EXPLORING THE RELATIONSHIP OF SPORT-SPECIFIC VARIABLES ON EATING DISORDER SYMPTOMS IN FEMALE COLLEGIATE ATHLETES

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DEDICATION

This research is for every female athlete who feels as if she has slipped through the cracks. May you never feel ignored again.

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Finally, I want to thank the strong women that completed this survey. You are cared for, even if you do not think so. I wish you peace and happiness in your identity as a female athlete.

ABSTRACT

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EXPLORING THE RELATIONSHIP OF SPORT-SPECIFIC VARIABLES ON EATING DISORDER SYMPTOMS IN FEMALE COLLEGIATE ATHLETES

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Eating disorders among female athletes are increasingly a concern, with a lack of clarity on the causes of eating disorder symptomatology. The researcher investigated the attributing factors to eating disorders and disordered eating by identifying four unique factors: interoceptive awareness, exercise dependence, self-surveillance, and body trust among endurance and nonendurance collegiate female athletes. Female athletes were recruited from universities across the country in all three divisions in the NCAA and NAIA. Fifty-one female collegiate athletes completed five assessments and a demographic questionnaire. The researcher tested hypotheses through multiple regression, t-tests, and correlations. A significant negative correlation was found between interoceptive awareness and self-surveillance. Interoceptive awareness predicted eating disorder risk. Endurance athletes scored higher on measures of exercise dependence and eating disorder risk and lower on measures of interoceptive awareness (IA) than their nonendurance counterparts, although these differences were not significant. Clinical, policy, and practical suggestions are provided for coaches and mental health professionals.

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CHAPTER I

INTRODUCTION

Sports are a fixture in U.S. society: athletes represent the pinnacle of physical prowess and determination, and college and professional sports leagues draw in millions of spectators each year. U.S. culture tends to view athletes as invincible, leaving athletes' mental health vulnerable to omission. Athletes' mental health was made particularly central when Simone Biles, widely regarded as one of the greatest gymnasts of all time, withdrew from the majority of events at the 2020 Tokyo Olympics due to a case of the *twisties* (Kowalski, 2021). Interest in student athlete mental health is growing in both cultural and psychological circles as a disturbing number of student-athlete suicides has been highlighted in mainstream news (Hensley-Clancy, 2022). Though research into athletes' mental health has been methodologically inconsistent, and many key terms have similarly been inconsistently defined, researchers have found athletes are vulnerable to a variety of mental health conditions including depression, anxiety, sleep disorders, eating disorders, and substance use disorders; all of these factors contribute to student athlete suicide (Chang et al., 2020; Rice et al., 2016).

Sport participation is typically portrayed as an endeavor that teaches teamwork, persistence, and hard work. Despite these benefits, athletes appear to be at a higher risk than non-athletes for developing mental health disorders. The American College of Sports Medicine (2021) estimated that around 35% of elite athletes suffer from disordered eating, burnout, depression, and/or anxiety; approximately 30% of women and 35% of male college athletes report having anxiety. Definitions of an elite athlete vary. Allen and Hopkins (2015) defined an elite athlete as an individual who has competed at the highest level of senior international competition in their respective sport. Rice and colleagues (2016) more inclusively defined elite

athletes as individuals who are competitive at the Olympic, international, national, or professional level; accordingly, collegiate athletes are included in this definition. Rice and colleagues (2016) reported that elite athletes experience mental health disorders at a higher rate than non-athletes. It is unclear if elite athletes experience mental health stressors more frequently than recreational athletes, as many studies compare elite-level athletes to non-athletes. Athletes appear to be classified by their accomplishments, such as their highest level of competition, when defining inclusion criteria for mental health disorders, which potentially neglects the experiences of athletes who contribute to high-achieving teams but do not compete at national or international-level events.

Regardless of competition status, athletes of all ability levels are susceptible to mental health problems. Adolescents are most susceptible to mental health problems at around the same time they are expected to advance in their sport and participate in recruiting for college sports (Gulliver et al., 2012; Rice et al., 2016). Once in college, athletes report higher rates of depression than their non-athlete peers (Wolanin et al., 2016). College athletes face unique challenges to their mental health, as athletes juggle academic work, expectations to maintain scholarships, and potential isolation from peers (Berg & Warner, 2019). Although college athletes have difficulty recognizing clinical presentations of anxiety and burnout, many do not seek mental health services when they experience mental distress for fear of stigmatization or potential removal from sport (Gulliver et al., 2012; Moreland et al., 2018; Neglia, 2021).

It is unclear what causes mental health issues in athletes, and the sports environment offers a variety of confounding variables when assessing mental health. Sports are most typically inherently competitive, evaluative, and performance-driven; the same personality traits that contribute to athletes' success in their careers, like perfectionism, might also contribute to

mental health disorders (Chang et al., 2020). Researchers have attempted to investigate the adaptability of perfectionistic tendencies in sport. Some researchers suggest that perfectionism invigorates athletic performance, while others suggest perfectionism creates vulnerability in athletes (Flett & Hewitt, 2014; Hill et al., 2018). Holland et al. (2013) found that perfectionism and interpersonal distrust predicted eating disorder onset over a 10-year period in female athletes. Informed introjection, an athlete's perceived obligation to meet the expectations of others, might serve to motivate athletes to perform well in practice and meets. However, informed introjection has been found to be highly associated with an athlete's eating behaviors and susceptibility to developing an eating disorder (Walter et al., 2022). Self-discipline and impulse control, two qualities highly desirable in athletes, are also associated with the development of disordered eating (Petrie & Greenleaf, 2010; Walter et al., 2022).

Sabiston and colleagues (2020) emphasized the importance of considering the experience of the sport context itself as a potential contributor to poor athlete outcomes. Reel and colleagues (2013) found that athletes experienced sport-specific pressure distinct from that of general sociocultural pressure, particularly the influence of coaches on athletes' self-perception. The manner in which coaches communicate sport-specific expectations and standards of achievement is related to how athletes perceive coaches' opinion on athletes' body weight and appearance, which is connected to athletes' eating behaviors (Voelker et al., 2022).

Clinical and Subclinical Eating Disorders

Eating disorders affect approximately 30 million Americans (National Association of Anorexia Nervosa and Associated Disorders, 2021). Although eating disorders affect people of all genders and may develop at any point in the lifespan, women are disproportionately affected

(Arcelus et al., 2011; Galmiche et al., 2019). Developmental periods like adolescence are particularly high-risk for developing an eating disorder, and eating disorders are the third most common mental illness for adolescent girls in the United States (Galmiche et al., 2019; Kalisvaart & Hergenroeder, 2007). Despite high prevalence rates, eating disorders remain stigmatized in the U.S. Around one-third of people with eating disorders will receive treatment, and fewer than one in five adolescents with an eating disorder receive treatment (Hudson et al., 2007; Swanson et al., 2011).

Subclinical eating disorders are patterns of disordered eating not severe enough to warrant an eating disorder diagnosis per the criterion of the *Diagnostic and Statistical Manual for Mental Disorders-5-Revised Edition* (*DSM-5-TR*; American Psychiatric Association, 2022; Fitzgibbon et al., 2003). There is no meaningful differentiation between clinical eating disorders and subclinical eating disorders in the *DSM-5-TR*, and the two conditions are not categorically distinct (American Psychiatric Association, 2022; Forbush et al., 2018). There is no clear difference between clinical and subclinical eating disorders apart from social expectations of the individual's weight, as psychiatric impairment, latent risk factors, and genetic and environmental risk factors fail to differentiate clinical eating disorders from subclinical presentations (Fairweather-Schmidt & Wade, 2014; Forbush et al., 2018).

Eating Disorders in Athletes

Eating disorders and their subclinical counterparts disproportionately affect female athletes. Petrie and Greenleaf's (2010) adapted model of eating disorders in athletes conceptualized sport-specific pressures as indirect and a psychosocial process relying on internalization of expected body types in sport and body surveillance. According to the model, the sporting environment and its accompanying pressures are so influential to an athlete's selfperception that it affects levels of body dissatisfaction and greater food restriction. In one

study, female athletes were found to experience sport-specific weight pressure unique from general sociocultural weight pressure, which predicted bulimic symptomatology and body dissatisfaction (Reel et al., 2013).

The type of sport in which one participates affects an athlete's risk factor of developing an eating disorder. Lean sports, such as gymnastics, swimming, distance running, and wrestling, are classified as sports that emphasize a lean physique and low body weight as a means of improving performance. Sports that emphasize leanness usually include an aesthetic component to overall performance, rely heavily on the effects of gravity, and operate within weight classes (Martinsen et al., 2010; Torstveit et al., 2008). Athletes participating in lean sports generally engage in higher levels of eating disordered behaviors than their peers in non-lean sports, though research suggests that athletes in all sport categories experience similar levels of eating disordered messages (McDonald et al., 2020).

Self-Objectification

Self-objectification occurs when people, especially women, internalize sociocultural messages and expectations surrounding their bodies and begin to view them from an outsider's perspective, an action called self-surveillance (Fredrickson & Roberts, 1997). Female athletes might be particularly susceptible to self-objectification, as many athletes experience conflicting expectations between two idealized body types: that of the thin and petite Western woman, and the muscular physique of a female athlete (Voelker et al., 2021). Self-surveillance predicts increased feelings of body shame that increase over time, and some researchers suggest that the continuous surveillance of an athlete from coaches and peers encourages self-surveillance behaviors, even when self-surveillance focuses on performance and effectiveness (Cosh et al., 2015; Sabiston et al., 2019). More research is needed to differentiate the relationship between

evaluation from others and self-objectification and the role self-surveillance plays in female athletes' experiences.

Interoceptive Awareness

Interoceptive awareness (IA) is the awareness of one's internal body states (Craig, 2003). IA may be influenced by self-surveillance, as higher levels of self-objectification are predicted by low levels of IA (Ainley & Tsakiris, 2013). IA works to maintain physical homeostasis by making unconscious signals conscious to the individual and then translating these signals into emotion. When individuals ignore their body cues, such as thirst or pain, the body becomes less sensitive to these body cues, and decreased body sensitivity has been positively associated with anxiety and eating disorders (Price & Hooven, 2018). Body trust, one component of interoceptive awareness, is the experience of one's body as reliable and trustworthy (Mehling et al., 2012). High levels of body mistrust predict disordered eating development and body image concerns among women (Poovey et al., 2022).

IA in Athletes

Female athletes may be at a higher risk for IA dysfunction. Researchers have found that motivation might be able to override bodily pain signals, allowing athletes to push beyond threshold aerobic levels (McCormick et al., 2015). Endurance athletes might be particularly vulnerable to compromised interoceptive awareness. While there are varying definitions of endurance sports in the literature, they are most often characterized by continuous, dynamic, and whole-body exercise tasks (McCormick et al., 2015). Endurance athletes are markedly different from their ball sport counterparts such that they work primarily to extend their bodies' natural capabilities, rather than strengthen team strategy or precision. In foundational research for endurance athletes, Tuffey (2000) proposed three types of psychological demands endurance athletes face: 1) long and repetitive training sessions that hinder motivation; 2) pain, discomfort,

and fatigue experienced in training and competition; and 3) committing to a race plan and planning for pain and discomfort during a competition. Undergoing physical pain and discomfort is the trademark of an endurance athlete. McCormick et al. (2018) interviewed recreational endurance athletes who indicated that "pushing through" (p. 14) pain and discomfort are imperative for desired results, both in training and competition. Hirao and colleagues (2020) found long-distance runners have inferior IA toward their body than their sprinting counterparts. More research is needed to further investigate the connection between endurance athletes and decreased IA. For the purpose of the study, the researcher will designate athletes who participate in artistic swimming, cross-country, swimming, and track as endurance athletes, while athletes who participate in volleyball, softball, soccer, basketball, dance, golf, tennis, diving, gymnastics, field events, wrestling, and stunt will be designated as non-endurance athletes. Sports commonly grouped together under one category, particularly swimming and diving, track and field, have been separated in order to accurately classify each discipline. The researcher's designation of endurance and non-endurance sports is consistent with McCormick et al.'s categorization (2015, 2018).

Exercise Dependence

Exercise dependence is a maladaptive pattern of exercise that creates clinically significant impairment or distress and is consistent with *DSM-5* criteria of a behavioral addiction (American Psychiatric Association, 2013; Hausenblas & Downs, 2002). Exposure to exerciserelated pain over time can increase pain tolerance and lead to exercise dependence (Duffy et al., 2018). Athletes report higher levels of exercise dependence than their non-athlete peers: in one study, athletes had a 40% higher reporting rate of compulsive exercise episodes than non-athletes (Flatt et al., 2021). Another study found endurance athletes and athletes who

participated in weight-training had higher levels of exercise dependence than athletes in team and ball sports (Bingol & Bayansalduz, 2016). Vayalapalli and colleagues (2018) conceptualized exercise dependence as a form of emotional suppression in which individuals engage in activities they know will harm them, creating cognitive dissonance. Exercise dependence is also linked to eating disorders. The same study found that anorexia nervosa, one major type of eating disorder, developed from a coping skill for dealing with exercise-induced emotional stress. Exercise dependence has not yet been studied extensively in relation to how female athletes use exercise as a coping skill.

