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Eating Disorder Symptoms On Female Collegiate-Level Athletes And Non-Athletes

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EATING DISORDER SYMPTOMS ON FEMALE COLLEGIATE-LEVEL ATHLETES AND NON-ATHLETES

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Abstract

In previous research, it found that the risk of developing an eating disorder (ED) is much higher in females compared to males (Dunca, Ziobrowski & Nicol, 2017; Raevuori, Keski-Rahkonen, & Hoek, 2014; Lewinsohn, Seeley, Moerk, & Striegel-Moore, 2002). Similarly, research has shown that the prevalence of EDs is much higher in female athletes compared to male athletes (Johnson, Powers, & Dick, 1999). Despite the risk of developing an ED being higher in females, research has not provided a strong understanding about the prevalence of EDs comparing female student-athletes and female student non-athletes. There is research that shows that athletes may have a lower risk of developing an ED (Hausenblas & McNally, 2004; Sanford-Martens et al. 2005; DiBartolo & Shaffer, 2002), in contrast, there is research that shows athletes may have a higher risk of developing an ED (Torstveit, Rosenvinge & Sundgot-Borgen, 2007; Greenleaf, Petrie, Carer & Reel, 2009). The goal of this study was to address this gap in literature and investigate whether there was a difference on ED symptoms and body image concerns among athletes and non-athletes. Additionally, this study aimed to to further understand how sociocultural factors impact female athletes and non-athletes differently. 71 women (34 athletes) responded to survey data and two analyses of covariance (ANCOVA) were conducted to test whether there was a difference between groups. This study found that there were no significant differences on ED symptoms between groups, but there were differences on the societal influence on eating disturbances and body image. Particularly, there were differences that suggest that female athletes may internalize and feel more pressure to meet the standards of appearance set by society and culture.

Keywords: eating disorders, college students, female student-athletes

Introduction & Literature Review

Eating disorders are defined by the American Psychological Association (APA, n.d.) as abnormal eating habits that can threaten one's health and/or life. According to the National Eating Disorders Association (NEDA, n.d.-a), in the United States it is approximated that at least 30 million people struggle with EDs, 20 million being women and 10 million being men. Particularly, in the United States, the literature is showing that the prevalence of EDs has increased among individuals who are attending college, with an increase of EDs from 23% to 32% among females from 1995 to 2008 (White, Reynolds-Malear & Cordero, 2011). In 2011, a national survey of the United States found that 8% to 17% of college students had a current diagnosis of an ED (Eisenberg, Nicklett, Roeder & Kirz, 2011). In this same survey, researchers found that 20% of respondents who were college students believed that they had an ED at some point in their life (Eisenberg, Nicklett, Roeder & Kirz, 2011). There is not a specific cause for the development of an ED in an individual and there are many elements that can play a role in the development, such as ones' environment, genetics, personality traits and trauma (NEDA, n.d.-b). The statistics shown above are a small illustration of the prevalence of EDs in the United States as well as the prevalence among the female college student population.

Within the college population there is a lack of attention on the prevalence of EDs among individuals who are participating in college sports. The current research about the relationship between ED risk and sports participation among female college athletes is conflicting (Hausenblas & McNally, 2004; Torstveit, Rosenvinge & Sundgot-Borgen, 2007). Previous literature shows that athletes may have a lower risk of developing an eating disorder (Hausenblas & McNally, 2004; Sanford-Martens et al. 2005; DiBartolo & Shaffer, 2002), and in contrast,

literature also shows athletes may have a higher risk of developing an eating disorder (Torstveit, Rosenvinge & Sundgot-Borgen, 2007; Greenleaf, Petrie, Carer & Reel, 2009).

Eating Disorder Symptoms

In the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (American Psychiatric Association [APA], 2013) there are eight disorders in the category of Feeding and Eating Disorders. These disorders are Pica, Rumination Disorder, Avoidant/Restrictive Food Intake Disorder, Anorexia Nervosa, Bulimia Nervosa, Binge-Eating Disorder, Other Specified Feeding or Eating Disorder, and Unspecified Feeding or Eating Disorder (APA, 2013). The most common EDs are anorexia nervosa, bulimia nervosa and binge-eating disorder (National Association of Anorexia Nervosa and Associated Disorders [ANAD], n.d.). For the purpose of this literature review, there will be a focus on these three most common eating disorders.

According to the DSM-5, the central diagnostic criteria for anorexia nervosa is characterized by (1) restriction of energy intake related to requirements that lead to significant low body weight for an individual; (2) intense fear of gaining weight and (3) disturbance in the way an individual's body weight or shape is experienced and/or lack of recognition of the seriousness of the low body weight (APA, 2013). Additionally, the DSM-5 states two subtypes of anorexia nervosa, the restricting type and the binge-eating/purging type.

Next, the main diagnostic criteria in the DSM-5 for bulimia nervosa are characterized by (1) recurrent episodes of binge-eating; (2) recurrent compensatory behavior to prevent weight gain such as using laxatives, diuretics, self-induced vomiting and others and (3) binge-eating and compensatory behaviors occur at least once a week (APA, 2013). To add, there are specifiers for the severity of the disorder illustrated by the term's mild, moderate, severe, and extreme. These specifiers illustrate the intensity and frequency of compensatory behaviors (APA, 2013).

