight (OR=11.16, p<0.001, 95% CI = 3.76, 33.12). The majority of males who reported trying to change their body weight were attempting to gain (75%). Of females who reported trying to change their weight, 14% were attempting to gain while 30% were attempting to lose when looking at athletes that reported trying to change their weight. Males were also more likely to have received a recommendation to change their body weight or eating habits (s (OR=6.30, p=.01, 95% CI = 1.54, 25.69), in particular sophomores. Based on sex by visit interaction, a significant number of sophomore males who had received a recommendation to change their weight or eating habits reported that

the recommendation came from a coach. Furthermore, males were more likely than females to have a target weight set for them (OR=59.94, $p < 0.001$, 95% CI = 8.62, 416.57). Overall, athletes in their 4th year were more likely to have a target weight set than any other year (OR=8.55, $p = .005$, 95% CI = 1.91, 38.23).

Association Between Risk Factors and Self-Reported Eating Disorders

We were unable to determine an association between body weight satisfaction, social pressure to change weight, or mental health status since only 2 individuals reported that they may have an eating disorder.

CHAPTER 4

Discussion

Our results indicated that there were no significant differences in feelings of sadness or depression, or likelihood to be under the care of a psychiatrist or other mental health professional, over time based on gender or sport. However, males were less likely to feel stressed than females. These findings provide partial support for our hypothesis that females would report higher levels of mental health dysfunction than males throughout their athletic participation. Our results also corroborate those of Wolanin and colleagues¹⁵ who examined the prevalence of clinically elevated depressive symptoms in college athletes; their results indicated that 23.7% of their participants reported clinically relevant levels of depressive symptoms with females having a higher prevalence than males at 28.1% vs 17.5% respectively. When divided by sport and gender, female and male track and field athletes were at the highest risk.

Findings from our study also indicated that the greatest number of participants reported feeling stressed during their sophomore year. Yang and colleagues,¹³ whose results revealed that college athletes reported their highest depressive symptoms during the freshman year, contrasts with our work. The difference in these results could stem from the measurement of different constructs (stress v/s depression) or potentially different stressors between freshman and sophomore years. Freshmen may report higher levels of stress as they acclimate to life as a college student whereas sophomores may be more prone to stress due to increased expectations to contribute to team success. The difference between our results and those reported by Yang et al could also emanate from differing coping styles or coping resources. Freshmen may lack the coping resources, in

particular social support, that sophomores and older have had time to develop. However, our results may indicate that coping resources may not have been sufficient to overcome the physical and psychological demands incurred during the sophomore year.

We also hypothesized that fewer females as compared to males would report satisfaction with their body weight. However, our results revealed that males were significantly less likely to be happy with their weight, and more likely to be trying to change their weight, than females. These findings contrast with those of Liechty and colleagues,¹² whose findings of a higher prevalence of dieting and weight loss behaviors over a 7 year period in females as compared to males, suggests a lower degree of body weight satisfaction in females. Our findings relative to male body weight dissatisfaction could be explained in part by the participant pool which was comprised of a substantial number of football participants and few cross-country. Previous research has indicated that male football players desired to weigh more while cross-country runners wanted to weigh less, presumably to gain a competitive advantage.¹¹

The majority of males attempting to change their weight in our study were trying to gain (75%). By comparison, Furnham et al¹⁶ found that 36.1% of males wanted to be heavier while 42.8% wanted to be lighter. Meanwhile, Furnham and colleagues¹⁶ reported that 8.1% of females wanted to be heavier and 74.6% wanted to be thinner. This finding in particular contrasts with our results which indicated that the majority of participants (56%) were satisfied with their current weight. However, the 30% of female participants in our study who were trying to lose weight is concerning and could reflect the make-up of our participant pool. Most of the females in our study were track and

equestrian athletes. Literature has found that these groups, as well as most aesthetic athletes, try to be thinner for their events and are at higher risk for disordered eating.^{17,18}

Results from our study also revealed that males, sophomores in particular, were more likely to have someone recommend that they change their weight or eating habits. The majority of these individuals were told to do so by a coach. Furthermore, males were more likely to have a target weight set for them than females, while athletes in their 4th year were more likely to report this than any other year. These findings were not consistent with our hypothesis that females would be more likely to experience heightened social pressure to change their weight.

Our results support those of Galli and colleagues¹⁹ who investigated weight pressures in male athletes and found that social pressures were a more extreme factor for weight changes in males compared to females. Furthermore, a majority of participants in our study were football players which also supports Parks and Read's findings,¹¹ indicating the likelihood of this particular subset of athletes to experience pressure to gain weight.

These results are important on several fronts. First, the pressure to change body weight could have served as a source of stress for participants as evidenced by the increased reports of stress found during the sophomore year. Failure to mitigate potential pressure created by recommending body weight changes could negatively influence social relationships, athletic performance, or even academic performance.²⁰ Second, as noted by Gaines and associates,⁷ peer pressure has been shown to positively predict disordered eating behaviors and negatively predict self-esteem and body image perceptions. Although peer pressure to change weight did not seem to predominate in

our study, the pressure to change weight could affect athletes' long term body weight satisfaction or overall health. Retired athletes that were formerly pressured to lose weight may face an unhealthy relationship with food due to the internal pressure to look like they did when they were competing. In addition, retired athletes that were formerly under pressure to gain weight could face long term effects of obesity. Weight gains, if excessive, could also lead to other health problems such as osteoarthritis or cardiovascular deficiencies. Baron and colleagues²¹ reported that retired National Football League players that had a BMI of greater than 30 were at an increased chance of cardiovascular mortality. Athletes that are told to gain weight, especially football players, could be at risk for these issues if they don't get down to a healthier weight after graduation.

