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# The Tripartite Influence Model of Body Image and Disordered Eating among Female Athletes: Testing an Expanded Model

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By

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**ABSTRACT**

The aim of the study was to investigate how different sources of sociocultural pressure (family, media, peers) described in the Tripartite Influence Model, and additions of teammate- and coach-pressures, were associated with thinness-and muscularity internalization and appearance comparisons among athletes. Subsequently, these potential mechanisms were explored as predictors of disordered eating among athletes. Analyses included 71 female athletes. Athletes were recruited through a student subject pool recruitment portal, as well as with local and regional flyers and emails. Participants completed a series of self-report measures in Qualtrics. Hierarchical linear regression analysis was utilized to test the hypotheses. Partial support for the Tripartite Model was found. Results indicated that media pressures were significantly associated with thin ideal internalization and appearance comparisons. Teammate and coach pressures were not associated with ideal internalization or appearance comparisons. Significant associations were found between athletic ideal internalization and engagement in excessive muscle building and exercise behavior. Significant associations also were found between appearance comparisons and binge eating. This research helps highlight the importance of developing targeted interventions for athletes, with particular attention to the media, thin- and athletic ideal internalization, and appearance comparisons.

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## LIST OF ABBREVIATIONS

ED: Eating Disorder

DE: Disordered Eating

DSM: Diagnostic and Statistical Manual for Mental Disorders

BMI: Body Mass Index

AN: Anorexia Nervosa

BN: Bulimia Nervosa

BED: Binge Eating Disorder

OSFED: Other Specified Feeding and Eating Disorder

MB: Muscle Building

EE: Excessive Exercise

BE: Binge Eating

PU: Purging

RE: Restricting

PACS: Physical Appearance Comparison Scale

SATAQ: Sociocultural Attitudes Towards Appearance Scale

EPSI: Eating Pathology System Inventory

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## INTRODUCTION

The purpose of this thesis was to extend Thompson et al.'s (1999) Tripartite Model of body image and disordered eating to apply to athletes, by investigating the role of additional sources of sociocultural pressures (e.g., coaches, teammates) most relevant to athletes. I will begin by providing an overview of different types of eating disorders. Additionally, I will provide an overview of the different problems associated with eating disorders, followed by information about disordered eating among college students, ending with a section discussing eating disorders among athletes. Finally, the paper will discuss the Tripartite Model and how it could be extended to apply to athletes.

### An Overview of Eating Disorders

Eating disorders (ED) are characterized by severe and persistent disturbances in eating behavior and are associated with distressing thoughts and emotions among the individual (APA, 2013). They are often demonstrated by (1) restrictive eating behaviors, where the individual limits calorie intake to control weight and body shape, or (2) binge eating behaviors, where the individual experiences a loss of control and eats large amounts of food in a discrete period of time (APA, 2013). Another factor linked with EDs is a negative or markedly distorted body image, sometimes combined with a fear of gaining weight (APA, 2013). EDs can also include compensatory behaviors, such as excessive exercise or muscle building behaviors, inappropriate use of laxatives, or self-induced vomiting, as tools to control body shape and weight (APA, 2013). The current Diagnostic and Statistical Manual for Mental Disorders (DSM-5) includes several distinct EDs, including pica, rumination disorder, avoidant/restrictive food intake disorder, anorexia nervosa, bulimia nervosa, binge-eating disorder, and other-/ un-specified feeding and eating disorders. The most common EDs in adults (i.e., bulimia nervosa, anorexia nervosa, binge-eating disorder, and

other-/un-specified feeding and eating disorder) will be described in the following paragraphs (Ward et al., 2019).

**Anorexia Nervosa (AN)**

The first diagnostic category is anorexia nervosa (AN), which is characterized by a low body weight that is associated with intentional and remarkable weight loss (APA, 2013). Underweight is defined by the World Health Organization (WHO) as a body mass index (BMI) below 18.5 among both males and females (WHO, 1995). The weight loss results from very restrictive eating and is related to a fear of weight gain together with disturbed body image (APA, 2013). There is often a denial of how serious this condition is and a resistance against gaining weight (APA, 2013). Based on a recent meta-analysis, the estimated lifetime prevalence of anorexia nervosa is 0.16% (Qian et al., 2022).