To continue, the DSM-5 states that a binge-eating disorder is characterized by recurrent episodes of binge-eating such as, (1) eating during a discrete period of time that is significantly larger than most people would eat in a similar period of time and/or (2) a sense of lack of control overeating during the episode (APA, 2013). Individuals who present with a binge-eating disorder, do not show compensatory behaviors or other symptoms related to the course of anorexia nervosa or bulimia nervosa (APA, 2013).

These three EDs, specifically anorexia nervosa and bulimia nervosa are the most common EDs that occur in young women, especially in Western countries (Sharan & Sundar, 2015). Finally, EDs have one of the highest mortality rates of psychiatric disorders (Sharan & Sundar, 2015), and thus should further the importance of gaining more information about protective and risk factors against the development of an ED.

Prevalence of Eating Disorders among Female Athletes in College

College students' face many demands and stressors such as academics, homesickness, transitioning into a college setting, social networks, finances, heavy workloads and housing (Hamaideh, 2011). Along with this, student-athletes can have additional unique stressors such as being in the sports environment, which can increase the demands of a student and create a larger variety of stressors that a student may face. These specific demands can include pressure from coaches, performance demands, team weigh-ins, comparison to teammates, and more (Greenleaf, Petrie, Carter & Reel, 2009).

In general, it is found that the risk of developing an ED is much higher in females compared to males (Dunca, Ziobrowski & Nicol, 2017; Raevuori, Keski-Rahkonen, & Hoek, 2014; Lewinsohn, Seeley, Moerk, & Striegel-Moore, 2002), and researchers have found that the prevalence of EDs is much higher in female athletes compared to male athletes (Johnson,

Powers, & Dick, 1999). Despite the risk of developing an ED being higher in females compared to males, among female college students, research has not provided a strong understanding about the prevalence of eating disorders comparing female student-athletes and female student non-athletes. There is research that shows that athletes may have a lower risk of developing an eating disorder and participating in sports provide protective factors against the development of an ED (Hausenblas & McNally, 2004; Sanford-Martens et al. 2005; DiBartolo & Shaffer, 2002). In contrast, there is research that shows athletes may have a higher risk of developing an eating disorder and participating in sports may increase risk factors in the development of an ED (Torstveit, Rosenvinge & Sundgot-Borgen, 2007; Greenleaf, Petrie, Carer & Reel, 2009).

In a study including female student-athletes of 3 NCAA Division I schools, 53.4% of women reported being dissatisfied with their current weight, and of those women, 88.2% believed that they were overweight (Greenleaf, Petrie, Carer & Reel, 2009). In the same study, researchers found that 25.5% of participants said they exercised at least 2 hours a day specifically to burn calories, 2.94% vomited at least 2 to 3 times a month, and 15.69% fasted or went on strict diets at least 2 times in the past year. Although many participants reported being dissatisfied with their current weight and some participants had symptoms of EDs, it was found that the majority of female athletes were asymptomatic for EDs and engaged in healthy eating behaviors. This research also found that of the athletes that presented with EDs, 92% were showing symptoms of a binge-eating or bulimia nervosa disorder, with only 2 athletes that were related to anorexia nervosa (Greenleaf, Petrie, Carer & Reel, 2009). These results suggest that female athletes may be more likely to develop a binge-eating or bulimia nervosa disorder compared to developing anorexia nervosa.

Similarly, Sanford-Martens, Davidson, Yakushko, Martens & Hinton (2005) looked at clinical and subclinical EDs among non-athletes and NCAA Division I athletes who were recruited from nine different sports. This study found that in both groups of athletes and non-athletes, females were 3.23 times more likely to show clinical symptomology for an ED compared to males (Sanford-Martens et al., 2005). It also found that 5.1% of female athletes had EDs and 14.5% presented with symptoms that are marked as ED symptoms in the DSM-5. It is clear that female athletes' have a risk of developing an ED, but it is unknown if it is due to participation in sports or due to other factors.

Continuing, a recent study on nutritional habits of female college athletes (N=77), researchers found that 32.5% of female athletes had eating disorders according to the Eating Attitudes Test-26 (Canbolat & Çakıroğlu, 2020). To add, the researchers found that the most common response for reasons for skipping a meal was "a lack of time", but the results also found that 6% of respondents answered that a reason for skipping a meal was "to have a slim body". In general, this study illustrated many different factors that played a role in eating behaviors among athletes with one factor being a strong interest in a fit and thin appearance. Other factors were social changes (i.e. moving to dormitories), lack of time and economic situations (Canbolat & Çakıroğlu, 2020).

Overall, the research has not provided a clear understanding if there is a relationship between the participation of sports and the development of an ED among female athletes. There is research that has suggested that females participating in sports do not increase the risk of developing an ED and instead, may provide protective factors against the development (Hausenblas & McNally, 2004; Sanford-Martens et al. 2005; DiBartolo & Shaffer, 2002); and there are other pieces of research has shown that females participating in sports do increase the

risk of developing an ED (Torstveit, Rosenvinge & Sundgot-Borgen, 2007; Greenleaf, Petrie, Carer & Reel, 2009).