Based on the review of the literature, four main points of interest have been identified with practical implications for eating disorder treatment among female athletes. First, the lack of differentiation between clinical and subclinical eating disorders creates confusion among researchers and practitioners attempting to conceptualize eating disorder pathology in female athletes (Forbush et al., 2018). With no clear delineation of severity, female athletes suffering from eating pathology and consequent distress might be easily overlooked due to a lack of readily observable physical symptoms. Second, there is much more to be discovered when considering the role of sport type (endurance vs. non-endurance) in potential contributors to eating disorders. Two of the potential contributors, IA and exercise dependence, have begun to be studied among female athletes. There is pertinent research suggesting that endurance athletes are more vulnerable to decreased IA than their non-endurance peers (Hirao et al., 2020; McCormick et al., 2018), although gaps still exist within the research. Exercise dependence has not been well-identified among female athletes, as it is difficult to identify maladaptive patterns of exercise in individuals who exercise in order to maintain or improve athletic performance. As with IA, endurance athletes have been identified as most susceptible to exercise dependence

(Bingol & Bayansalduz, 2016), but the reasons for this increased susceptibility have not yet been thoroughly investigated. This creates the third point of interest for the study: the intersection of sport type, IA, and exercise dependence. By placing eating pathology on a continuum of distress rather than objective physical criteria, the researcher of the study will offer a new perspective on the spectrum of eating disorder pathology in female athletes by examining the association between sport type, interoceptive awareness, and exercise dependence in an attempt to clarify the sport-specific circumstances contributing to eating pathology in female athletes. Lastly, the role of self-surveillance on female endurance athletes' body consciousness is the final point of interest in this study. High levels of self-surveillance have been found to be predictors of selfobjectification levels and high levels of body shame among female athletes (Pasricha et al., 2018; Sabiston et al., 2019), although research is still needed to determine if female athletes participating in endurance sports experience higher levels of self-surveillance than their nonendurance peers. The interplay between levels of self-surveillance and levels of interoceptive awareness could be important in identifying female athletes at risk for eating disorders. The author's review of the literature informed the development of her research questions.

Research Questions

Question 1: What factors predict eating disorders in female collegiate athletes?

Question 2: What factors predict disordered eating in female collegiate athletes?

Question 3: How does self-surveillance affect female endurance collegiate athletes?

Question 4: How does self-surveillance relate to interoceptive awareness in female collegiate athletes?

Question 5: Do endurance athletes differ from non-endurance athletes on their degree of exercise dependence, IA, and eating disorder symptoms?

Question 6: Similarly, do endurance athletes differ from non-endurance athletes on their degree of exercise dependence, IA, and disordered eating symptoms?

Glossary of Terms

Eating Disorders: Characterized by severe disturbances in eating behavior, body weight, and body image perception (Schmidt et al., 2016). Clinical eating disorders are those that are identified by the *DSM-5-TR* as meeting sufficient criteria. There are three primary types of eating disorders according to the *DSM-5-TR* (American Psychiatric Association, 2022) that are grouped by symptomatology: anorexia nervosa (AN), bulimia nervosa (BN), and binge eating disorder (BED). The *DSM-5*-TR has recently conceptualized "atypical" eating disorders as "those otherwise specified": avoidant/restrictive food intake (ARFID), pica, and atypical anorexia (American Psychiatric Association, 2022; Hay, 2020).

Disordered Eating: Also called subclinical eating disorders; conditions with higher levels of eating disorder symptoms than the general population but that do not meet criteria for a clinical eating disorder according to the behavioral and physical markers of the *DSM-5-TR* (American Psychiatric Association, 2022; Fitzgibbon et al., 2003).

Interoceptive Awareness (IA): Awareness of one's internal body states (Craig, 2003). IA functions as a window to emotional experience, and IA dysfunction has been linked to panic, anxiety, and eating disorders (Farb et al., 2015; Khalsa & Lapidus, 2016; Price & Hooven, 2018).

Body Trust: The experience of feeling as if the body is trustworthy and safe (Mehling et al., 2012). Body trust allows people to recognize bodily sensations like pain or fatigue as important and a signal of a deeper body state (Duffy et al., 2018; Mehling et al., 2012).

Self-Surveillance: Viewing one's body the way an outsider would (Frederickson & Roberts,

1997).

Exercise Dependence: A maladaptive pattern of exercise leading to clinically significant impairment or distress, with potential symptoms of tolerance, withdrawal, lack of control, time, reductions in other activities, and continuance in activities despite adverse consequences; exercise dependence is consistent with *DSM-5-TR* criteria for substance addictions (American Psychiatric Association, 2022; Duffy et al., 2018).

CHAPTER II

REVIEW OF THE LITERATURE

Eating Disorders

Research focused on eating disorders among female athletes has developed over the last 30 years. Sundgot-Borgen's (1994) revolutionary investigation of Norwegian female athletes found female athletes to be at a higher risk for eating disorders than their non-athlete counterparts. In her follow-up study, the author found higher eating disorder rates in female athletes who participated in sports where success was perceived to be dependent upon weight or aesthetic shape, such as gymnastics, dancing, or running, or weight-classed, like wrestling (Sundgot-Borgen, 1994). Interest in eating disorders among female athletes surged particularly after influential athletes like Michael Phelps and Mary Cain publicized their mental health concerns. Scholarship on eating disorder prevalence and triggers among female athletes has advanced significantly in the last 10 years, and much of the recent literature has shifted away from identifying at-risk athletes and onto external factors influencing eating disorder development.

Research on eating disorders among female athletes remains equivocal. While much of the existing research confirms higher rates of eating disorders in female athletes, some researchers have found no difference in prevalence rates among those who participate in regular exercise (Fulkerson et al., 1999; Smolak et al., 2000). Interestingly, a handful of researchers have found athletes to have lower incidences of eating disorders compared to their non-athlete peers (Rosendahl et al., 2009; Martinsen et al., 2010), suggesting that athletic participation for some people might act as a protective factor against body image concerns and eating disorder development.

Some of the equivocation in the research findings might stem from a lack of validated assessments for eating disorders designed for and normed specifically on athletes. Unclear diagnostic criteria, including too-stringent diagnostic criteria, might also account for a lack of consensus among psychologists regarding what constitutes problematic eating symptoms. The *DSM-5* (American Psychiatric Association, 2013) does not provide a systematic criterion for clinical significance of eating disorders, in which the severity of psychological distress is considered in diagnosis. The *DSM-5-TR* has been updated to consider interference with psychosocial functioning as a criterion for diagnosis, which could be impacted by distress (American Psychiatric Association, 2022). Criterion for clinical significance is used to avoid overdiagnosis, or "diagnostic inflation" (Mitchison et al., 2020, p. 982), when assessing individuals for mental disorders (Moynihan et al., 2018). Mitchison et al. (2020) found that, among a sample of Australian adolescents, the prevalence of eating disorders was reduced by 40% (to 13.1%) when a criterion for clinical significance was applied. However, the opposite might hold true for eating disorders: individuals might be denied an eating disorder diagnosis, and subsequent treatment, despite clinical levels of psychological distress. Mitchison and colleagues (2020) stressed the necessity of including distress and impairment of daily functioning associated with eating disorder symptoms when screening individuals for eating disorders.

Eating Disorder Assessments

The Eating Attitudes Test (EAT-26) is the most widely used questionnaire measuring disordered eating behaviors among collegiate athletes, used to assess athletes for excessive exercise, restricting food, and binging and purging behaviors (Pallotto et al., 2022; Pope et al., 2015). The EAT-26 was not specifically created for athletes, however, and recent efforts have

been made to develop a valid measure identifying athlete-specific symptoms of disordered eating. Preliminary research suggests that the Female Athlete Screening Tool (FAST) accurately identifies the three physical symptoms of the female athlete triad: amenorrhea (absence of menstruation), low bone mineral density, and malnutrition (Hinken, 2018). The Disordered Eating Screen for Athletes (DESA-6) is a promising new assessment tool that demonstrates success identifying early-emergence of disordered eating behaviors in both collegiate and adolescent athletes of all genders (Kennedy et al., 2021). There has been some success in measuring important information specific to athletes. Most recently, the Eating Disorders Screen for Athletes (EDSA), a brief screening tool designed for athletes, was validated for level of competition by comparing Division I college team athletes with club team members and sport type (lean versus non-lean; Hazzard et al., 2020).

Clinical Eating Disorders

Nearly one in seven boys and men and one in eight girls and women in the U.S. are estimated to have had an eating disorder by the time they turn 40, with transgender individuals reporting similar prevalence rates (Ferrucci et al., 2022; Ward et al., 2019). Eating disorders are characterized by severe disturbances in eating behavior, body weight, and body image perception (Schmidt et al., 2016). Clinical eating disorders are those that are identified by the *DSM-5-TR* meeting sufficient criteria. There are three primary types of eating disorders according to the *DSM-5-TR* (American Psychiatric Association, 2022) that are grouped by symptomatology: AN, BN, and BED. The *DSM-5-TR* has recently conceptualized three other eating disorders: ARFID, other specified, and unspecified (American Psychiatric Association, 2022; Hay, 2020). Notably, eating disorders have the second-highest mortality rate, next to opiate addiction (Smink et al., 2012), of all mental health disorders.

AN is characterized by internalization of the thin ideal and extreme weight-control behaviors with an inability to maintain a healthy body weight (American Psychiatric Association, 2013; Hay, 2020). Individuals with AN engage in restriction via self-starvation or compulsive exercise in order to avoid weight gain, though some individuals with AN also engage in binging and purging (Hay, 2020). Cognitive symptoms, such as elevated body image concerns that significantly affect self-worth and body dysmorphia, occur with AN (Hay, 2020). While low body weight could make an individual's suffering visible, AN is considered an ego-syntonic illness, such that it is consistent with the self-concept of the sufferer (Hail & Le Grange, 2018). Because of this, individuals with AN might be less open to treatment and less likely to self-report compared to individuals with an ego-dystonic disorder, like BN. Around 1.4% of women will experience AN in their lifetime, and many cases of AN develop in adolescence (Hay, 2020). AN has the highest mortality rates of all eating disorders. Mortality rates for AN are 5%, and one in five individuals with AN who died did so by suicide (Arcelus et al., 2011). Even for those who survive, research on recovery statistics is bleak: only 30–40% of individuals with AN make a full recovery (Steinhausen, 2009).

BN is marked by recurrent episodes of binge eating and purging with an associated loss of control. Occasionally, individuals with BN do not engage in compensatory behaviors to purge food intake but restrict food intake, engage in compulsive exercise, or engage in laxative use (American Psychiatric Association, 2013; Hay, 2020). Like their AN counterparts, individuals suffering from BN express shape overvaluation, shape and weight preoccupation, and restraint as symptoms of the disorder (Forrest et al., 2018). BN is considered ego-dystonic, unwanted by the sufferer (Hail & Le Grange, 2018). However, shame and secrecy might inhibit help-seeking behaviors or self-report. Like those with AN, suicidality is high among those with BN. Among a

group of adolescents with BN, 53% endorsed suicidal ideation, which was higher than adults with BN and the highest mortality rates among youth diagnosed with any eating disorder, as well as suicide attempts (Hail & Le Grange, 2018).

Recently included in the *DSM-5*, BED does not include purging and is characterized by consuming large quantities of food in short periods of time (American Psychiatric Association, 2013). Individuals engaging in binge eating often feel as if they cannot control their food intake and consequently feel distressed after episodes of binge eating (Hay, 2020). BED is the most prevalent of the three main eating disorders, with a prevalence rate for women at 2.8% (Hay, 2020). Individuals with BN and BED are generally associated with being at a normal weight or overweight, and both disorders have intersecting risk factors like childhood trauma (Swanson et al., 2011). Swanson and colleagues (2011) found that adolescents with BN and BED endorsed three or more classes of comorbid disorders, particularly mood and anxiety disorders (27% for BN, 37% for BED). Individuals with BED also endorsed suicide plans and attempts, according to Swanson and colleagues (2011).

Atypical anorexia, a recent classification added to the *DSM-5* (American Psychiatric Association, 2013), contains much of the same criteria of AN without the weight-loss criterion. Before revision of the *DSM* criteria, eating disorder not otherwise specified (EDNOS) was the most prevalent eating disorder diagnosis, with almost all individuals diagnosed unable to meet the weight specifications for a specific diagnosis (Moskowitz & Weiselberg, 2017). Individuals at a higher weight might lose a significant amount of weight but not meet criteria to be diagnosed as underweight, increasing accessibility to an eating disorder diagnosis and subsequent care. Among adolescents already diagnosed with an eating disorder, approximately 30% qualified for an atypical anorexia diagnosis (Moskowitz & Weiselberg, 2017). Although

atypical presentations are often overlooked in clinical settings, individuals with atypical anorexia have twice the death rates of their non-eating disordered peers (Neglia, 2021).

Eating disorders typically onset in early adulthood, and eating disorders are highly prevalent in adolescence. Total eating disorder prevalence rates range from 6-8%, and 75% of those with an AN diagnosis had early onset before 22 years of years of age (Volpe et al., 2016). In the same study, 83.3% of individuals with BN were diagnosed before 24 years of age. Though BED age of onset was more varied, and the risk of onset remained stable across ages, the mean age of onset was 23.3 years. In younger populations, an inability to identify conceptual concerns, like the influence of shape and weight, or cultural messages, might affect diagnosis, treatment, and prevalence rates.

Fairburn and colleagues' (2003) transdiagnostic model of eating disorders identifies a dysfunctional self-perception at the core of eating disorder formation, with perfectionism, high levels of harm avoidance, low levels of self-esteem, and interpersonal difficulty as core components of eating disorder development and maintenance. Fairburn et al. posited that eating disorders' distinctive yet shared features are maintained through similar psychopathological processes. Fairburn et al.'s theory encompasses the spectrum of eating disorder diagnoses and suggests that common mechanisms perpetuate eating disorder severity.