As only two athletes reported concerns of having an eating disorder, we were unable to determine if there was an association between eating disorders and mental health status, body weight satisfaction, or social pressure to change weight. The fact that only 2 athletes reported having concerns over possessing an eating disorder could be explained by a number of factors including underreporting.^{22,23} Compared to the .9% prevalence reported in our study, findings from Johnson et al's²² study of 11 Division I schools revealed that 13% of athletes suffered from some type of disordered eating. Additionally, this institution's sports medicine staff collects the medical history questionnaires at the beginning of each year to identify each athletes' injury and illness risk. As such, some athletes may not answer the eating disorder questions honestly for fear that their answers will disqualify them from competition. Wolanin and associates²⁴ reported similar challenges with underreporting when investigating the prevalence of and

risk factors for depression. The authors surmised that athletes tend to portray psychological strength when being assessed for depression symptoms. Miracle et al²⁵ also cited underreporting of disordered eating on pre-participation physical examinations as problematic, noting that participants may report honestly if they knew their responses would be used only for research purposes.

Participants' lack of knowledge regarding what constitutes an eating disorder could also have led to the low prevalence of reported eating disorders found in our study. While the medical history questionnaire in this study was developed based off of recommendations from the National Athletic Trainers' Association, National Collegiate Athletic Association, and the Inter-Association Consensus Statement,¹⁴ the lack of depth or condition description may hinder accurate reporting of a variety of conditions including eating disorders.

Regardless of the reason, the lack of an association found in our study between diagnosed eating disorders and select eating disorder risk factors stands in stark contrast to the healthy dose of literature that supports this association. While Shanmugam and colleagues'²⁶ results indicated that athletes' depressive symptoms didn't predict their eating psychopathology, eating psychopathology did predict depressive symptoms six months later. This particular finding highlights the challenge of understanding causation between eating disorders and mental health dysfunction. Literature has also clearly implicated the role that social pressure and body weight satisfaction can have as risk factors for eating disorders, including in college athletes.^{7,16} Although our results did not reveal an association, the available literature supports the necessity of effectively

monitoring social pressure, body weight satisfaction, and mental health as a means of lowering risk for eating disorders in college athletes.

Limitations

This retrospective study focused on a convenience sample of participants from a single Division I university, thus, our results may not be representative of all college student-athletes. Furthermore, due to graduation we were unable to talk to participants if we needed clarification on existing data. Data was collected from the participants at singular points in time. As such, fluctuations in mood, stress levels, or daily hassles could have influenced our results. In addition, even though participants had to compete for a minimum of 2 years to be included in the study, not all participants competed for the same number of years which could have affected the results. This study was limited by the use of a non-validated measurement tool which could lack adequate descriptors or sensitivity and specificity for clinical utility. Furthermore, the self-report nature of this instrument could have limited honest participant responses for fear of being disqualified from competition. Finally, while the structure of the medical history questionnaire has remained largely consistent, slight question modifications were made over time to the instrument's current form.

Conclusions

Males were less likely to feel stressed than females and more likely to feel stressed or under pressure their sophomore year compared to their freshman. Males were less likely to be satisfied with their body weight and were also more likely to be changing their weight. The majority of males who reported trying to change their body weight were attempting to gain. While the majority of females expressed satisfaction with their body

weight, most of those who expressed dissatisfaction were attempting to lose weight. Males were also more likely to have received a recommendation to change their body weight or eating habits, in particular sophomores; most recommendations came from a coach. Furthermore, males were more likely than females to have a target weight set for them; athletes in their 4th year were more likely to have a target weight set than any other year.

Based on our findings, sports medicine professionals in the collegiate setting should implement annual educational programming for coaches and athletes aimed at improving participants' knowledge of eating disorders and the influence of risk factors including mental health, social pressure, and body weight satisfaction. This educational programming should include common signs and symptoms of eating disorders and emphasize honesty in reporting. While annual medical history questionnaires may serve as a foundational starting point for gathering important health-related data, clinicians in the collegiate setting should evaluate the efficacy of utilizing validated measures to assess for eating disorders and associated risk factors.

Future research efforts should be directed at investigating differences in male and female mental health and body weight satisfaction, along with exposure and response to social pressure to change body weight. Furthermore, longitudinal changes in eating disorder risk factors, in particular comparing collegiate athletes to non-athletes, warrants further investigation. Current literature comparing athletes and non-athletes contrasts on which group is at higher risk for eating disorders. Moreover, the majority of available studies only look at a certain point in time and do not follow the changes and challenges students face through college. Future research efforts should examine rates of depression

and eating disorder underreporting as well as barriers to reporting these conditions.

Finally, additional research should be produced that focuses on collegiate athletes from different divisional classifications to determine if certain classifications yield a higher volume of reported eating disorders or differences in associated risk factors.

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