Eating Disorders by Sport

It is noted that the prevalence of EDs among female athletes is much higher in sports that emphasize aesthetics and leanness (Sundgot-Borgen & Torstveit, 2004). Such sports that emphasize these characteristics are gymnastics, track and field, distance running, swimming and dance. Theimann et al. (2015) found that there were greater percentages of maladaptive eating in aesthetic sports (17%) compared to ball-game sports (3%). To add, Carter and Rudd (2005) found a significant difference between lean and non-lean sports, with 17.5% of lean-sports and 9.2% of non-lean sport athletes showing subclinical symptoms for an ED. Another study focusing on leanness and non-leanness sports found that 46.7% of leanness sport athletes had clinical EDs compared to 21.4% of non-leanness sports (Torsveit, Rosenvinge, Sundgot-Borgen, 2007).

In contrast, Sanford-Martens et al. (2005) indicated that athletes participating in sports that emphasize aesthetic and leanness did not show a greater percentage of ED symptoms and/or ED diagnoses compared to sports that do not emphasize leanness. Another piece of research that focused on the comparison of ED behaviors among different sports found that there were no significant statistical differences of ED behaviors (DiBartolo & Shaffer, 2020). They also found that there were no significant differences for sports that emphasized body leanness compared to sports that do not (DiBartolo & Shaffer, 2002).

In conclusion, some literature supports the idea that lean-sport athletes have a higher risk of developing an ED due to the emphasis on aesthetics and leanness (Sundgot-Borgen & Torstveit, 2004; Theimann et al., 2015; Carter & Rudd, 2005). On the other hand, literature also

shows that there may not be a significant difference on the development and prevalence of an ED between non-lean sport athletes and lean sport athletes (Sanford-Martens et al., 2005; DiBartolo & Shaffer, 2002). Future research is needed to provide clear information about the type of sport and if there is a relationship between the type of sport and the development of an ED.

Risk of Eating Disorder Development comparing Female Athletes versus Non-Athletes

As illustrated earlier, there is a higher risk of developing an ED among females compared to males, but the research is inconsistent with understanding if females participating in sports provide protective factors or risk factors for the development of an ED. The results in Sanford-Martens et al. (2005) showed a larger number of non-athletes compared to athletes who were symptomatic and even met a diagnosis for an ED. In another study comparing NCAA Division III female collegiate athletes and female college non-athletes, it found that athletes reported less ED symptoms and less disturbance of body image compared to non-athletes (DiBartolo & Shaffer, 2002). This study showed that 10.7% of athletes compared to 15.2% of female non-athletes scores indicated disordered eating behavior (DiBartolo & Shaffer, 2002). These two studies support the idea that participating in sports may provide protective factors against the development of an ED or that there is no significant relationship between the participation of sports and the development of an ED.

Additionally, in a study of track and field athletes and non-athletes both on a collegiate level and high-school level, it was suggested that the track and field athletes were not at increased risk for developing an ED compared to non-athletes (Hausenblas & McNally, 2004). In particular, it was indicated that participating in sports may play a protective factor against the development and suggested that non-athletes reported a larger degree of body dissatisfaction compared to the athlete participants (Hausenblas & McNally, 2004). In this study, it was stated

that a possible reason for sports to be a protective factor is that athletes may have a positive body image due to their activity levels which may result in their body becoming closer to the societal ideal physique and their ideal physique compared to non-athletes.

In contrast, Torstveit, Rosenvinge and Sundgot-Borgen (2007) studied the prevalence of disordered eating behaviors and clinical ED's among athletes and non-athletes. The participants were athletes competing on Norwegian national teams and a control group. The results showed that 32.8% of athletes met the criteria for a clinical diagnosis of an ED and that 21.4% of the control group, non-athletes, met a clinical diagnosis of an ED (Torstveit, Rosenvinge & Sundgot-Borgen, 2007). These results contradict the studies shown above and show that more athletes met an ED diagnosis compared to non-athletes. Additionally, the results suggested that 46.7% of individuals competing in leanness sports met the clinical diagnosis of an ED, which was significantly higher than both individuals in the control group and among non-leanness sport athletes.

Overall, previous research has not provided a strong understanding of the prevalence of EDs comparing athletes and non-athletes. It clear that the research is inconsistent and there is both research that show that athletes may have a lower risk of developing an ED (Hausenblas & McNally, 2004; Sanford-Martens et al. 2005; DiBartolo & Shaffer, 2002); and that show athletes may have a higher risk of developing an ED (Torstveit, Rosenvinge & Sundgot-Borgen, 2007; Greenleaf, Petrie, Carer & Reel, 2009). Additionally, research may be suggesting that there should be a focus on leanness sport athletes rather than athletes as an entire population (Torstveit, Rosenvinge & Sundgot-Borgen, 2007; Sundgot-Borgen & Torstveit, 2004; Carter and Rudd, 2005.

College Environment & Prevention

There are a range of factors that play a role in EDs and the development of an ED. There are biological, psychological and sociocultural influences, and each individual is affected differently by these factors (NEDA, n.d.). Even though each individual may be affected differently, there is a strong emphasis on the importance of early detection to prevent the development of an ED. There are a variety of risk factors that have been identified to contribute to the development of an ED, and with early detection, can reduce the risk of development (Taylor et al., 2006).