Eating Disorders in Athletes

Athletes are at a higher-risk for developing an eating disorder than their non-athlete counterparts, and collegiate and elite-level female athletes are a particularly high-risk group (Greenleaf et al., 2009; Mancine, Gufsa, et al., 2020; Smolak et al., 2000). Clinical eating disorders range from 2.0-19.9% prevalence among collegiate and elite-level athletes (American Psychiatric Association, 2013; Thompson et al., 2021). True prevalence rates of clinical eating

disorders among athletes are unknown, as underreporting likely occurs. Athletes experience AN commonly and at higher rates than their non-athlete peers. In a study on Norwegian athletes, around 18% of athletes exhibited symptoms of AN, whereas only 5% of non-athletes exhibited AN symptoms (Vayalapalli et al., 2018). In another study, 33% of athletes reported engaging in at least one weight control behavior (Walter et al., 2022). The most frequently reported weight control methods were permanent dieting and increased exercising. Neuroimaging showed athletes' brains require more effort and complex thinking when shown images of food than exercising suggesting that, in athletes, exercise or any form of physical activity is viewed as a reflex and requires less processing as the brain views exercise as a habit, more so than eating (Walter et al., 2022).

Among classes of female athletes, those who practice endurance, aesthetic, and weightclass sports (e.g., gymnastics, figure skating, and wrestling) have higher eating disorder prevalence rates than ball sports. Women participating in sports that emphasize leanness as a performance predictor or aesthetic preference (e.g., gymnastics, diving, and long-distance running) report more clinical eating disorders (46.7%) compared to women who participate in sports that do not emphasize leanness (19.8%) and non-athletes (21.4%; Torstveit et al., 2008). Individual sports, in contrast with team-based sports, present higher risks for athletes developing eating disorder symptomatology, as do endurance sports (Neglia, 2021). Athletes in lean sports often engage in weight-control behaviors in order to maintain a body type or weight that is conducive to sport-specific expectations. Athletes who participate in lean sports more commonly engage in restrictive eating, fasting, laxative use, diet pills, excessive exercise, or other risky behaviors regarded as disordered eating to control body shape or enhance performance

(Chatterton & Petrie, 2013). This does not mean, however, that non-lean sport athletes should be disregarded. In a recent study, female athletes in non-lean sports reported higher scores on the attitudinal portion of the EAT-26, indicating that while non-lean athletes experience similar levels of eating disordered thoughts, they might be less likely to engage in weight-control behaviors (McDonald et al., 2020). Weight-class athletes face unique pressures to maintain or change body weight. Research suggests that around 70% of weight-class athletes will exhibit AN symptoms to reduce their weight before competition (Joy et al., 2016).

Fairburn and colleagues' model (2003) has been validated with athletic populations. While sport-related factors might be more influential in eating disorder formation in athletic populations than general eating disorder risk factors (Bonci et al., 2008), clinical perfectionism, desire for autonomy, and low self-esteem remain stable in athletic populations (Martinsen et al., 2010). Due to the complex interplay between individual characteristics and environmental expectations, eating disorders often do not easily resolve when female athletes retire from collegiate sports. In a recent study, 51% of athletes in the disordered eating category of their study remained disordered in the 2 years following their retirement from sports, and 23.5% moved into the disordered group after their retirement (Thompson et al., 2021). Athletes voiced an intention to restrict their food intake, expressed body dissatisfaction, and noted pressure to exercise affected their outcomes in the following 6 years post-retirement. The findings were consistent with previous studies in which female athletes' concerns about body image, food consumption, and exercise remain relatively stable over time and extend into the life of an athlete long after they retire from sports (Anderson et al., 2012; Krentz & Warschburger, 2013). These results emphasize the necessity of targeting interventions toward current student athletes. Of note, those in the healthy group of the study remained healthy across time.

Subclinical Eating Disorders

Subclinical eating disorders, also referred to as disordered eating, are conditions with higher levels of eating disorder symptoms than the general population but that do not meet criteria for a clinical eating disorder according to the behavioral and physical markers of the *DSM-5-TR* (American Psychiatric Association, 2022; Fitzgibbon et al., 2003). Subclinical eating disorders cause significant psychological impairment, and there appears to be little difference in severity of psychological symptoms between clinical and subclinical disorders (MangwethMatzek et al., 2014; Mitchison et al., 2012; Swanson et al., 2011).

Prevalence rates for subclinical eating disorders are likely affected by individuals who present clinically significant symptoms but fail to meet diagnostic criteria. When considering subclinical presentations of BN, prevalence rates rose significantly, from 1-1.5% to 14-22% (Jones et al., 2001; Swanson et al., 2011). Swanson and colleagues (2011) found that among people with AN, inclusion of dimensional assessments and subclinical symptoms increased prevalence rates significantly, specifically in adolescents. Among adolescents with an eating disorder, fewer than 5% received treatment. The authors concluded that the spectrum of eating disorders and accompanying behavior was likely more expansive than originally thought, a possibility that would affect the conceptualization of eating disorders in adolescents.

Subclinical Eating Disorders in Athletes

Anorexia athletica (AA), not a formally recognized form of eating disorder, refers to the unique signs and causes of anorexia found among athletes. The term was introduced in the early 1990s by eating disorder research pioneer Sundgot-Borgen (1993) to better understand eating disorder symptomatology and presentations unique to athletes. Sudi and colleagues (2004) defined AA as a state of reduced energy intake and reduced body mass despite high physical

performance. Though AA resembles AN in terms of distorted body image and symptom presentation, AA does not have the full weight-loss criteria of AN, making it a subclinical eating disorder (Sudi et al., 2004). Athletes are often under the weight or body mass index (BMI) of the general population, making it difficult for clinicians to distinguish eating disorder concerns. While many clinicians use the traditional weight criteria of the *DSM* (American Psychiatric Association, 2013), Golubnitschaja et al. (2021) suggested that normal BMI does not correlate to well-being. Even if an individual is at a conventionally normal weight but engaging in disordered eating, the individual is at risk for several health concerns like sleep deprivation, systemic inflammation, and metabolic dysfunction (Golubnitschaja et al., 2021). In lean but suboptimal weight profiles, gut microbiomes can be disrupted resulting in intestinal issues like IBS. Amenorrhea, the cessation of menstruation, can occur; while many symptoms can remit following increased nutrition, amenorrhea may become chronic if restriction has been maintained for an extended period of time (Golubnitschaja et al., 2021; Marí-Sanchis et al., 2022).

Similarly, athletes undergo periods of fast growth and increased muscle mass during adolescence, leaving some female athletes with higher levels of muscle mass than their nonathlete peers (Pustivšek, 2019). While it might be assumed that only underweight athletes are susceptible to disordered eating, Pustivšek (2019) found that at-risk athletes have significantly higher values of BMI percentiles and higher percentages of fat mass. Relative energy deficiency in sport syndrome (RED-S) is a potential symptom of disordered eating. Formerly known as the female athlete triad, RED-S represents the spectrum of complications and conditions characterized by low energy availability with or without disordered eating, menstrual dysfunction, and low bone mineral density (Brown et al., 2017). Low energy may arise from a

failure to maintain the adequate nutrition needed to sustain high intensity exercise, which might arise intentionally or unintentionally. Low energy availability through methods of purging, restriction, or use of compulsive exercise and laxative can be used as a qualification for a formal eating disorder diagnosis (Brown et al., 2017). RED-S symptoms generally present as medical conditions like stress fractures and might not raise suspicion of disordered eating patterns. However, it is important that psychologists and therapists assess psychological symptoms associated with RED-S, including depressive symptoms, judgment and concentration problems, and compulsive exercise, especially in those at risk for disordered eating (Kerrigan et al., 2019; Lydecker et al., 2021).

The same mechanisms that maintain eating disorders have been found in disordered eating, particularly among athletes. The prevalence of disordered eating behaviors is higher in the college-aged population, regardless of receiving a formal eating disorder diagnosis (Joy et al., 2016; Martinsen et al., 2010). Athletes in sports emphasizing leanness such a swimming and cross-country running reported higher disordered eating behaviors, like use of laxatives, purging, and excessive exercise than those in non-lean sports (Reinking & Alexander, 2005; SundgotBorgen, 1993), and women in sports emphasizing leanness engaged in more disordered eating behaviors than their male counterparts (Martinsen et al., 2010; Stoyel et al., 2020). Stoyel and colleagues (2020) found that disordered eating rates increased in athletes during the off-season of their sports, suggesting that athletes are more susceptible to sociocultural pressures during periods of lessened physical activity. Stoyel et al. (2020) asserted that sports pressure might not directly affect development of BN and BED; Of note, the longer an athlete participates in sport, the more sport-specific pressure affects the athlete, with athletes who have participated in sports for over 9 years most affected by disordered eating (Stoyel et al., 2020).

Subclinical eating disorder behaviors have not been comprehensively operationalized within the sports community, leaving coaches, athletic trainers, and the athletes themselves to determine when a behavior becomes problematic (Chapa et al., 2018; DiPasquale & Petrie, 2013; Greenleaf et al., 2009). A lack of standardization and misconceptions about disordered eating and an individual's weight could delay early intervention among female athletes and inhibit athletic trainers and psychological professionals from identifying at-risk athletes. The study aims to contribute information about sport-specific variables that might affect athlete symptomatology and distress, improving the conceptualization of athletes who are experiencing distress or impairment from disordered eating.

Interoceptive Awareness

IA is awareness of one's internal body states (Craig, 2003). IA allows people an understanding of the "material me," communicating feelings of pain, hunger, thirst, and itches (Craig, 2003). IA forms the foundation for emotion regulation. Price and Hooven (2018) defined emotion regulation as "a coherent relationship with the self, specifically communication between mind, body, and feelings" (p. 3). IA functions as a window to emotional experience, and IA dysfunction has been linked to panic, anxiety, and eating disorders (Farb et al., 2015; Khalsa & Lapidus, 2016; Price & Hooven, 2018).

William James theorized that the body controlled a pattern of emotional responses necessary for survival (James, 1884/1948). While originally an evolutionary theory, theories of IA have evolved to incorporate cognitive and emotional purposes. Damasio's (1996) somatic marker theory introduced IA as sensitivity to body signals and cues. IA represents a complex series of systems working to make the unconscious conscious by processing inner sensations and translating them into emotion (Price & Hooven, 2018). When people ignore their bodily signals

perceived by IA over time, the body may become less sensitive and responsive to body cues (Price & Hooven, 2018). Mehling and colleagues (2012) delineated IA as adaptive or maladaptive. Focus on immediate experienced feelings is a productive use of IA, while abstract self-rumination and hypervigilance proves maladaptive. Mehling et al. (2012) identified eight separate components of IA, including body trust, noticing, and emotional awareness. The construct of body trust is most salient to the study, as it relates to overall IA and eating disorders, two constructs that will be investigated in the study.

Role of IA in Athletes

Physical activity manipulates afferent input entering the interoceptive system via the central nervous system (Craig, 2003). In the central nervous system, interoceptive mechanisms work to maintain allostasis and moderate goal-directed behavior (Craig, 2006; Hossack, 1987). If IA is high, the individual's perception of fatigue aligns with the actual state of bodily fatigue. The individual can subsequently regulate their physical activity accurately as well as increase physical activity levels, which in turn bolsters interoceptive accuracy, in a process called a feedback loop (Wallman-Jones et al., 2021). If IA is low, and an individual's perception of body signals is inconsistent with the actual body state, physical activity may cease or continue past healthy levels, leading to a negative evaluation of one's body and a sense of lack of control (LeyFlores et al., 2019; Wallman-Jones et al., 2021). It appears that motivation could override interoceptive cues in cases of intense physical activity, explaining why elite athletes are capable of pushing the boundaries of human capability, whereas non-athletes might stop due to injury or fatigue (McCormick et al., 2015).

Interpretation of pain is significant in the psychological profile of an athlete. Many researchers have found that athletes, regardless of sport, are less sensitive to pain, and more

tolerant of it, than non-athletes (Assa et al., 2019; Thornton et al., 2017). There is speculation about how this occurs. Assa and colleagues (2019) suggested that the continuous exposure to pain might cause an adaptation to tolerate it or that athletes might simply be less vigilant to pain than non-athletes. Although a higher pain-tolerance might be adaptive for an athlete, it might also put the athlete at a higher risk for low interoceptive awareness and eating disorders as individuals diagnosed with eating disorders, particularly those with binging and purging subtypes, were found to have elevated pain thresholds (Papežova et al., 2005).

Role of IA in Endurance Athletes

Overriding physical cues are often believed to be necessary for endurance athletes since endurance athletes train to manage pain for extended periods of time. There are many definitions of endurance athletes. Assa and colleagues (2019) classified endurance athletes as those "who perform continuous aerobic exercise for prolonged durations" (p. 2). Endurance sports appear to be different from other types of sports (e.g., power, strength, and ball sports) by the duration of time the athlete engages in the activity. Endurance athletes are often classified as those who participate in the sports included in a triathlon: swimming, cycling, and running (Assa et al., 2019). There is little research examining sport-specific IA. One exception was Hirao et al. (2020), who found that long-distance runners have inferior IA associated with attention control of their own bodies compared to their sprinting peers. Endurance athletes might be more motivated to tolerate pain, as they reported a feeling of euphoria after training as well as brain activation in pain modulation regions (Assa et al., 2019; Scheef et al., 2012). The brain activation in pain modulation regions when training is particularly salient, as the brain is activated similarly when forgoing food in individuals with AN (Kaye et al., 2009), although activity in the rewardcircuit portion of the brain in individuals with AN is not well understood.

More research is needed to identify how endurance athletes use IA to override interoceptive interpretations of fatigue and whether this is correlated with AN symptomatology in athletes.

Body Trust

Body trust is defined as "the experience of one's body as safe and trustworthy" (Mehling et al., 2012, p. 10). Body trust allows people to recognize bodily sensations like pain or fatigue as important and a signal of a deeper body state (Duffy et al., 2018; Mehling et al., 2012). Individuals high in body trust likely consider their bodily states when making decisions regarding their health and well-being, referred to as mindfulness. High levels of body trust are negatively associated with trait anxiety, dissociation, and poor stress management skills (Duffy et al., 2018; Mehling et al., 2012; Price & Hooven, 2018). Body mistrust is a key predictor of disordered eating development and body image concerns (Poovey et al., 2022).