**Bulimia Nervosa (BN)**

The second diagnostic category is bulimia nervosa (BN), which is characterized by frequent episodes of eating large amounts of food over a short period of time along with a feeling of loss of control (APA, 2013). BN is also characterized by attempts to compensate for binge eating, by induced vomiting, fasting, excessive exercise and/or inappropriate use of laxatives (APA, 2013). Like with AN, BN is characterized by an over-evaluation of the importance of an "ideal" body shape for self-worth (APA, 2013). Based on a recent meta-analysis, the estimated lifetime prevalence of BN is 0.63% (Qian et al., 2022).

**Binge Eating Disorder (BED)**

The third diagnostic category is the last major type of ED which is binge eating disorder (BED). BED is characterized by binge eating behavior (i.e., eating large amounts of food in a short period of time, with loss of control), but without the compensatory behaviors seen in BN (APA, 2013). Individuals with BED also often experience guilt, discomfort, and shame (APA, 2013). BED

episodes should on average occur at least once a week for 3 months in order to diagnose an individual with it (APA, 2013). BED is a newer diagnosis in the DSM-5. Based on a recent meta-analysis, the estimated lifetime prevalence of BED is 1.53% (Qian et al., 2022).

**Other Specified Feeding and Eating Disorders (OSFED)**

Eating Disorders Not Otherwise Specified (EDNOS) was previously the most prevalent ED diagnosis (Thomas et al., 2009), but the newest DSM-5 reduced the proportion of cases of other-/un- specified eating disorders and replaced it with the diagnostic term OSFED (Other Specified Feeding and Eating Disorders) (Dahlgren & Wisting, 2016; Smink et al., 2014). OSFED involves clinically significant symptoms of an eating/feeding disorder, but without meeting diagnostic criteria for any other DSM-5 ED (APA, 2013). An individual diagnosed with OSFED could, for instance, demonstrate significant restrictive eating behavior and a negative body image, but with a BMI in the normal range (APA, 2013). It could also involve an individual showing binge eating behavior with compensatory behaviors, but not as often as described in the DSM-5 for BN (Galmiche et al., 2019). It is important to note that even though the weight is not as low as it is among individuals with AN or even though the frequency of binge eating/compensatory behaviors is not happening as often as in individuals with BN, the level of psychological distress is significant among individuals with OSFED (Sawyer et al., 2016).

**Psychological and Physical Correlates of Eating Disorders**

Upon a review of the literature, a variety of psychological and physical problems associated with ED have been found. On a psychosocial level, EDs are associated with depression (Becker et al., 2014), anxiety (Swinbourne et al., 2012), social isolation (Sandoz et al., 2011), and feelings of loneliness (Levine, 2012). Individuals with an ED are more likely to attempt suicide and have a lower self-esteem compared to the general population (Guillaume et al., 2011). Another study also found that at least 80% of individuals that suffered from AN or BN had at least one comorbid

psychiatric disorder (Cetin, 2021). The most common comorbidities are anxiety (~ 62%), mood (~ 54%) and substance use and post-traumatic stress disorders (~27%) (Hambleton et al., 2022). AN can lead to physical consequences like bone loss caused by low energy availability that leads to an imbalance between bone deposition and resorption which increases the risk for fractures (Drabkin et al., 2017; Steinman & Shibli-Rahhal, 2019). Other consequences of AN could be metabolic disturbances (Steinman & Shibli-Rahhal, 2019). The endocrine system can suffer from starvation because the production of certain hormones is altered (Seitz et al., 2019). EDs can also lead to physical consequences like complaints of early satiety, abdominal pain, bloating, and constipation (Lin et al., 2021). The list of physical and mental health consequences is long and critical, and it is crucially important to treat and help individuals with ED before they experience long-term consequences.