A possible issue that plays a role in the prevalence and the lack of prevention of EDs among the college population is the lack of screening practices in colleges. It was found in a study that among 42 states and the District of Columbia, less than half of college entry health forms had any questions related to an ED diagnosis (Someshwar, Someshwar, & Tuchman, 2016). This research shows the lack of understanding about the prevalence of EDs and "… represents a missed opportunity to identify students requiring additional support and resources during the transition to college" (Someshwar, J., Someshwar, A. & Tuchman, 2016, p. 28). An increase in screening practices in colleges may allow colleges to identify students who are at a high risk of an ED and provide resources as well as education regarding EDs. Another prevention strategy is the use of educational programs. Such programs implemented into colleges could be those that promote increased knowledge of EDs, how to identify symptoms and the onset as well as to promote healthy eating habits, and self-acceptance (Coelho, Gomes, Ribeiro & Soares, 2014).

Furthermore, Taylor et al. (2006) focused on the prevention of EDs among female college students, focused on using an eight-week, internet-based, cognitive behavior program

combined with a moderated discussion group. The results showed significantly decreased weight and shape concerns among the participants and in turn, may have decreased the risk of developing an ED. This internet-based intervention can be easily used and cost-efficient, with the only primary cost being group moderators who need to be selected, trained and supervised (Taylor et al., 2006).

Continuing, one huge risk factor for individuals is the influence of society. Society is seen as a huge factor in creating unrealistic and unhealthy body image ideals among females (Francisco, Narciso & Alarcão, 2013). Among the college-aged population, it was found that using self-esteem and media-literacy based approaches to improve health behaviors and body image was the most effective prevention strategy (Yager & O'Dea, 2006). Media-literacy-based prevention would be focused on increasing critical evaluation of the media, and this, in turn, may decrease the media's influence on an individual's body image. As illustrated, this type of intervention aims to reduce societal body image norms and decrease the internalization of a "thin ideal" among society (Yager & O'Dea, 2006).

Finally, it is important to note the pertinent differences in prevention among college-aged students. Lipson et al. (2017) found that college students who had significant ED symptoms, 86.5% of them have not received treatment. Furthermore, college students reported not seeking help due to a perceived lack of time, perceived lack of need as well as the desire to solve the issue "on my own" (Lipson et al., 2017). Overall, this study helps to illustrate the different needs among populations when looking at prevention strategies for the development of an ED.

The Current Study

Previous literature has shown that females have a greater risk of developing an ED when compared to males, and the prevalence of EDs are higher in women compared to men (Duncan,

Ziobrowski & Nicol, 2017; Raevuori, Keski-Rahkonen, & Hoek, 2014; Lewinsohn, Seeley, Moerk, & Striegel-Moore, 2002). Research has also shown that the prevalence of EDs is much higher in female athletes compared to male athletes (Johnson, Powers, & Dick, 1999). Previous studies have not provided a strong understanding of the prevalence of EDs comparing athletes and non-athletes. There is research that shows that athletes may have a lower risk of developing an ED (Hausenblas & McNally, 2004; Sanford-Martens et al. 2005; DiBartolo & Shaffer, 2002), and in contrast, there is research that shows athletes may have a higher risk of developing an ED (Torstveit, Rosenvinge & Sundgot-Borgen, 2007; Greenleaf, Petrie, Carer & Reel, 2009). The present study sought to further understand the prevalence and development of an ED comparing female college athletes and non-athletes. Furthermore, this study aimed to further understand how sociocultural factors impact female athletes and non-athletes differently.

Methods

The purpose of this study was to identify if competing in the National Collegiate Athletic Association (NCAA) put females at a higher risk of developing an ED when compared to female college students who do not participate in the NCAA. The independent variables are the two populations analyzed, female student-athletes and female student non-athletes. An *athlete* was defined as someone who is currently participating in an NCAA sport, and a *non-athlete* was defined as someone who has never participated in an NCAA sport. The dependent variables are ED symptoms; the symptoms will be defined using two measures, the Change in Eating Disorder Symptoms scale (CHEDS; Spangler, 2010) and the Sociocultural Attitudes Towards Appearance Scale-3 (SATAQ-3; Thompson, Van Den Berg, Roehrin, Guarda & Heinberg, 2004). Along with the CHEDS and SATAQ-3, there was an additional measure that assessed general demographic information such as age, ethnicity/race and year in school. This measure also included previous

and/or current ED diagnoses, previous sport participation and current sport participation. Detailed descriptions of each measure are shown in subsequent sections.

Participants

Due to the purpose and hypotheses of this study, the study was comprised of all female-identified participants. The sample consisted of 71 female participants. The age range of this sample was from 18 years old to 43 years old, with the mean age being 22.26. The sample included 34 females who currently participate in college-level sports (*athletes)* and 37 females who do not currently participate in college-level sports (*non-athletes)*. The athlete participants were recruited by emails to coaches and emails to individuals who were identified as student-athletes at the University of North Dakota (UND). The non-athlete participants were recruited by emailing professors at UND to share with their students for participation. For the athlete group of this sample, there were 7 sports that were reported as current sport participants in the NCAA. Of the total 34 participants in the athletes' group, the sports that were reported were Track & Field/Cross-Country (10; 14.08%), Soccer (12; 17.14%), Basketball (3; 4.23%), Volleyball (6; 8.45%), Golf (1; 1.41%), Softball (1; 1.41%), and Tennis (1; 1.41%).