High levels of body trust allow athletes to better deal with unexpected situations and stressors. Athletes high in body trusting demonstrate the ability to regulate perceived stress by reducing negative stress and increasing positive stress (di Fronso et al., 2022). To the researcher's knowledge, there are no studies linking levels of body trust to an athlete's risk of eating disorders, particularly within endurance sports.

Self-Objectification

When subscribing to cultural perceptions of women's bodies, women might begin to view and monitor their bodies from an outsider's perspective. Frederickson and Roberts (1997) posited through their theory of self-objectification that prevalent cultural attitudes toward the function and purpose of women's bodies lead women to evaluate their bodies in terms of physical attractiveness instead of physical effectiveness. Self-objectification has been suggested

as an important causal factor in women's mental health, particularly in the formation of eating disorders, body shame, and anxiety (Fredrickson & Roberts, 1997; Myers & Crowther, 2008; Voelker et al., 2021). IA may be a contributing factor to self-objectification. Ainley and Tsakiris (2013) found that high self-objectification was predicted by low IA, suggesting that women who have low IA might also miss interoceptive cues related to their emotions. Similarly, Myers and Crowther (2008) suggested that an inability to identify and describe internal emotional states is a potential pathway connecting missing interoceptive cues to disordered eating.

Self-surveillance, which is viewing one's body the way an outsider would, is a distinct component of self-objectification. Female athletes might exhibit particularly high levels of body surveillance. Pasricha and colleagues (2018) found that female athletes who endorse higher levels of self-surveillance are also more likely to endorse higher levels of self-objectification. While evaluating one's body in terms of its effectiveness and adaptability has been shown to be a protective factor against self-surveillance and body shame, the emphasis of the body's appearance on athletic performance might be harmful to female athletes' body perceptions (Tylka & Wood-Barcalow, 2015). Female athletes might experience cognitive dissonance between the necessity of cultivating an athletic physique that often contradicts the Western idealized body type, which contributes to higher levels of body shame (Voelker et al., 2021). Cosh and colleagues (2015) proposed that the goal of continual improvement in athletic settings inadvertently encourages athletes to practice self-surveillance and body regulation, leaving female athletes vulnerable to eating disorders. In a longitudinal study, Sabiston and colleagues (2019) found body surveillance predicted increased body shame in athletes and that body shame increased over time, suggesting that the sporting context plays a role in body surveillance practices.

Many self-surveillance practices are normalized or encouraged by coaches and teammates. Willson and Kerr (2022) found that female athletes on national teams for aesthetic sports described routine weigh-ins in front of teammates. Athletes reported that coaches and training staff monitored the athletes' bodies and put them on restrictive diets in order to maintain the shape and size perceived to be necessary for success. Many of the athletes interviewed reported developing eating disorders after years of disordered eating practices that affected their lives after retiring from elite sport.

Even in sports that do not emphasize leanness or view the body aesthetically, athletes are often exposed to both positive and negative body comments. Female athletes might receive compliments (e.g., "You have the perfect body") due to their athletic physique; such compliments are associated with higher body dissatisfaction in women, particularly among women who demonstrate greater self-objectification (Calogero et al., 2009). Similarly, engaging in or overhearing fat talk, which is making negative comments about one's own body in the presence of others, also affects athletes' valuation of their own size and shape (Nichter & Vuckovic, 1994). Simply overhearing fat talk has been correlated with increased body dissatisfaction and body-related shame (Mills & Fuller-Tyszkiewicz, 2017). Lucibello and colleagues (2021) found that even performance-based body talk negatively impacted athletes' body perceptions. In interviews with female athletes, comments made by coaches and parents about athletes' size on opposing teams affected players' perceptions of their own bodies, even when the comments were made in reference to strategy or performance tactics. In response to these comments, athletes reported questioning others' perspectives of their bodies and making comparisons between their own bodies and those of their teammates and competitors. As such, teammates are also highly influential in athletes engaging in eating disorder behaviors. Athletes

in non-lean sports are more likely to imitate problematic eating behaviors of their teammates than athletes in lean sports, presumably because there is a larger discrepancy between the cultural thin-ideal and normative body shape in non-lean sports (Scott et al., 2022).

For athletes, sport-specific body surveillance might affect eating disorder symptomatology more than general sociocultural ideas toward beauty. Barrett and Petrie (2020) found that pressures unique to the sporting environment, particularly those that emphasized body shape and weight such as by utilizing form-fitting uniforms, were more influential to athletes' body perception. Body surveillance related to athletic performance norms affected currently competing athletes' dietary intention (e.g., restriction or use of laxatives, purging) more than body surveillance related to general aesthetic expectations. Interestingly, retired athletes reported increased levels of body dissatisfaction, which they attributed to the effects of general sociocultural pressures that led to increased eating disorder symptoms. The effect of sport specific pressures and body surveillance on eating disorder outcomes is still speculatory, and the study aims to examine the connection between self-surveillance and vulnerability to eating disorders among athletes.

Interoception's Role in Eating Disorders

Interpreting hunger/satiety cues is particularly important when considering eating disorders. Research supports the connection between the strength of hunger/satiety cues and eating disorder development. In college and young adult populations, those who reported less reliance on hunger/satiety cues for food consumption reported higher scores of facets of disordered eating and body image concerns (Linardon & Mitchell, 2017). Similarly, individuals diagnosed with an eating disorder reported less reliance on hunger/ satiety cues than their counterparts without eating disorders (van Dyck et al., 2016). Poovey et al. (2022) found that the

strength of IA in hunger/satiety cues could be related to the type of eating disorder behavior in which people engage: those with AN demonstrated lower IA than controls (Pollatos et al., 2008). Hunger/satiety-specific cues predicted binging and purging behaviors as well as mental restriction, but not food restriction (Poovey et al., 2022).

There is still much to be discovered about the correlation between IA and disordered eating. There has been little research indicating whether poor IA helps create or sustain disordered eating patterns or whether disordered eating inhibits proper IA functioning. Should IA continue to be suppressed after weight restoration in eating disorder recovery, a potential phenotype for eating disorder development should be considered (Martin et al., 2019). Similarly, there is little research investigating associations between interoceptive variability in athletes and disordered eating symptomatology. Emerging research on the feedback loop of interoceptive cues indicates that there is a decrease in interoceptive ability during long periods of exercise, which suggests that endurance athletes might be at a higher risk for developing eating disorders and related issues. This is an important line of inquiry to further illuminate eating disorder risk factors for female athletes.

Exercise Dependence

Exercise dependence is a maladaptive pattern of exercise leading to clinically significant impairment or distress, with potential symptoms of tolerance, withdrawal, lack of control, time, reductions in other activities, and continuance in activities despite adverse consequences; exercise dependence is consistent with *DSM-5-TR* criteria for substance addictions (American Psychiatric Association, 2022; Duffy et al., 2018). Exercise-dependent individuals may continue exercising despite adverse consequences of injury and illness, often incurring overuse injuries and reduced performance overall (Duffy et al., 2018).

Exercise dependence first appeared in the literature in 1984, when Sachs and Pargman used the term *running addiction* to describe the withdrawal symptoms runners experienced during periods of running deprivation (Sachs & Pargman, 1984). The conceptualization of exercise dependence remains unclear: exercise dependence has been classified as both a primary disorder, in that engaging in it reduces negative affect, and a secondary symptom to eating disorders to control shape and weight (Bamber et al., 2003; Cunningham et al., 2016). While there have been many diagnostic models used to conceptualize exercise dependence, the overarching theory is rooted in affect-regulation strategies. This research has identified primary exercise dependence to carry addictive qualities to it, while secondary exercise dependence has been found to carry compulsive qualities.

Exercise Dependence in Athletes

Sports participation has long been lauded as an avenue for the development of higher self-esteem, lower rates of depression and anxiety, and the development of leadership skills (McMahon et al., 2017). However, participation in elite-level sports might introduce some room for caution. High-level athletes are frequently exposed to high levels of pain and studies between contact and non-contact sports and athletes vs. non- athletes have demonstrated that exposure to exercise-related pain can increase pain tolerance over time (Duffy et al., 2018). Such repeated exposure could lead to exercise dependence.

Flatt and colleagues (2021) found that athletes reported a 40% higher rate of compulsive exercise episodes than non-athletes, and simply identifying as an athlete heightened rates of compulsive exercise. In a sample of 234 elite Australian athletes, nearly 64% of athletes demonstrated exercise dependence, and athletes exhibiting exercise dependence held more extreme and maladaptive beliefs about exercise than their non-dependent counterparts

(McNamara & McCabe, 2012). Lichtenstein et al. (2021) found that the highest risk for exercise dependence occurred in athletes 15-19 years old. Approximately 16% of athletes in the high-risk exercise category displayed eating disorder symptoms. Exercise-dependent athletes also reported higher levels of order pressure from coaches and teammates and lower social support than nondependent athletes.

Exercise dependence could also be conceptualized as a coping skill for stress, though it is difficult to determine the relationship's directionality. In some cases, AN develops as a coping strategy for exercise-induced emotional stress (Vayalapalli et al., 2018). This strategy involves emotion suppression, which causes illogical responses and behaviors to situations in which a "normal" response is expected. Emotion suppression can cause an individual to engage in activities they know will harm them, creating cognitive dissonance. It is also possible that stressors could arise from non-exercise factors, with the individual exercising as a way to relieve stress (Vayalapalli et al., 2018). Although there is evidence that sports participation acts as both a buffer and a source of stress for collegiate athletes, there is little research investigating participation in sport as a coping skill or avoidance tactic among collegiate athletes (Kimball & Freysinger, 2003). The study aims to begin exploration into sport itself as a maladaptive coping mechanism, which could trigger ED symptoms.

Exercise Dependence in Endurance Athletes

Athletes participating in endurance sports might be at a higher risk for exercise dependence. In a sample composed largely of performance-oriented endurance athletes, exercise dependence rates were 30% higher than that of the general population (Hauk et al., 2020). Similar studies have found that exercise dependence was significantly higher in athletes participating in endurance sports compared to sports where training volume was less important

(Bingol & Bayansalduz, 2016; Di Lodovico et al., 2019). Interestingly, athletes who participated in team sports reported a lower sense of achievement than those participating in individual sports (Reche et al., 2018). Time spent exercising might be important to developing exercise dependence, as many endurance athletes spend long hours training. Athletes who spent less time on their workouts reported a reduced sense of accomplishment, whereas athletes who spent more time on workouts reported higher levels of physical and emotional exhaustion (Reche et al., 2018). Endurance athletes were more likely to exercise while injured because they perceive the benefits of exercising to be more beneficial than the risks (Nogueira et al., 2018); exercising while injured is characteristic of exercise dependence. Future research in this area could shed more light on the contributing factors to exercise dependence in endurance athletes.

Exercise Dependence and Eating Disorders

Exercise dependence is common in individuals with eating disorders. Up to 80% of individuals with AN and 73% of those with atypical anorexia experience exercise dependence (Dalle Grave et al., 2008; Sawyer et al., 2016). Cross-sectional research suggests that individuals with exercise dependence and ED pathology experience greater levels of addiction and compulsive qualities toward exercise than individuals who do not have an eating disorder pathology (Cook et al., 2014 Cunningham et al., 2016). Exercise dependence serves as a shortterm, maladaptive technique of coping with negative affect and emotions in a way similar to other maladaptive eating disorder behaviors (Swerdlow et al., 2020). IA could serve as a mediator between eating disorder pathology and exercise dependence, although researchers are unsure of the relationship between IA and exercise dependence in an eating disorder context.

Eating disorder symptoms and exercise dependence are connected, although it is unclear which disorder develops first. Zeulner and colleagues (2016) found a significant correlation

between disordered eating rates and exercise dependence in elite endurance athletes. Vayalapalli and colleagues (2018) suggested a causal relationship between compulsive exercise and AN, as athletes are required to regularly exercise in order to maintain a level of performance in their sport. Godoy-Izqueirdo et al. (2021) reported that up to 80% of athletes who exhibit disordered eating also show features of exercise dependence. Walter and colleagues (2022) found that around 30% of athletes reported using exercise outside of their sport as a weight-control method. In some cases, athletes continuing to train despite injury and illness is normalized, raising questions about the prevalence rates of exercise dependence in collegiate and national-level athletes.

Rationale and Hypotheses

The purpose of the study is to shed more light on the variables impacting ED/DE symptomatology in female collegiate athletes, particularly among endurance athletes. Participation in sports offers many benefits, but existing research suggests that aspects of the sports environment, or the demands of the sport itself, might contribute to eating disorders or disordered eating (Reel et al., 2013; Sabiston et al., 2020). Given the research on IA and exercise dependence, the researcher examined hypothesized associations between IA and exercise dependence, which might contribute to psychological distress and impairment in an athlete's eating behaviors and weight/shape. The researcher explored the association between IA and selfsurveillance levels in female athletes in order to better understand the effects of different sport types on eating disorder vulnerability. By isolating factors that might be amplified by the sporting environment, at-risk athletes might be better identified and treated before eating disorder symptomatology becomes life-threatening.

Hypothesis 1

Female collegiate athletes reporting higher levels of exercise dependence and lower levels of interoceptive awareness will be most likely to show signs of having an eating disorder.

Hypothesis 2

Female collegiate athletes reporting higher levels of exercise dependence and lower levels of interoceptive awareness will be most likely to show signs of disordered eating.

Hypothesis 3

Self-surveillance will be negatively associated with interoceptive awareness in female collegiate athletes.

Hypothesis 4

Female collegiate endurance athletes will report higher levels of self-surveillance than female collegiate non-endurance athletes.

Hypothesis 5

Female collegiate endurance athletes will report higher levels of exercise dependence, lower levels of IA, and more eating disorder symptoms than non-endurance athletes.