**Disordered Eating in College Students**

Disordered eating (DE) is common among college students (Alhaj et al., 2022). Individuals with disordered eating do not demonstrate sufficient symptoms to be diagnosed with an ED (as categorized by the DSM-5) but rather demonstrate a subclinical-ED (Walter et al., 2022). Furthermore, problems with eating, body shape, and weight cannot just be divided by a clear line into healthy or unhealthy behavior (Wildes & Marcus, 2013). For many forms of DE, it is rather a continuum from healthy eating behaviors to having developed a DE pattern and then finally to a diagnosable ED (Lichtenstein & Melin, n.d.). The same is true when an individual has sought treatment for an ED. It is not a quick transition from “unhealthy” to “healthy” or having a disorder to “recovered”, but instead recovery takes time and is a process that happens gradually (Bardone-Cone et al., 2018). Research suggests behavior often changes first, but dysregulated/dysfunctional emotions and thoughts take longer to change (Bardone-Cone et al., 2010). Thus, it is important to understand dysregulated eating along this continuum, particularly among college students, who are

in a vulnerable developmental period, and furthermore are in the median age of onset for ED (Lipson & Sonneville, 2020).

College students may be at an increased risk of ED due to the fact that they go through an important developmental period during their college years where they start to integrate their identity and they begin to internalize a personal set of beliefs and values (Hines et al., 2019; Lipson & Sonneville, 2020). The prevalence of positive eating disorder screenings among college students is estimated to be between 9-13% for females and 3-4% for males (Eisenberg et al., 2011). A study by Hoerr et al. (2002) found that the risk for DE among college students relates to both gender, ethnicity, sports, and academics. They reported that the risk for DE and body dissatisfaction had a major impact on a wide range of people, many of whom endorsed that these DE concerns had an impact on their academic performance (Hoerr et al., 2002). This highlights the importance of creating awareness about DE patterns because it affects many different groups of people in different aspects of their life, like academic performance, as mentioned above. Body dissatisfaction is a significant risk factor for ED (Stice, 2002), which underlines the importance of creating different interventions that can help decrease the level of body dissatisfaction among students and other individuals in order to avoid a further development of DE (Dakanalis et al., 2015; Hamel et al., 2012).

**Disordered Eating among Athletes**

Another group at risk for DE is athletes (Arthur-Cameselle et al., 2017; Bratland-Sanda & Sundgot-Borgen, 2013). DE among athletes has been a well described problem in the literature throughout the past several decades (e.g., Mancine et al., 2020; DiPasquale et al., 2013). Elite athletes demonstrate more clinical and subclinical ED symptomatology compared to the general population (Karrer et al., 2020; Lichtenstein et al., 2022). Historically, research suggested that EDs were more prevalent in weight-dependent (endurance) and leanness-dependent (aesthetic) sport

types, compared to other sport types (Mancine et al., 2020). Furthermore, it was previously thought that female athletes were at substantially greater risk for developing EDs compared to male athletes (Bratland-Sanda & Sundgot-Borgen, 2013). Newer research suggests that ED symptoms are also present among athletes participating in non-lean sports, where leanness is less directly relevant to performance, like in soccer or football, but rates are still lower than in lean sports (Mancine et al., 2020). Lean sport types are defined as sports placing an emphasis on leanness as a means to improve performance, such as gymnastics, ice-skating, distance running, swimming and dancing (Reinking & Alexander, 2005). Some of these sports, like gymnastics and ice skating, revolve around the athletes being aesthetically pleasing as part of the evaluation criteria during competition, which can also be associated with the development of ED (Zaccagni & Gualdi-Russo, 2023). Non-lean sport types are defined as not placing an emphasis on leanness as a mean to improve performance, which includes sport types like ball sports, power- and technical sports (Mancine et al., 2020).

Several risk factors have been identified among athletes. One proposed explanation for why athletes are at greater risk of developing an ED is the internal pressure to perform well (Mancine et al., 2020). Athletes who believe that they need a slim, thin, strong, and defined body to perform well and maximize performance can lead to excessive preoccupation with body shape, diets, and weight loss (Coelho et al., 2014; Mancine et al., 2020). This is supported by evidence showing that EDs are more prevalent among the athletes competing in lean sport types, where the emphasis is on the body weight or body shape as a key factor for increased performance or evaluation, such as in endurance sports (e.g., running, road biking) (Mancine et al., 2020). Athletes also face pressure to conform to a specific body type in sports where achieving an aesthetically pleasing appearance impacts performance (e.g., gymnastics, ballet, ice-skating & dancing) (Coelho et al., 2014). Studies show that female athletes that compete in aesthetic sports are at a higher risk of developing an ED

because their performance can be perceived to be enhanced by weight regulation (Scoffier-Mériaux et al., 2018). Additionally, athletes competing in sports divided by weight (like boxing) may be at a higher risk of developing an ED because they want to reach a lower weight class to gain an advantage (Sundgot-Borgen &Torstveit, 2010).