Of the participants, 65 (91.55%) did not report a previous diagnosis of an ED and six (8.45%) did report a previous diagnosis of an ED. Additionally, 65 (91.55%) did not report a current diagnosis of an ED; four (5.63%) did report a current diagnosis of an ED; and two (2.82%) reported "Unknown" for a current diagnosis of an ED. More information and details about participants' demographic information is shown below in Table 1.

Table 1.
Demographic information

Variable	**Athletes**	**Non-Athletes**	**Total (*n*)**	**Total %**
Year in school:				
Freshmen	6	5	**11**	**15.49**

Sophomore	7	3	**10**	**14.08**
Junior	9	7	**16**	**22.54**
Senior	11	9	**20**	**28.17**
Graduate	1	13	**14**	**19.72**
Sexual Orientation:				
Bisexual	0	3	**3**	**4.23**
Gay	0	0	**0**	**0**
Heterosexual	34	33	**67**	**94.37**
Lesbian	0	0	**0**	**0**
Self-identify (Specify):	0	**1**	**1**	**1.41**
- Asexual				
Ethnicity:				
American Indian or Alaska Native	0	3	**3**	**4.23**
Asian-American	0	1	**1**	**1.41**
Black or African American	0	1	**2**	**2.28**
Hispanic/Latino/a/x	3	1	**4**	**5.63**
Native Hawaiian or Other Pacific Islander	0	0	**0**	**0**
North African or Middle Eastern	0	0	**0**	**0**
White	30	29	**59**	**83.10**
Multi-ethnic (Specify):				
- American Indian or	1	0	**1**	**1.41**
Alaska Native, White		1	**1**	**1.41**
Other (Specify):	0			
- Asian Indian				
	N= 34	N= 37	N= 71	

Measures

The measures that were used were hosted on Qualtrics, an online survey platform, and was sent to prospective participants through email, listservs and by communication with coaches. The inclusion criteria were individuals who are female-identifying and are currently attending college. All participation was voluntary, and participants were free to discontinue participation at any time without any adverse consequences. After informed consent was complete, participants completed the three self-report measures including the General Demographic and Medical History measure, CHEDS and SATAQ.

General Demographic and Medical History. This measure assessed demographic information, sport team participation and specification, year in school and previous diagnoses.

Change in Eating Disorder Symptoms Scale (CHEDS). The CHEDS is a 35-item scale that focuses on seven symptom domains. The seven subscale domains of the CHEDS are eating concerns/preoccupation, restriction, body preoccupation, body dissatisfaction, body checking, vomiting, and binge eating (Spangler, 2010). The responses were based on a Likert response format ranging from 0 ("Never") to 4 ("Always"); and participants answered these based on how they have been feeling the past six months. The CHEDS is a reliable scale with a Cronbach's alpha of the overall scale being 0.96 (Spangler, 2010).

Sociocultural Attitudes Towards Appearance Scale-3 (SATAQ-3). The SATAQ-3 is a 30-item scale that will measure societal influence on eating disturbances and body image (Thompson, Van Den Berg, Roehrin, Guarda & Heinberg, 2004). The responses were based on a Likert response format ranging from 1 ("Definitely Disagree") to 5 ("Definitely Agree"); and the responses were based on how much the participant agrees and/or disagrees with the statements. The SATAQ-3 is a reliable scale with a Cronbach's alpha of 0.94. (Thompson, Van Den Berg, Roehrin, Guarda & Heinberg, 2004).

Hypotheses

Based on previous research, studies have shown that participating in sports puts female athletes at a higher risk of developing an ED (Torstveit, Rosenvinge & Sundgot-Borgen, 2007; Greenleaf, Petrie, Carer & Reel, 2009). In contrast, studies have shown that females participating in sports may provide protective factors against the development of an ED (Hausenblas & McNally, 2004; Sanford-Martens et al. 2005; DiBartolo & Shaffer, 2002). The two hypotheses

are that there is a difference in ED symptoms between athletes and non-athletes (H1) and that there is a difference in body image concerns between athletes and non-athletes (H2).

Given previous findings on how participating in sports put female athletes at a higher risk for developing an ED (Hausenblas & McNally, 2004; Sanford-Martens et al. 2005; DiBartolo & Shaffer, 2002), it is important to investigate whether taking part in athletics is a protective or risk factor. Based on the available literature (Hausenblas & McNally, 2004; Sanford-Martens et al. 2005; DiBartolo & Shaffer, 2002; Torstveit, Rosenvinge & Sundgot-Borgen, 2007; Greenleaf, Petrie, Carer & Reel, 2009), it was expected there would be a difference between the two groups, and that the difference will support the risk/protective hypotheses.

Results

To test whether there was a difference in ED symptoms (CHEDS) and societal influence on eating disturbances and body image (SATAQ-3) between athletes and non-athletes, two analyses of covariance (ANCOVA) were run. Additionally, as the level of physical activity could potentially interfere with the results as a confounding variable, we controlled for it in the analyses.