Hypothesis 6

Female collegiate endurance athletes will report higher levels of exercise dependence, lower levels of IA, and more disordered eating symptoms than non-endurance athletes.

CHAPTER III

METHODOLOGY

Participants

The researcher surveyed cisgender female collegiate athletes from varying athletic departments across the country. Although 93 individuals engaged with the survey, a total of 42 participants were excluded from the study due to completing less than 50% of the survey; the exclusion criterion was determined based on current best practices in order to preserve the generalizability of results. The investigator retained data from seven participants who completed 50% or more of the survey's instruments. Three additional responses were excluded due to the current study's inclusion criteria, which required that (a) participants are collegiate athletes in America, (b) athletes are classified under an amateur status, and (c) participants are 18 years of age or older. Thus, the final analysis sample consisted of 51 cisgender female collegiate athletes. No significant difference was found in age or ethnicity of participants who completed vs. those who did not complete at least 50% of the survey. Of note, there was a significant difference in years spent competing in sport between those who completed at least 50% of the survey and those who quit early, with participants who had spent more time in their sport over their lifetime dropping out of the survey earlier (M = 13.02, SD = 3.86) than participants who spent less time participating in their sport in their lifetime (M = 10.64, SD = 4.71), $t(67) = 2.15$, $p = .04$.

The majority of participants (80.4%; n = 61) identified as White, with 11.8% identifying as Hispanic/Latina. The remainder of participants identified as bi-ethnic or multiethnic (2%), Asian (2%), and American Indian/Alaska Native (3.9%). The participants ranged in age from 18 to 36 years. The average participant age was 20 years old (M = 20.70, SD = 2.93). Of the 19 sports listed on the survey, respondents competed in artistic swimming, basketball, cross

country, dance, field events, golf, gymnastics, soccer, softball, stunt, swimming, tennis, track events, and volleyball. Approximately 78% of respondents were non-endurance athletes (artistic swimming, basketball, dance, field events, golf, gymnastics, soccer, softball, stunt, tennis, volleyball), while

21% of respondents were endurance athletes (cross-country, swimming, and track events). Softball was the most endorsed sport in the study (30%), and two participants indicated competing in two collegiate sports. Participants represented DI, DII, DIII, and NAIA universities from Arkansas, California, Colorado, Idaho, Iowa, Kentucky, Michigan, Missouri, Oklahoma, Texas, and West Virginia. The majority of participants (62.8%) competed at a NAIA school, while the rest competed in a NCAA Division I (4%), Division II (17.7 %), or Division III (11.8%) school. Two participants did not provide the name of their school. Three states had an equal number of participants: Arkansas, Michigan, and Texas. More than half of the sample (68.5%) reported competing in their sport for 10 or more years. The longest time spent competing in one's sport was 18 years.

Upon running a power analysis (Faul et al., 2007), medium power suggests that for three response variables and two groups yielding a medium effect size with $\alpha = .05$, the minimum number of participants needed was 180, split into two groups of 90 participants who represented endurance and non-endurance sports. The sample in the current study fell short of the required number of participants to achieve reasonable power.

Procedure

Female collegiate athletes were recruited on a voluntary basis through recruiting emails the researcher sent to athletic departments across the country. The researcher also recruited through online sources, including social media platforms such as Facebook, Instagram, and

Reddit, as well as private Facebook groups for mental health and athletes. The researcher emailed the senior woman leaders, the highest-ranking woman in the athletic department, in athletic departments across the country. Recruitment emails were sent to the athletic director if there was not a senior woman leader on staff. Upon receiving the letter, the researcher requested the recruitment materials be forwarded to each athlete in the athletic department (see Appendix A). Prior to taking part in the study, participants indicated their informed consent (see Appendix B). Participants were provided with a list of mental health referrals including counseling and additional information within the informed consent (see Appendix C). Participants were also provided with a more thorough explanation of the study's scope and additional resources at the conclusion of the survey (see Appendix D). Participants then completed a demographic questionnaire (see Appendix E) and a series of online questionnaires and surveys including: the Multidimensional Assessment of Interoceptive Awareness- 2nd Version (MAIA-2; Mehling et al., 2018; see Appendix E), the Exercise Dependence Scale (EDS-21; Hausenblas & Downs, 2002; see Appendix F), the Objectified Body Consciousness Scale, Self-Surveillance Subscale (OBCS; McKinley & Hyde, 1996; see Appendix G), Eating Disorder Screen for Athletes (EDSA-6; Hazzard et al., 2020; see Appendix H), and the Disordered Eating Scale for Athletes (DESA-6; Kennedy et al., 2021; see Appendix I). Participation occurred online using PsychData, a secure site that collects participant data using a numerical identification system. The numerical identification system ensured confidentiality and maintained participant anonymity. Following the data collection, all participant data were analyzed using Version 28 of SPSS software.

Upon review of their specified sports, participants were placed into two categories: an endurance athlete or a non-endurance athlete. For the purpose of accurately designating sports as endurance and non-endurance sports, two pairs of disciplines commonly grouped together,

swimming and diving, and track and field, were split into four separate sports. The literature on how sports should be classified is ambivalent, but most studies concur that endurance sports are categorized primarily by activation of the aerobic energy system and the necessity for sustained energy (Hauck et al., 2020; McCormick et al., 2015). For this study, the researcher consulted the literature and divided the sports offered by local universities as the following: cross country, rowing, swimming, track events, and wrestling were designated endurance sports while artistic swimming, basketball, dance, diving, equestrian, field events, golf, gymnastics, soccer, softball, stunt, tennis, and volleyball were categorized as non-endurance sports. The researcher categorized sports based upon the energy demands placed upon the athlete when performing in competition rather than in practice, as most sports utilize endurance activities for training even if endurance performance is not needed for competition.

Instrumentation

There were six measures used in the proposed study and a demographic questionnaire, and the study was implemented using PsychData.

Demographic Questionnaire

The author administered a demographic questionnaire that asked participants for their age, race/ethnicity, sports background, and sport type. If athletes reported participating in more than one sport at the collegiate level and indicated that one of the sports they participated in was an endurance sport, the athlete was classified as an endurance athlete.

MAIA-2

The MAIA is one of the most widely used assessments for interoceptive bodily awareness (Mehling et al., 2018). The MAIA is a 32-item self-report assessment that measures eight dimensions of interoception. The eight categories assessed for are noticing, not-distracting,

not-worrying, attention regulation, emotional awareness, self-regulation, body listening, and trust. Not-distracting refers to the tendency to ignore or distract oneself from sensations of pain or discomfort, and not-worrying indicates emotional distress or worry when experiencing sensations of pain or discomfort. Participants answer questions on a Likert scale of 0-5 (*never* to *always*). Sample questions include "I trust my body sensations" and "I try to ignore pain."

Mehling and colleagues (2018) updated the original MAIA to include reverse scoring and 6 additional items to account for prior low internal consistency reliability. The MAIA-2 has 37 items, which improved internal consistency reliability. Body trust is a subsection of the MAIA-2, and it was used to measure body trust in the current study. The body trust subscale consists of three items: "I feel my body is a safe place," "I am at home in my body," and "I trust my body sensations." Participants rate the degree to which the statement applies to them on a 6-point Likert scale.

The MAIA-2 has improved reliability and internal consistency from the original version. Cronbach's alphas for each of the eight factors ($N = 1090$) ranged from 0.64 to 0.83 (Mehling et al., 2018). Two factors, noticing and not worrying, fell below the criterion of 0.70, at 0.64 and 0.67, respectively. The Cronbach's alphas for each of the eight factors for the current study ranged from 0.62 to 0.91 in the current study; the factors noticing and not worrying fell below the accepted criterion established in validation studies of 0.70, at 0.62 and 0.67, respectively. In past research, all item-scale correlations met the criterion alpha of 0.30 (Mehling et al., 2018). In validation studies, the strongest correlations were between self-regulation and body listening and between emotional awareness and body listening (Mehling et al., 2018).

EDS-21

The EDS-21 (Hausenblas & Downs, 2002) is a 21-item questionnaire designed to operationalize exercise dependence consistent with the *DSM-5-TR* criteria (American Psychiatric Association, 2022) for substance dependence. Participants are asked to answer on a Likert scale the frequency of exercise beliefs or behaviors within the last 3 months. Answers ranged from *never* (1) to *always* (6). The assessment provides a mean overall score of exercise dependence symptoms; a higher score indicates more exercise dependent symptoms. The assessment differentiates participants between at-risk for exercise dependence, nondependent-symptomatic, and nondependent asymptomatic. Differentiation is based on the seven *DSM-5 (*American Psychiatric Association, 2013) criteria for substance dependence: tolerance, withdrawal, intention effect, lack of control, time, reductions in other activities, and continuance. Scores as 56 on the exercise dependence scale are operationalized as dependence for that item, and participants who score in the 3-4 range are considered symptomatic for that item; both groups are considered at-risk for exercise dependence. Participants who score in the 1-2 category are considered asymptomatic.

Studies have shown that the EDS has acceptable test-retest and internal consistency reliability (Hausenblas & Downs, 2002). The test is widely used and is multidimensional, increasing its utility. The 7-factor model was confirmed, and the scales were internally consistent, with Cronbach's alphas ranging from 0.78 to 0.92 (Downs et al., 2004). Researchers found that those at risk for exercise dependence reported significantly more moderate and strenuous exercise than the nondependent symptomatic and asymptomatic groups, $p < .05$, which confirms prior research (Downs et al., 2004; Hausenblas & Downs, 2002). Cronbach's alphas for the current study ranged from 0.75 to 0.93, indicating acceptable to strong internal reliability.

OBCS

The surveillance subscale of the OBCS (McKinley & Hyde, 1996) was used in the current study to measure the degree to which athletes monitor their bodies in the way an outside observer would. The subscale has eight items, and participants answer questions such as "I rarely worry about how I look to other people." Participant answers are based on a Likert scale from 1 (*strongly disagree*) to 7 (*strongly agree*); mean scores for each item are calculated to create an index of self-surveillance, with higher scores indicating higher levels of body monitoring. The self-surveillance subscale has been found to be a significant predictor of body esteem, indicating the individuals who engage in self-surveillance are concerned more with how they appear to others than their own thoughts and feelings (McKinley & Hyde, 1996). To the researcher's knowledge, the self-surveillance subscale has not been used specifically for the purpose of investigating the relationship between body awareness and eating disorder symptomatology in female athletes, particularly those participating in endurance sports.

The OBCS demonstrates good test-retest reliability between the three subscales ($p <$ .001; McKinley & Hyde, 1996). The internal consistency of the surveillance scale was 0.79 and 0.76 for undergraduates and middle-aged women, respectively. The surveillance subscale had a moderate negative correlation with body esteem, $r(79) = -0.26$, $p < .05$, as well as being significantly related to public body consciousness, $r(79) = 0.46$, $p < .05$, indicating that selfsurveillance relates to the individual being concerned with how they are perceived by others (McKinley & Hyde, 1996). For the current study, the researcher calculated Cronbach's alpha as 0.79 for the self-surveillance subscale, indicating acceptable reliability.

EDSA

The EDSA (Hazzard et al., 2020) is a 6-item, one factor structure that assesses eating disorder risk in male and female athletes. The EDSA originated from the Female Athlete Screening Tool (McNulty et al., 2001) and the Female Athlete Triad Screening Questionnaire (Mountjoy et al., 2015). The EDSA focuses on gender-neutral body ideals and represents the core attitudinal features of eating disorders, such as weight concerns, dietary restraint, and the importance of weight (Cooper & Fairburn, 1987). Questions like "Do you worry if your weight, shape, or body composition will change if you cannot exercise?" on a 5-point Likert scale ranging from 1 (*never*) to 5 (*always*).

The EDSA has good internal consistency and is highly accurate in predicting eating disorder status in both genders, with corrected item-to-total correlations ranging from 0.60-0.75 for female athletes (Hazzard et al., 2020). Internal consistency was good for female athletes (α = 0.86). Cronbach's alpha of the current study was calculated to be 0.86, indicating good internal consistency. The EDSA also demonstrates excellent criterion validity with the EDE-Q (AUC = 0.92, 95% CI: 0.89-0.94). The EDSA had a sensitivity level of 0.96 and specificity level of .64 for female athletes (Hazzard et al., 2020). Validation studies indicate that the EDSA has strong measurement invariance by gender, level of competition (Division I versus club), and sport type (lean versus non-lean).

DESA-6

The DESA-6 is a 6-item screening instrument for disordered eating. Each of the six items is designed to evaluate a specific aspect of disordered eating that is unique to athletes, including fear of weight gain, frequency and severity of injuries, and the presence of pressure (Kennedy et al., 2021). A positive score of 3 or greater on the DESA-6 is indicative of

disordered eating risk in athletes. The questionnaire reflects the *DSM* criteria for both AN and BN (American Psychiatric Association, 2013; Kennedy et al., 2021).

The DESA-6 has been validated within athletic populations of adolescent athletes 13-19 years of age, and it is validated with the EAT-26, another instrument used in the current study (Kennedy et al., 2021). The instrument is currently the shortest screening tool available for DE, as well as the only known screening tool for adolescent athletes aged 13-19 of both genders and all sport types (Kennedy et al., 2021). There were 12 sports represented in the original sample, indicating the test was validated among a varied sample (Kennedy et al., 2021).

The DESA-6 has excellent validity, with sensitivity and specificity rates of 92% and 85.96% respectively when compared to clinical interview methods (Kennedy et al., 2021). When compared to the EDE 17.0, the DESA-6 demonstrated a strong positive correlation, indicating good concurrent validity (Kennedy et al., 2021). Test-retest reliability showed a significant positive correlation in females [$r\,(59) = 0.76$, $p < 0.001$], consistent with assessments like the AMDQ, EDE 17.0, and EAT-26 (Kennedy et al., 2021). Notably, likely due to its use of nominal data, Cronbach's alpha was not indicated in prior validation surveys. Accordingly, the current study did not report Cronbach's alpha.