The first ANCOVA that was run looked at differences in ED symptoms between athletes and non-athletes. The ANCOVA indicated that there was no difference between female athletes and non-athletes on ED symptoms as measured by CHEDS in this sample, even after controlling for levels of physical activity. The ANCOVA indicated the following results in Table 2 for the overall CHEDS scale and seven subscales.

Table 2.
CHEDS Results

Scale/Subscale	**Athlete Mean**	**Non-Athlete Mean**	**F(1,66)=**	***p***	η^2

Change in Eating Disorder Symptoms (CHEDS)	**91.875**	**96.649**	**1.07**	**0.303**	**0.016**
CHEDS – Vomiting	2.500	2.677	0.638	0.427	0.010
CHEDS – Food Preoccupation/Eating Concerns	10.788	11.676	1.18	0.281	0.018
CHEDS – Restriction	9.273	10.027	0.798	0.375	0.012
CHEDS – Binge Eating	13.265	12.757	0.433	0.513	0.007
CHEDS – Body Checking	14.265	14.351	0.204	0.653	0.003
CHEDS – Body Dissatisfaction	20.118	22.378	3.56	0.064	0.051
CHEDS – Body Preoccupation	21.545	22.784	1.39	0.242	0.021

In the table above and the scores found, the *p* value indicates the significance of difference, with scores below .05 indicating a statistically significant difference. The η^2 (eta-squared) scores represent the magnitude of difference between groups. As shown above, all of the *p* values for the CHEDS scale and subscales were above 0.05 therefore there were no significant different on ED symptoms between athletes and non-athletes in this sample, after controlling for physical activity. The effect sizes were also all negligible, as all η^2 scores were below 0.05.

The second ANCOVA measured the differences in societal influence on eating disturbances and body image using the SATAQ-3. The results indicated that there were significant differences in societal influence on eating disturbances and body image between athletes and non-athletes in this sample. After controlling for physical activity, athletes scored significantly different on the overall SATAQ-3 measure as well as two of the SATAQ-3 subscales, the Pressure subscale and the Internalization-General subscale. Further, there were two subscales that did not show a significant difference between the two groups of athletes and non-athletes, these were the Information subscale and the Internalization-Athlete subscale. The

ANCOVA indicated the following results shown below in Table 3 for the overall scale and subscales.

Table 3.
SATAQ-3 Results

Scale/Subscale	**Athlete Mean**	**Non-Athlete Mean**	**F(1,65)=**	***p***	η^2
Sociocultural Attitudes Towards Appearance Scale-3 (SATAQ-3)	92.188	99.972	**4.03**	**0.049**	**0.058**
SATAQ-3 – Pressures	20.333	24.500	7.45	0.008	0.103
SATAQ-3 – Internalization-General	26.818	30.139	1.18	0.035	0.018
SATAQ-3 – Information	24.824	26.405	2.21	0.142	0.033
SATAQ-3 – Internalization-Athlete	20.500	18.676	0.81	0.373	0.012

As shown, the *p* value is smaller than 0.05 which indicated that there are some significant differences between athletes and non-athletes. Despite the two subscales that showed no difference, the SATAQ-3 ANCOVA that was ran found that athletes had higher scores on the overall measure ($p = 0.049$), the Pressures subscale ($p = 0.008$) and Internalization-General subscale ($p = 0.035$). In addition, as indicated by the η^2 scores, the difference between measures was significant and ranged in magnitude from 5-10%.

In summary, through the analyses that were ran and after controlling for physical activity, the results indicated that athletes and non-athletes had a significant difference in regard to societal influence on eating disturbances and body image. Specifically, there was a significant difference in the Pressures and Internalization-General subscales of the SATAQ-3. The Internalization-General subscale show that athletes cognitively internalize "… socially and

culturally determined standards of appearance" (Lewis-Smith et al., 2021, p. 2), and engage in behavior that move them closer to these ideals compared to the non-athlete group. Additionally, the Pressures subscale indicate that athletes feel more pressure to meet beauty ideals depicted by multiple forms of media (Montoya, Quenaya & Mayta-Tristán, 2015). Finally, although there were differences on the sociocultural factors, the results indicated that there were no significant differences of ED symptoms between athletes and non-athletes.

Discussion

The purpose of this study was to identify if competing in the NCAA put females at a higher risk of developing an ED when compared to female college students who do not participate in the NCAA. Particularly, the purpose was to further understand the prevalence and development of an ED comparing female college athletes and non-athletes. In addition, this study aimed to further understand how sociocultural factors impact female athletes and non-athletes differently. We hypothesized that that there would be a difference in ED symptoms and body image concerns between athletes and non-athletes. Further, given previous findings on how participating in sports put female athletes at a higher risk for developing an ED (Hausenblas & McNally, 2004; Sanford-Martens et al. 2005; DiBartolo & Shaffer, 2002) and based on the available literature (Hausenblas & McNally, 2004; Sanford-Martens et al. 2005; DiBartolo & Shaffer, 2002; Torstveit, Rosenvinge & Sundgot-Borgen, 2007; Greenleaf, Petrie, Carer & Reel, 2009), we hypothesized that there would be a difference between the two groups, and that the difference will support the risk/protective hypothesis'. The findings in this study partially supported our hypotheses.

We found that after controlling for physical activity, athletes and non-athletes had a significant difference in regard to societal influence on eating disturbances and body image.