CHAPTER IV

RESULTS

The goal of the current investigation was to determine the connection between eating disorder and disordered eating symptoms and levels of interoceptive awareness, body trust, self surveillance, and exercise dependence in female collegiate athletes participating in endurance and non-endurance sports. First, the researcher ensured all statistical assumptions were met. The data were consistent with assumptions. Once assumptions were checked and the data were determined to be normally distributed, the researcher calculated appropriate output scores for each measure. Specifically, each participant's average interoceptive awareness score, exercise dependence score, self-surveillance score, and risk for eating disorders and disordered eating was calculated by summing the subtotals of each measure.

Descriptive findings were assessed within the data. Additionally, more than half of participants (61%) reported that they were not happy with their current weight, and 51% of participants reported being told they should lose weight by someone other than a health professional, such as a coach, fellow athlete, or family member. Detailed scores on each measure by sport type can be found in Table 1. Correlations between each variable can be found in Table 2.

Table 1

Descriptive Data: Means and Standard Deviations on All Measures by Sport Type

	Endurance athletes			Non-Endurance athletes				
Measure	*n*	*M*	*SD*	*n*	*M*	*SD*	Possible range	Actual range
MAIA-2[a]	11	3.52	.55	40	3.28	0.70	0-6	2.19- 4.62
EDS-21[b]	10	4.33	1.40	36	3.82	1.04	0-7	2.48- 6.14
OBCS[c]	10	5.67	.99	36	5.07	1.15	0-7	2.67- 7
EDSA-6[d]	10	4.05	.70	34	3.68	0.92	0-6	1.50- 5
DESA-6[e]	10	1.67	.25	24	1.77	0.26	0-6	1.33- 2.17

Note: ED risk is identified at 3.33 or higher on the EDSA-6

[a]MAIA-2 = Multidimensional Assessment of Interoceptive Awareness, 2nd Edition

[b]EDS-21 = Exercise Dependence Scale

[c]OBSC = Objectified Body Consciousness Scale (only self-surveillance subscale used)

[d]EDSA-6 = Eating Disorder Screen for Athletes

[e]DESA-6 = Disordered Eating Screen for Athletes

Table 2

Total Correlations Between Measures

	N	*M*	*SD*	MAIA-2 total	EDS-21 total	OBCS total	EDSA-6 total	DESA-6 total
MAIA-2[a]	51	3.47	0.58	1	-.25	-.55**	-.39**	-.00
EDS-21[b]	46	3.93	1.13	-.25	1	.20	.32*	.02
OBCS[c]	46	5.20	1.13	-.55**	.20	1	.63**	.05
EDSA-6[d]	44	3.76	.88	-.39**	.32*	.63**	1	.12
DESA-6[e]	44	1.75	.26	-.00	.02	.05	.12	1

Note. means and standard deviations represent the entire sample

[a]Multidimensional Assessment of Interoceptive Awareness-2nd edition

[b]Exercise Dependence Scale

[c]Objectified Body Consciousness Scale, only self-surveillance subscale used

[d]Eating Disorder Screen for Athletes

[e]Disordered Eating Screen for Athletes

**. Correlation is significant at the .01 level (2 tailed)

*. Correlation is significant at the .05 level (2 tailed

Hypothesis 1

The researcher used a multiple regression analysis to test Hypothesis 1, which predicted that higher levels of exercise dependence and lower levels of IA would significantly predict eating disorder risk. There were two independent variables, exercise dependence and IA, and the dependent variable was eating disorder risk. Results of the regression found that IA was a significant predictor of eating disorder risk, B = -0.33, p = 0.03. Exercise dependence was not a significant predictor of eating disorder risk, B = .24, p = .13. Therefore, Hypothesis 1 was partially supported, $F(2,41) = 5.23$, p= 0.01, $R^2 = .20$.

Hypothesis 2

Hypothesis 2, which predicted that high levels of exercise dependence and low levels of IA would significantly predict disordered eating risk, was tested using multiple regression. There were two independent variables, exercise dependence and IA, and one dependent variable, disordered eating risk. Neither exercise dependence, B = 0.02, p = .91, nor IA, B = .00, p = .99, was a significant predictor of disordered eating risk. Therefore, Hypothesis 2 was not supported, $F(2,41) = .01$, p = .99, $R^2 = .02$.

Hypothesis 3

Hypothesis 3, which predicted that self-surveillance and IA would be negatively correlated, was tested using a correlation analysis. Results showed that there was a significant moderate negative correlation between levels of self-surveillance and levels of IA, indicating that participants who had lower levels of IA also reported higher levels of self-surveillance, $r(44)$ = -.55, p = <.001. Thus, Hypothesis 3 was found to be significant.

Hypothesis 4

Hypothesis 4, which predicted that endurance athletes would report higher levels of selfsurveillance than non-endurance athletes, was tested using an independent samples t-test. The independent variable was the type of athlete, endurance or non-endurance, and the dependent variable was the level of self-surveillance. Self-surveillance levels were found to be marginally different between endurance athletes (M = 5.67, SD = .99) and non-endurance athletes (M = 5.07, SD = 1.14), $t(43) = 1.50$, $p = .07$ in a one-tailed test. However, in a two-tailed t-test selfsurveillance levels were not found to be significant $t(43) = 1.50$, $p = .14$. Therefore, Hypothesis 4 was not supported.

Hypothesis 5

Hypothesis 5, which predicted higher levels of exercise dependence, IA, and eating disorder risk among endurance athletes than non-endurance athletes, was tested using a MANOVA. There was no significant difference in factors (exercise dependence, IA, and eating disorder risk) based on athlete type, $F(10,34) = .84$, $p = .48$; Wilk's lambda = 0.94. Thus, Hypothesis 5 was not supported.

Hypothesis 6

Hypothesis 6, which predicted higher levels exercise dependence, IA, and disordered eating risk among endurance athletes than non-endurance athletes, was tested using a MANOVA. There was no significant difference in factors (exercise dependence, IA, and disordered eating risk) based on athlete type, $F(10,34) = 1.16$, $p = .34$; Wilk's lambda = 0.92. Thus, Hypothesis 6 was not supported.

Exploratory Analysis

Based on findings from Hypothesis 3, additional correlation analyses were run for the other factors used in the current study. In a two-tailed analysis, eating disorder risk was found to

be significantly negatively correlated with IA, $r(44) = -.39$, $p = 01$ and significantly positively correlated with self-surveillance $r(44) = .63$, $p = < .001$. In a one-tailed analysis, eating disorder risk was found to be significantly positively correlated with exercise dependence, $r(44) = .32$, $p = .03$.

Although Hypotheses 5 and 6 revealed no statistically significant difference between endurance and non-endurance athletes in levels of IA, exercise dependence, self-surveillance, and eating disorder/disordered eating risk, endurance athletes scored higher on average on measures of exercise dependence ($M = 4.33$, $SD = 1.40$) than their non-endurance athlete counterparts ($M = 3.77$, $SD = 1.01$). Endurance athletes also scored higher on measures of eating disorder risk ($M = 4.05$, $SD = 0.71$) than non-endurance athletes ($M = 3.68$, $SD = 0.92$). Endurance athletes scored lower on measures of IA ($M = 3.37$, $SD = 0.67$) than non-endurance athletes ($M = 3.49$, $SD = 0.59$).

CHAPTER V

DISCUSSION

Summary of Findings

Although researchers have devoted more attention to investigating the causes behind eating disorders in female athletes, little is known about specific variables leading to risk for female collegiate athletes developing an eating disorder. Sport-specific variables like sport-type, training schedules, and expectations on different types of athletes have gone unexamined among researchers. Further, disordered eating is often categorized with eating disorders rather than separate terms to evaluate the separate risk of each among female athletes. Thus, this study aimed to gain insight into whether specific variables were related to athlete eating disorder and disordered eating risk. Perhaps the most compelling finding in the current correlation was between IA and eating disorder risk in female athletes. Consistent with predictions, IA was identified as a factor in developing an eating disorder, and statistical analyses revealed a negative correlation between IA and self-surveillance (H3), indicating the connection between an individual's ability to identify sensations in their body and the frequency and way in which an individual perceives their body. Both variables were significant in an athlete's eating disorder risk, indicating that there might be a relationship between IA and self-surveillance which impacts eating disorder formation. Notably, IA and self-surveillance were not found to be significant in an athlete's disordered eating risk (H2). A potential explanation for this lack of significance is the measure the researcher used to evaluate disordered eating risk. Disordered eating was measured with the DESA-6 (Kennedy et al., 2021) a new measure that has not undergone extensive validation testing. Scoring within the DESA-6 (Kennedy et al., 2021) is not standardized or provided to users of the measure, potentially affecting the assessment's validity.

While existing literature supports the idea that athletes participating in aesthetic sports develop eating disorders at higher rates than athletes competing in non-aesthetic sports, sportspecific variables like sport type and expectations on different types of athletes lack appropriate investigation and consideration within the research community. Thus, the researcher sought to investigate the differences between endurance and non-endurance athletes' risk of eating disorder/disordered eating and potential differences in variables affecting these conditions. Analyses did not indicate statistically significant differences in levels of IA, exercise dependence, and self-surveillance on eating disorder and disordered eating risk among endurance and non-endurance athletes (H4, 5, 6), although analyses did indicate marginal differences in self-surveillance among endurance and non-endurance athletes (H4), with endurance athletes reporting a higher average score of self-surveillance than non-endurance athletes. The lack of significance is likely due to the low power, and results like the marginal significance found in Hypothesis 4 indicate that significance might have been attained with a larger sample size. Additionally, there was a significantly larger number of non-endurance athletes who participated in the current study compared to endurance athletes. The discrepancy in the groups likely affected the analyses and should be explored in future research.

Despite these findings, exploratory analyses yielded interesting insight into the experiences of the female athletes who participated in the study. On average, endurance athletes reported lower scores on the MAIA-2 (Mehling et al., 2018) than non-endurance athletes, indicating that endurance athletes had lower levels of IA in the current sample. Additionally, endurance athletes reported higher scores of measures of exercise dependence and eating disorder risk on average. Of note, 75% of the participants scored at or above the cut-off score on measures assessing ED risk, which supports previous research on the prevalence of eating

disorders in the female athlete community (Thompson et al., 2021; Walter et al., 2022). Additionally, 51% of all participants reported being told that they should lose weight by someone other than a medical professional, replicating prior research that coaches, training staff, and peers can impact eating disorder and disordered eating risk among female athletes (Biesecker & Martz, 1999; Muscat & Long, 2008).

Integration of Findings With Existing Literature

The investigator aimed to explore gaps in current understanding surrounding eating disorder risk in female athletes, specifically variables affected by the type of sport in which an athlete participates. In particular, the researcher examined how IA, exercise dependence, and self-surveillance relates to eating disorder and disordered eating risk in both endurance nonendurance athletes. Results revealed a correlation between low levels of IA and higher eating disorder risk in female athletes, consistent with previous findings (Linardon & Mitchell, 2017), although discovering this relationship among female athletes makes a unique contribution to the literature.

Further, results from the current study revealed self-surveillance and IA to be negatively correlated among female athletes. To the researcher's knowledge, there is no prior research to definitively establish a relationship between IA and self-surveillance in female athletes; future research should seek to validate the results from the current study. The findings on how IA and self-surveillance affect eating disorder risk are sparse, although some researchers suggest that interoceptive awareness may contribute to self-objectification, of which self-surveillance is a component (Ainley & Tsakiris, 2013). Myers and Crowther (2008) suggested that an inability to identify and describe internal emotional states is a potential pathway connecting missing

interoceptive cues to disordered eating, although their study was not conducted with a female athlete population.

Results did not support the researcher's hypothesis that endurance athletes would exhibit significantly lower levels of IA than their non-endurance counterparts, contradicting Hirao and colleagues' findings (2020). However, research is ambiguous concerning differences in IA between endurance and non-endurance athletes, and more research is needed to establish whether there is a definitive connection. Results were marginally significant for higher levels of selfsurveillance among endurance athletes compared to non-endurance athletes, although limited power suggests caution in interpreting the current study's results. There is little research examining the differences in self-surveillance between endurance and non-endurance athletes, although Barrett and Petrie (2020) found that athletes competing in sports that required tight uniforms, weigh-ins, or other aesthetic requirements reported higher levels of self-surveillance. These researchers also found that body surveillance related to performance norms affected currently competing athletes' dietary intention (e.g., restriction or use of laxatives, purging) more than body surveillance related to general aesthetic expectations, suggesting a difference between sport type might exist.

Exercise dependence was not found to be a significant predictor of eating disorder risk in either endurance or non-endurance athletes. This is contrary to predictions and previous research; significant correlations have been found between disordered eating rates and exercise dependence in elite endurance athletes (Zeulner et al., 2016). However, there are few studies addressing exercise dependence among strictly classified endurance and non-endurance athletes; recent studies have examined exercise dependence loosely categorized sets of athletes, such as comparing athletes on the time they spend at practice (Di Lodovico et al., 2019; Reche et al.,

2018). Future studies could expand upon the current study's explorations by creating universally accepted criteria for endurance and non-endurance classifications. Additionally, in the current study, exercise dependence was not found to be a significant predictor of eating disorder or disordered eating risk among any athletes. To the researcher's knowledge, there is no previous research looking at the relationship between IA and exercise dependence and its impact on eating disorder and disordered eating risk.

Finally, there was no significant difference between eating disorder and disordered eating risk among endurance and non-endurance athletes in the current study, contrary to previous findings. Multiple studies have found that athletes in individual and endurance sports report higher prevalence of eating disorder and disordered eating symptoms than athletes in team-based and non-endurance sports (Neglia, 2021; Torstveit et al., 2008). However, endurance athletes in the current study reported higher scores on measures assessing for eating disorder and disordered eating risk than their non-endurance counterparts, suggesting that there is more research needed in this area with a larger sample.

Implications for Theory and Future Research

Although there is no specific theory of eating disorder and disordered eating oriented toward female athletes, Fairburn and colleagues' transdiagnostic theory (2003) remains a popular theory that views eating disorder/disordered eating symptoms on a spectrum. Fairburn et al. (2003) posited that eating disorder formation across individuals has a similar dysfunctional selfperception and shared characteristics like high levels of harm avoidance and low levels of selfesteem, and eating disorders are perpetuated through common mechanisms. Using Fairburn et al.'s model, it is not unreasonable to assume that female athletes, who comprise a distinctive group with common features and identity, would share common mechanisms that form and

perpetuate eating disorder severity. These sport-specific group differences can be seen in aggregate score difference on measures of IA, eating disorder risk, and exercise dependence based on sport type. Further, the correlation between IA and self-surveillance in female athletes might be a common mechanism that should be explored further. Although key elements of the model like clinical perfectionism, desire for autonomy, and low self-esteem have been validated in athletic populations (Martinsen et al., 2010), further research should seek to validate a new type of transdiagnostic model that contains variables salient to eating disorder risk that is inherent to the athletic environment (Cosh et al., 2015). Applying Fairburn et al.'s model (2003) to female collegiate athletes, researchers should continue to identify common mechanisms through which eating disorders occur among female athletes. Additionally, researchers should investigate latent factors in developing an eating disorder in endurance versus nonendurance athletes. Although the current study did not reveal significant differences, given the small sample size that compromised power, more research should be conducted to help identify the potential role sport type plays in the development of eating disorders. If common mechanisms can be identified specific to female athletes in future research, accurate screening tools can be developed, and susceptible groups of athletes can be accurately screened for eating disorder and disordered eating risk.

Self-objectification appears to be a salient factor among female athletes and should be considered as such. Consistent with Frederickson and Roberts' (1997) self-objectification theory, which theorized that prevalent cultural attitudes affect the way women perceive and evaluate their bodies, female athletes are immersed in unique cultural settings. Barrett and Petrie (2020) found that pressures unique to a sporting environment, like form-fitting uniforms, affected athletes' body perceptions more than general cultural pressures. Likewise, Cosh and colleagues

(2015) have suggested that emphasis on continual improvement and performance itself increases female athlete levels of self-surveillance, which in turn increases other deleterious effects such as disordered eating. While this line of inquiry has been facilitated particularly through Petrie and Greenleaf's etiological model of eating disorders (2012), more work needs to be done to determine whether there are sport-specific factors affect female collegiate athletes' levels of self-objectification and self-surveillance. Should there be environmental triggers among different groups of athletes, this could shed light on the eating disorder and disordered eating risk levels of female athletes, leading to improved screening protocols and better treatment outcomes. Research should continue to investigate the ways in which self-objectification manifests in female athlete environments.

Practice and Policy Implications of Findings

Eating disorders are complicated and notoriously difficult to treat, with little consensus on best practices for treating female athletes. It remains imperative that both practitioners and institutions act in accordance with best practices when treating female athletes with eating disorders. The current study aimed to isolate potential sport-specific factors in order to improve identification and treatment among female athletes. Current understanding emphasizes the difference in prevalence rates among lean and non-lean athlete groups, and researchers have begun to explore variables inherent to an athlete's sport as a contributing factor to eating disorder formation.

As such, many people who work with female athletes could benefit from the knowledge this study provides and future directions for research. Athletic trainers are often undereducated on eating disorder behaviors and risk among athletes, and as a result many do not feel comfortable working with athletes who have an eating disorder (Moore et al., 2022). Athletic

trainers could benefit from the finding that IA is negatively correlated with eating disorder risk, particularly when considering an athlete's propensity to report injuries or other medical issues. This knowledge could encourage athletic trainers to proactively assess for eating disorder and disordered eating behaviors, particularly during yearly physical examinations. Additionally, it could be helpful for athletic trainers and medical professionals to understand the relationship between self-surveillance and IA particularly at the macro level. By understanding the relationship between self-surveillance and IA, more athletes might be identified as high-risk for EDs if they score within the high-risk range for a particular measure.

Trainers and medical professionals could also benefit from understanding and promoting the concept of intuitive eating (IE) to female athletes. Proponents of IE encourage people to listen to internal hunger and fullness that cue the body to make decisions on meal choice and timing. Those who practice IE give themselves permission to eat all types of food to satisfy emotional as well as physical needs (Tribole & Resch, 1995). Although little research exists on IE levels in female athletes, researchers have found that IE practices reduce eating disorder and disordered eating risk, increase IA, and is associated with greater body acceptance in those who practice it (Linardon et al., 2021). Athletic trainers, in collaboration with coaches and mental health professionals, could begin educating female athletes on intuitive eating practices in order to increase IA in at-risk athletes. Practitioners could use IE to establish a baseline for IA, then work with athletes to systematically increase IA in a process similar to systematic desensitization. For athletes with extremely low IA, IE practices could function as a type of harm reduction strategy.

Coaches could particularly benefit from considering the results of this study. According to Berry and Fowler (2019), coaches account for 20-30% of the variation in team outcomes, and

a coaching style that is performance-related and preoccupied with body weight contributes to negative outcomes among female athletes (Biesecker & Martz, 1999). Given that 51% of athletes in this study reported being told that they needed to lose weight by a non-medical professional, coaches could benefit from assessing their current coaching style in context of their sport's requirements. Coaches could benefit from psychoeducation regarding their sport's risk factors; mental health professionals working with athletes can work collaboratively with coaches to create performance goals unrelated to body weight or shape. Coaches could also review literature on the influence of teammates on eating disorder risk-factors like fat talk and stay proactive in shaping team culture and norms (Mills & Fuller-Tyszkiewicz, 2017; Nichter & Vuckovic, 1994). One such example is the team meal. Athletes often eat together when traveling and usually have limited input on what they eat given travel constraints. Cosh and colleagues (2019) suggested that it was more important how coaches talked to athletes about their body and food rather than the actual food athletes ate. Given the results of this study, coaches should encourage athletes to pick quality meals that athletes enjoy eating. A component of IE, this practice could promote stronger IA and reduce stigma and fear around foods typically regarded as *bad* (Cosh et al., 2019). Coaches could also incorporate yoga practices into team routines, as emerging research suggests that practicing yoga can increase body trust and distress tolerance among female athletes (Rovig, 2021).

Psychologists and clinicians working with teams and athletes would benefit from the descriptive results from the current study. More than half of the athletes who participated in this study reported both being unhappy with their current weight and being at least minimum risk for an eating disorder, which indicated some level of distress from participants. The current data suggest that female athletes who are unhappy with their current weight are at risk to engage in

weight loss/control behaviors regardless of their weight (Hay, 2020; Moskowitz & Weiselberg, 2017), and clinicians should be mindful of this when assessing female athletes for eating disorders, particularly AN.

Clinicians working with female athletes should assess athletes broadly for distress pertaining to weight as well as levels of IA and self-surveillance. Since the current study indicated that female athletes report relatively low levels of IA, mental health professionals should not wait for athletes to self-report symptoms related to eating disorders or disordered eating. Clinicians should proactively screen for other conditions that might reveal and eating disorders or disordered eating such as IBS and the female athlete triad. Mental health professionals working with athletes should consider providing psychoeducation to athletes regarding sport-specific factors that are correlated with eating disorder and disordered eating risk; this psychoeducation and assessment effort could be utilized collaboratively with athletic trainers in outreach programming.

Finally, institutions committed to advancing the health and well-being of female athletes, like athletic directors and the NCAA, could benefit from the information this study provided. Descriptive findings from this study revealed the prevalence of eating disorder risk among female collegiate athletes from a variety of divisions and sport types. This study, and studies following it, could be used among academic institutions affiliated with the NCAA to eliminate barriers to distributing research to student athletes, which will be addressed further in the following section.

Study Limitations

There are several limitations to the current study that are notable. First, despite recruitment efforts by the investigator, the sample size was inadequate for the power needed. All

communication to athletes went through the senior woman's administrator (SWA), the highestranked woman in the athletic department. However, not all departments have an SWA position, in which case communication was subsequently sent to an athletic director or mental health liaison for athletes. The lack of standardization in who received the study requests in athletic departments may have contributed to a lack of responses. In addition, several SWAs were also head coaches of a specific sports team and could have forwarded the study to their athletes only, which could explain why some sports are overrepresented. Notably, the investigator received replies from many athletic departments who stated they would not distribute the survey request to athletes. Many reasons were given for this denial: some departments reported it was against school policy to distribute research generated from an outside institution, some reported that they did not distribute any surveys to athletes in order not to overwhelm the athletes, and many departments did not provide a rationale for their decision. As such, many potential participants likely would not have known about the study, limiting the researcher's pool of potential participants.

The NCAA has no regulating rules on distributing surveys to athletes, which allows athletic departments to create their own requirements for allowing access to their student athletes, which could enable gatekeeping and a desire to ignore potential issues in student athlete mental health. Another barrier to participant recruitment was a barrier for compensation. While compensating student athletes for their participation is allowed, regulations for compensation vary across NCAA divisions. For example, Division I allows student athletes to be compensated for athlete-specific studies if "the study is initiated and conducted by a faculty member at a member institution," but Division III allows student-athlete compensation for a study of which a student is a principal investigator provided "…it is for participation in an institutional study with

faculty oversight and the rest of the criteria of the bylaw is met" (NCAA, 2021; Bylaw 16.11.1.10.2).

In order to allow as many divisions as possible to participate as well as NAIA athletes, the researcher did not provide compensation to student athletes for completing the survey, and a lack of compensation may have affected recruitment. Taken together, the biggest limitation of the current study was its low sample size.

Another limitation of this study was its length. The study used five measures along with a demographic questionnaire. Several participants did not answer all five surveys, yielding incomplete data. It is possible more data would have been gathered if there had been fewer measures used in the assessment. Similarly, there was a plethora of validated measures to choose from for the variables measured in this study. While the DESA-6 underwent validity testing prior to this study (Kennedy et al., 2021), it is possible the measure itself hindered accurate results with the current sample. Had different measures for eating disorder and disordered eating risk been used, it is possible a different result would have been found in the current study. Similarly, the MAIA-2 contains two factors that fall below acceptable internal consistency for validity, which was acknowledged in validation studies (Mehling et al., 2018).

Another limitation in this study was the lack of agreement in the research community over the definitions of an endurance and non-endurance athlete. There are varying definitions of what constitutes a sport to be an endurance discipline, and researchers have not agreed upon criteria for classifying endurance and non-endurance athletes. As such, the researcher for this study classified participating athletes based upon the existing literature and current conceptualizations of endurance sports. However, a pre-existing classification system for athletes would standardize results and provide clarity when choosing and interpreting measures. The

current study lacked equal distributions between endurance and non-endurance athletes, and part of this result was due to the disproportion between endurance and non-endurance athletes in collegiate settings. Classifying athletes into broader categories of "endurance" and "nonendurance," such as "weight-dependent" and "non-weight dependent," or "skill-based" sports versus "power-based" sports might allow for more accurate and proportional categorization in future studies.

Study Strengths

Perhaps the biggest strength of the current study was its expansion into previously unexamined areas. The interplay of IA, exercise dependence, and self-surveillance among female athletes has rarely been addressed, and the current study provided avenues for researchers to replicate in the future. The study also utilized two new measures, the EDSA-6 (Hazzard et al., 2020) and the DESA-6 (Kennedy et al., 2021), which could provide useful data for the measures' respective strengths and limitations. Overall, the current study provided insight into the experiences of female student athletes across the country and affirmed the need for more research and preventative measures in order to accurately detect and treat eating disorders and disordered eating in female athletes.

Conclusion

The current study suggests that there is a relationship between variables that might affect eating disorders and disordered eating risk. Specifically, findings revealed that when an athlete has low levels of IA, they are at greater risk for eating disorder. Lower levels of IA also indicate higher levels of self-surveillance in the study's sample of female collegiate athletes. Inconsistent with researcher predictions, the type of sport an athlete participates in did not relate to levels of IA, exercise dependence, and self-surveillance, nor did sport type affect an athlete's risk of

eating disorders or disordered eating. However, low power and barriers to recruiting female athletes should be considered in the interpretation of the study's findings. Additionally, the findings of the current study emphasize the need for standardization of recruiting efforts, classification systems, and a sport-specific model of eating disorders when conducting research on female athletes. These findings have policy implications for athletic departments and the NCAA, particularly in allowing access to student athletes. Moreover, the descriptive findings in this study highlight the fact that distress surrounding one's body type and weight transcend division, region, or status.

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APPENDIX A

RECRUITMENT SCRIPT

Hello,

My name is Bailey Bickerstaff, and I am a Master's candidate in Counseling Psychology at Texas Woman's University. I am inviting you to participate in a research study (IRB approval #) which will explore experiences of female student athletes. You will be asked questions about your experiences of your body and sport. Your participation will help researchers understand more about how female athletes experience their sport, as well as what female athletes need in order to stay healthy and successful. As a former college athlete myself, I remember how I often felt isolated from those not participating and sports, and I think this is a great opportunity to communicate your experiences, positive or negative, and allow your voice to be heard. Participation is voluntary, and you may quit the study at any time. Your coach will not be informed if you have completed the study. If you are at least 18 years old, identify as a cisgender woman, and are a female student athlete in college, we welcome your participation. Please follow the link to complete this study:

We will work to ensure that all information remains confidential, but there is a potential risk of loss of confidentiality in all email, downloading, electronic meetings, and internet transactions. There is also a risk of experiencing emotional discomfort while taking this survey. Should you experience emotional discomfort, you can exit the survey.