Specifically, there was a significant difference in the Pressures and Internalization-General subscales of the SATAQ-3. This finding supported our hypothesis that there would be a difference between athletes and non-athletes in areas of body image concerns. Furthermore, the results indicated that there were no significant differences of ED symptoms between athletes and non-athletes. This did not support our hypothesis that there would be a difference between the two groups and ED symptoms.

These findings suggest that athletes and non-athlete females do not present with differences in ED symptoms. Previous research has been conflicting as there is not a strong understanding if there are ED differences among athletes and non-athletes, and if participating in sports provide risk or protective factors relating to the development of an ED. Previous research indicates both that athletes may have a lower risk of developing an ED (Hausenblas & McNally, 2004; Sanford-Martens et al. 2005; DiBartolo & Shaffer, 2002); and that athletes may have a higher risk of developing an ED (Torstveit, Rosenvinge & Sundgot-Borgen, 2007; Greenleaf, Petrie, Carer & Reel, 2009). The results of the current study differ from these findings and suggest that there is no difference between female non-athletes and athletes as it pertains to ED symptoms and the risk of developing an ED. The results of the current study also suggest that participating in sports may not provide any risk or protective factors against the development of an ED.

Although these findings do not suggest that there is a difference in ED symptoms comparing these two groups, the findings indicated that athletes and non-athletes have significant differences in regard to societal influence on eating disturbances and body image. Specifically, the athlete group showed significantly higher rates of cognitive internalization of standards of appearance set by culture and society (Lewis-Smith et al., 2021), shown through the

Internalization-General subscale in the SATAQ-3. The athlete group also showed significantly higher rates of pressure to meet beauty ideals depicted by different forms of media (Montoya, Quenaya & Mayta-Tristán, 2015), shown through the Pressures subscale in the SATAQ-3. These results differ from previous findings that suggest that athletes report less disturbance of body image compared to non-athletes (DiBartolo & Shaffer, 2002). In fact, this study suggests that female athletes experience greater societal influence on eating disturbances and body image concerns when compared to non-athletes.

Implications

Overall, results of this study have broad implications about the differences of EDs among female collegiate athletes and non-athletes, as the results imply that there is no difference among these two groups when comparing ED symptoms. These results may suggest that there may need to be a focus on the prevention of ED among women as a whole, and that the participation in sports may not play a significant risk or protective factor against the development of ED symptomatology. Additionally, the current study did not focus on a specific sport, although previous research indicates that there should be a focus on leanness sport athletes rather than athletes as an entire population (Torstveit, Rosenvinge & Sundgot-Borgen, 2007; Sundgot-Borgen & Torstveit, 2004; Carter and Rudd, 2005). Future research should consider the type of sport that athletes are participating in and if sports that emphasize leanness increase the risk of the development of an ED.

Further, the current study suggests that although there are no differences in ED symptoms, female athletes may internalize and feel more pressure to meet the standards of appearance set by society and culture. This finding creates an opportunity for researchers to further explore and understand why athletes may be more influenced by society and forms of

media compared to non-athletes. This finding provides information to athletes, coaches and athletic departments to provide ways to help increase media-literacy and self-esteem among female athletes. As an example, Yager and O'Dea (2016) illustrate that using self-esteem and media-literacy based approaches to improve health behaviors and body image was the most effective prevention strategy among college age students (Yager & O'Dea, 2006). Thus, media-literacy-based prevention can be used and geared towards female athletes to increase critical evaluation of the media and decrease the media's influence on an individual's body image (Yager & O'Dea, 2006). Particularly, with the results of this study showing a greater impact of the Internalization-General subscale of the SATAQ-3 among female athletes, this type of intervention aims to reduce societal body image norms and decrease the internalization of a "thin ideal" among society (Yager & O'Dea, 2006).

Limitations

Although there are several implications of this study, a few limitations must be noted. While close to the a priori power analysis, this study had a small sample size (n = 71), which might prevent the generalization of the results. Moreover, due to the effects of the COVID-19 pandemic, we were unable to reach a larger number of participants that we were initially aiming for in our power analysis. Due to the small sample size, the results of this study may make it difficult to generalize to the entire population of female collegiate athletes and non-athletes. Another limitation is general demographic information and lack of diversity in the sample. Efforts were made by the researchers to gain a diverse sample but due to the region that this study was conducted and the use of convenience sampling, the sample consisted of 83.10% of White-identified females and 94.37% of individuals identified as heterosexual. This is a limitation of this research as the results are not generalizable to the entire population of female

collegiate athletes and non-athletes. Future research is needed to provide more information about ED symptoms and the societal influence of body image with individuals and participants from a variety of identities and backgrounds.

Appendices

Appendix A. General Demographic and Medical History Questionnaire

General Demographic:

Age: _____

Year in school:

- Freshmen
- Sophomore
- Junior
- Senior
- Graduate

Gender:

- Male
- Female
- Transgender
- Self-Identify: _____

Sexual Orientation:

- Heterosexual
- Lesbian
- Gay
- Bisexual
- Self-Identify: _____

Ethnicity:

- American Indian or Alaska Native
- Asian-American
- Black or African American
- Hispanic/Latino/a/x
- Native Hawaiian or Other Pacific Islander
- North African or Middle Eastern
- White
- Multi-ethnic (specify): _____
- Other (specify): _____

How would you characterize your social class growing up?

- At or below the poverty line

- Lower class
- Middle class
- Upper class

Are you a former member of the Armed Forces of the United states?

- Yes
- No

Do you currently participate in any sport(s) at the collegiate level (i.e. NCAA, NAIA, etc.)?

- Yes (specify level and sport/s): _____
- No

Have you ever participated in a sport at the collegiate level (i.e. NCAA, NAIA, etc.)?

- Yes (specify level and sport/s): _____
- No

Have you ever participated in a sport(s) at a competitive level from ages 14-18?

- Yes (specify what sport/s): _____
- No

During a typical week (currently), do you participate in any physical activity? (Such as brisk walking, bicycling, vacuuming, gardening, or anything else that causes some increase in breathing or heart rate)

- Yes
- No

If you answered yes to the question above: During a typical week (currently), do you participate in at least 150 minutes/week of physical activity? (30 minutes on five days per week)

- Yes
- No

Medical History:

Have you ever been diagnosed with eating disorder in past?

- Yes (specify): _____
- No
- Unknown

Are you currently diagnosed with an eating disorder?

- Yes (specify): _____
- No
- Unknown

Appendix B. Change in Eating Disorder Symptoms Scale Items

(Spangler, 2010)

Please read each of the following items carefully and indicate the number that best reflects how often you have experienced the statement within the past 6 months.

Never Rarely Sometimes Often Always

1. Have difficulty focusing on other things due to thoughts about your body
2. Feel that your mood was influenced by your body weight, shape or size
3. Feel you can't stop thinking about your body
4. Feel that your sense of self-worth was strongly influenced by your body shape, weight or size
5. Feel that much of your energy and focus went into managing your body
6. Feel that your body shape, weight or size is very important
7. Feel your attention is on your body weight, shape or size
8. Have a strong desire to change your body shape, weight or size
9. Feel an urgency to lose weight or become thinner
10. Feel afraid of gaining weight or becoming fat
11. Worry about your body shape, weight or size
12. Hate the way your body looks
13. Compare your body to others
14. Squeeze or touch parts of your body to determine their size or form
15. Stare at parts of your body other than your face (such as thighs, stomach, hips) to evaluate your size and shape
16. Pinch or measure parts of your body
17. Feel you must check the size or shape of parts of your body (other than your face)
18. Feel you must weigh or measure your body
19. Feel like you can't stop eating
20. Rapidly eat a very large amount of food
21. Eat in secret due to large amount of food consumed
22. Feel out of control when eating
23. Crave large amounts of food
24. Fear you will be unable to stop eating
25. Skip meals to influence your size, weight or shape
26. Eat much less than regularly sized meals
27. Try to go as long as possible without eating
28. Try to restrict the amount of food you eat
29. Feel upset by thoughts about food or eating
30. Feel preoccupied with thoughts about food
31. Have difficulty concentrating due to thoughts about food

32. Think about ways to reduce the amount of food you eat
33. Feel afraid to eat
34. Have an urge to vomit (whether or not you actually vomited)
35. Vomit after eating

Appendix C. Sociocultural Attitudes Towards Appearance Questionnaire

(Thompson, Van Den Berg, Roehrin, Guarda & Heinberg, 2004)

Please read each of the following items carefully and check the box that best reflects your agreement with the statement.

Definitely Disagree	Mostly Disagree	Neither Agree Nor Disagree	Mostly Agree	Definitely Agree

1. TV programs are an important source of information about fashion and "being attractive".
2. I've felt pressure from TV or magazines to lose weight.
3. I do not care if my body looks like the body of people who are on TV.
4. I compare my body to the bodies of people who are on TV.
5. TV commercials are an important source of information about fashion and "being attractive".
6. I do not feel pressure from TV or magazines to look pretty.
7. I would like my body to look like the models who appear in magazines.
8. I compare my appearance to the appearance of TV and movie stars.
9. Music videos on TV are not an important source of information about fashion and "being attractive".
10. I've felt pressure from TV and magazines to be thin.
11. I would like my body to look like the people who are in movies.
12. I do not compare my body to the bodies of people who appear in magazines.
13. Magazine articles are not an important source of information about fashion and "being attractive."
14. I've felt pressure from TV or magazines to have a perfect body.
15. I wish I looked like the models in music videos.
16. I compare my appearance to the appearance of people in magazines.
17. Magazine advertisements are an important source of information about fashion and "being attractive."
18. I've felt pressure from TV or magazines to diet.
19. I do not wish to look as athletic as the people in magazines.
20. I compare my body to that of people in "good shape".
21. Pictures in magazines are an important source of information about fashion and "being attractive."
22. I've felt pressure from TV or magazines to exercise.
23. I wish I looked as athletic as sports stars.
24. I compare my body to that of people who are athletic.
25. Movies are an important source of information about fashion and "being attractive."
26. I've felt pressure from TV or magazines to change my appearance.
27. I do not try to look like the people on TV.

28. Movie starts are not an important source of information about fashion and "being attractive."
29. Famous people are an important source of information about fashion and "being attractive."
30. I try to look like sports athletes.

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