If you have any questions or concerns, please email Bailey Bickerstaff at bbickerstaff1@twu.edu or her research advisor, Debra Mollen PhD at dmollen@twu.edu. Thank you for your time!

Best,

Bailey Bickerstaff, B.A.; M.A. Counseling Psychology Candidate, Texas Woman's University

APPENDIX B

INFORMED CONSENT

TEXAS WOMAN'S UNIVERSITY (TWU)

CONSENT TO PARTICIPATE IN RESEARCH

THE EXPERIENCES OF FEMALE COLLEGIATE ATHLETES

Principal Investigator: Bailey Bickerstaff (she/her) ..... bbickerstaff11@twu.edu
Faculty Advisor: Debra Mollen, PhD (she/her) ..... dmollen@twu.edu

Summary and Key Information about the Study

You are being asked to participate in a research study conducted by Bailey Bickerstaff, a graduate student at Texas Woman's University, as a part of her thesis. The purpose of this research is to investigate female collegiate athletes' experiences. You have been invited to participate in this study because you are a cisgender woman, and you are an athlete competing at the collegiate level. As a participant, you will be asked to take part in an online study regarding your experiences as a collegiate athlete.. The total time commitment for this study will be about 25 minutes. There is no compensation for participating in this study. The greatest risks of this study include potential loss of confidentiality and emotional discomfort. We will discuss these risks and the rest of the study procedures in greater detail below.

Your participation in this study is completely voluntary and you may withdraw from the study at any time without penalty. If you are interested in learning more about this study, please review this consent form carefully and take your time deciding whether or not you want to participate. Please feel free to ask the researcher any questions you have about the study at any time.

Description of Procedures

As a participant in this study, you will be asked to spend approximately 25 minutes completing an online study. The study will utilize several measures that will ask you questions about your nutritional and exercise habits and your experiences as an athlete. You will be automatically generated a code number so that identifying information will not be linked to your responses. In order to be a participant in this study, you must be a cisgender woman and a member of a collegiate sports team.

Potential Risks

A possible risk in this study is discomfort with these questions you are asked. Some questions will require an answer before moving on. However, if you become tired or upset, you may take breaks as needed. You may also stop answering questions at any time and end the study immediately by exiting the browser. We will provide you with a list of resources at the conclusion of the study.

Another risk in this study is loss of confidentiality. Confidentiality will be protected to the extent that is allowed by law. The survey will not ask you any questions that will ask for identifying information. Data will be collected using a secure site, PsychData.

Additionally, all downloaded data will be transmitted to a password protected computer that is only accessible by the primary investigator. Please note that there is a potential risk of loss of confidentiality in all email, downloading, electronic meetings and internet transactions.

The researchers will try to prevent any problem that could happen because of this research. You should let the researchers know at once if there is a problem and they will try to help you. However, TWU does not provide medical services or financial assistance for injuries that might happen because you are taking part in this research.

Participation and Benefits

Your involvement in this study is completely voluntary and you may withdraw from the study at any time. You will not receive compensation for participating in this research.

Questions Regarding the Study

You may print a copy of this online consent form to keep. If you have any questions about the research study, you should ask the researchers; their contact information is at the top of this form. If you have questions about your rights as a participant in this research or the way this study has been conducted, you may contact the TWU Office of Research and Sponsored Programs at 940-898-3378 or via e-mail at IRB@twu.edu.

By clicking on the "I Agree" button below, you are providing your consent to participate

in this research study.

o I Agree o I Do

NOT Agre

APPENDIX C

ADDITIONAL INFORMATION

Additional Information

Thank you for your participation in this study. We are gathering information on the connections between sport participation and the risk of disordered eating and eating disorders in female athletes. Specifically, we are interested in how interoceptive awareness, which is how you perceive your body's signals, and your level of trust in your body, affects the risk of eating disorders in female athletes. We asked you questions about your relationship with food, your level of trust in your body, and your experience as an athlete in order to get important information about how eating disorders develop in female athletes. Your participation is greatly appreciated, and the data collected could help future generations of female athletes. Should you like more resources or help on this topic, resources are provided at the bottom of the page.

All your answers will remain confidential, and your coach will not be informed if you participated in this study. We asked you several questions about your relationship with food. If you are actively restricting your food intake or binging and purging, or you simply feel distressed about your relationship with food, there is help available. Should you like more resources or help on this topic, resources are provided at the bottom of the page. If you would like to talk with a mental healthcare provider, please visit the director of mental health services for your athletics department or your school's counseling center. Information can be found on your school's website.

If you would like a copy of the results of this study or if you have further questions or concerns,

please contact Bailey Bickerstaff (bbickerstaff1@twu.edu) or Debra Mollen (dmollen@twu.edu).

Thank you again for your participation!

Resources:

Information on eating disorder symptoms in athletes:

https://www.nationaleatingdisorders.org/eating-disorders-athletes

https://truesport.org/body-image/disordered-eating-athletes/

National Eating Disorder Chat Helpline:

https://chatserver.comm100.com/ChatWindow.aspx?siteId=144464&planId=467.

National Eating Disorder Call and Text Helpline: (800) 931-2237

National Suicide Prevention Lifeline: 1-800-273-TALK (8255)

APPENDIX D

MENTAL HEALTH RESOURCES

- Information on eating disorder symptoms in athletes:

  https://www.nationaleatingdisorders.org/eating-disorders-athletes

  https://truesport.org/body-image/disordered-eating-athletes/

- National Eating Disorder Chat Helpline:

  https://chatserver.comm100.com/ChatWindow.aspx?siteId=144464&planId=467.

- National Eating Disorder Call and Text Helpline: (800) 931-2237 • National Suicide

  Prevention Lifeline: 1-800-273-TALK (8255) APPENDIX E

APPENDIX E

DEMOGRAPHIC QUESTIONAIRRE

How old are you? Years What

is your race/ethnicity?

American Indian / Alaska Native

Asian

Bi-ethnic or Multiethnic

Black/African American

Hispanic, Latino(a)(x)

Native Hawaiian or Other Pacific Islander

White

Other Race

What sport do you compete in at the collegiate level? Please select all that apply.

Artistic Swimming

Basketball

Cross Country

Dance

Diving

Equestrian

Field Events (Indoor and Outdoor)

Golf

Gymnastics

Rifle

Rowing
Soccer

Softball

Stunt

Swimming

Tennis

Track Events (Indoor and Outdoor)

Volleyball (Beach and Indoor)

Wrestling

*If you participate in one or more sport at the collegiate level, which sport do you spend the most time at practice and/ or have received a scholarship for?

What university do you attend?

How long have you been participating in your sport (in years)?

APPENDIX F

MAIA-2

Below you will find a list of statements. Please indicate how often each statement applies to you generally in daily life.

.	Circle one number on each line					
	Never					Always
1. When I am tense I notice where the tension is located in my body.	0	1	2	3	4	5
2. I notice when I am uncomfortable in my body.	0	1	2	3	4	5
3. I notice where in my body I am comfortable.	0	1	2	3	4	5
4. I notice changes in my breathing, such as whether it slows down or speeds up.	0	1	2	3	4	5
5. I ignore physical tension or discomfort until they become more severe.	0	1	2	3	4	5

6. I distract myself from sensations of discomfort.	0	1	2	3	4	5
7. When I feel pain or discomfort, I try to power through it.	0	1	2	3	4	5
8. I try to ignore pain	0	1	2	3	4	5
9. I push feelings of discomfort away by focusing on something	0	1	2	3	4	5
10. When I feel unpleasant body sensations, I occupy myself with something else so I don't have to feel them.	0	1	2	3	4	5
11. When I feel physical pain, I become upset.	0	1	2	3	4	5
12. I start to worry that something is wrong if I feel any discomfort.	0	1	2	3	4	5
13. I can notice an unpleasant body sensation without worrying about it.	0	1	2	3	4	5
14. I can stay calm and not worry when I have feelings of discomfort or pain.	0	1	2	3	4	5

15. When I am in discomfort or pain I can't get it out of my mind	0	1	2	3	4	5
16. I can pay attention to my breath without being distracted by things happening around me.	0	1	2	3	4	5
17. I can maintain awareness of my inner bodily sensations even when there is a lot going on around me.	0	1	2	3	4	5
18. When I am in conversation with someone, I can pay attention to my posture.	0	1	2	3	4	5

How often does each statement apply to you generally in daily life? Circle one number on each line

	Never				**Always**	
19. I can return awareness to my body if I am distracted.	0	1	2	3	4	5
20. I can refocus my attention from thinking to sensing my body.	0	1	2	3	4	5

21. I can maintain awareness of my whole body even when a part of me is in pain or discomfort.	0	1	2	3	4	5
22. I am able to consciously focus on my body as a whole.	0	1	2	3	4	5
23. I notice how my body changes when I am angry.	0	1	2	3	4	5
24. When something is wrong in my life I can feel it in my body.	0	1	2	3	4	5
25. I notice that my body feels different after a peaceful experience.	0	1	2	3	4	5
26. I notice that my breathing becomes free and easy when I feel comfortable.	0	1	2	3	4	5
27. I notice how my body changes when I feel happy / joyful.	0	1	2	3	4	5
28. When I feel overwhelmed I can find a calm place inside.	0	1	2	3	4	5
29. When I bring awareness to my body I feel a sense of calm.	0	1	2	3	4	5

30. I can use my breath to reduce tension.	0	1	2	3	4	5
31. When I am caught up in thoughts, I can calm my mind by focusing on my body/breathing.	0	1	2	3	4	5
32. I listen for information from my body about my emotional state.	0	1	2	3	4	5
33. When I am upset, I take time to explore how my body feels.	0	1	2	3	4	5
34. I listen to my body to inform me about what to do.	0	1	2	3	4	5
35. I am at home in my body.	0	1	2	3	4	5
36. I feel my body is a safe place.	0	1	2	3	4	5
37. I trust my body sensations.	0	1	2	3	4	5

APPENDIX G

EXERCISE DEPENDENCE SCALE

Instructions. Using the scale provided below, please complete the following questions as honestly as possible. The questions refer to current exercise beliefs and behaviors that have occurred in the past 3 months. Please place your answer in the blank space provided after each statement.

Never 1 2 3 4 5 6 Always

1. I exercise to avoid feeling irritable._____
2. I exercise despite recurring physical problems._____
3. I continually increase my exercise intensity to achieve the desired effects/benefits._____
4. I am unable to reduce how long I exercise._____
5. I would rather exercise than spend time with family/friends._____
6. I spend a lot of time exercising._____
7. I exercise longer than I intend._____
8. I exercise to avoid feeling anxious._____
9. I exercise when injured._____
10. I continually increase my exercise frequency to achieve the desired effects/benefits._____
11. I am unable to reduce how often I exercise._____
12. I think about exercise when I should be concentrating on school/work._____

13. I spend most of my free time exercising._____

14. I exercise longer than I expect._____

15. I exercise to avoid feeling tense._____

16. I exercise despite persistent physical problems._____

17. I continually increase my exercise duration to achieve the desired effects/benefits._____

18. I am unable to reduce how intense I exercise._____

19. I choose to exercise so that I can get out of spending time with family/friends._____

20. A great deal of my time is spent exercising.____

21. I exercise longer than I plan._____

APPENDIX H

OBJECTIFIED BODY CONSCIOUSNESS SCALE, SELF- SURVEILLANCE SUBSCALE

Using the scale below, please circle the number that best matches your agreement with the following statements.

__1. I rarely think about how I look.

___2. I think it is more important that my clothes are comfortable than whether they look good on me.

___3. I think more about how my body feels than how my body looks.

___4. I rarely compare how I look with how other people look.

___5. During the day, I think about how I look many times.

___6. I often worry about whether the clothes I am wearing make me look good.

___7. I rarely worry about how I look to other people.

___8. I am more concerned with what my body can do than how it looks.

APPENDIX I

EDSA-6

Please read each question carefully and select the appropriate response. Please note that "weight" refers to numbers on a scale, "shape" refers to amount and distribution of body fat and muscle, "body composition" refers to ratio of body fat to muscle, and "leanness" refers to low body fatto-muscle ratio.

	Never	Rarely	Sometimes	Often	Always
1. Does your weight, shape, or body composition affect the way you feel about yourself?	1	2	3	4	5
2. Are you dissatisfied with your weight, shape, or body composition?	1	2	3	4	5
3. Do you worry that your weight, shape, or body composition will change if you cannot exercise?	1	2	3	4	5

4. Do you want to be leaner even if others may think you are 1 2 3 4 5 already lean?

5. Do you worry about losing control over your eating because of how it may affect your weight, shape, or body composition?	1	2	3	4	5
6. Do you try to avoid certain foods to influence your weight, shape, or body composition?	1	2	3	4	5

APPENDIX J

DESA-6

Please circle the answer choice that fits best.

1. Have you had 3 or more injuries in the past season OR did your past season end early due to injury? a. Yes b. No

2. Do you worry about gaining weight during the off season or when you can't train due to injury? a. I worry about gaining weight a few times per week b. I worry about gaining weight daily c. I worry about gaining weight constantly. I do not worry about gaining weight.

3. Are you happy with your current weight? a. Yes b. No

4. How many pounds do you think you need to lose to be at your best performance weight? a. 1 to 5 pounds b. 5 to 10 pounds c. 10 to 15 pounds d. 15+ pounds e. None

5. Do you follow a specific diet plan (low fat, low carbohydrate, low fat, low sugar, high protein, etc.) to achieve your best performance weight? a. Yes b. No

6. Have you ever been told you should lose weight by someone who is not a health professional, such as a coach, fellow athlete or family member? a. Yes b. No