The manifestation of ED differs between male and female athletes, likely related to gender differences in societal views of "the ideal body type" (Galli & Reel, 2009; Izydorczyk et al., 2023). Both genders have different body ideals which they try to reach, and research underlines that the differences in body ideals among the two genders is associated with differences in ED pathology (Hazzard et al., 2020). Among males, the ideal body type typically involves a low body fat percentage and muscularity, with a big emphasis on lean and well-defined muscles (Lefkowich et al., 2017). Research suggests that males engaging in body talk (talk about their body appearance) regarding muscularity and body fat percentage is associated with a greater body dissatisfaction (SturtzSreetharan et al., 2020; Velkoff et al., 2019), and ED symptoms among males (Ahlich et al., 2019). Furthermore, there is a concerning correlation between body dissatisfaction (specifically muscle dissatisfaction), and the expectation of positive outcomes from using anabolic steroids to compensate for muscle dissatisfaction (SturtzSreetharan et al., 2020; Velkoff et al., 2019). Recent research supports that EDs in male athletes are likely under-identified in previous work (Abbott et al., 2021). For example, the ratio of male athletes to female athletes diagnosed with AN has narrowed down from 1:15 20 years ago to 1:2 in recent years (McDonald et al., 2020).

According to a study by Krane et al. (2004) the ideal female body in modern Western societies places an emphasis on being thin. Additionally, research points out that a new idealized female beauty has been created on social media in recent years, which involves thin, toned, athletic, and muscular body shapes (Aparicio-Martinez et al., 2019). Furthermore, another study addressed how female athletes are facing paradoxical challenges because they both have to be muscular in

order to be successful in their respective sport but at the same time, they have to endure a societal pressure to appear “feminine” which may not go hand in hand with being muscular (Steinfeldt et al., 2011).

The most common form of DE/weight control among male and female athletes is excessive exercise (Chatterton & Petrie, 2013; Greenleaf et al., 2009), but in sports like wrestling and gymnastics, food restriction is also commonly reported (Engel et al., 2003). In a restrictive eating pattern, consumption of food is often measured, counted, and controlled closely, often based on calories, and there are often strict rules about what food is “okay/allowable” to consume (Lichtenstein et al., 2022). Excessive exercise is another method by which athletes may influence weight (Lichtenstein et al., 2017). Excessive exercise involves high frequency, compulsive exercise behavior around training which can affect an athlete's physical and mental health (Godoy-Izquierdo et al., 2023). It is described as consistently increasing amount of training and striving for a “high” at every single practice (Lichtenstein et al., 2017). It can also be experienced as a loss of control over the training which can lead to serious injuries and pain (Berczik et al., 2012). Excessive exercise can be dangerous for athletes as this behavior can be mistaken as dedication to their respective sport and as a strive for top performance (Lichtenstein et al., 2022). This leads to athletes more easily being capable of hiding an ED through excessive exercise as this behavior might be complimented rather than being perceived as ED pathology (Lichtenstein et al., 2022). Excessive exercise can precede development of a full-blown ED and ultimately contribute to decreased sports performance (Lichtenstein et al., 2017). Though excessive exercise and restriction are most common among both male and female athletes, in the general population, females are more likely to engage in body checking, avoidance, fasting, vomiting, and binge eating, while males are more likely to engage in overeating and demonstrate greater rates of steroid abuse in order to achieve a greater muscle mass or to improve performance (Striegel-Moore et al., 2009).

As in the general population, EDs among athletes are associated with a number of negative outcomes like increased susceptibility to injury, problems with recovery due to a lack of daily calorie consumption, muscle deficiencies, decreased bone density, loss of menstrual periods, impairment of optimal athletic functioning, inconsistent athletic performance, social problems, and emotional problems, which all together increases the risks for overuse injuries, early retirement from sport, decreased sports performance and finally dissatisfaction among the athletes (Eichstadt et al., 2020; Torstveit & Sundgot-Borgen, 2005). Therefore, it is important to create awareness and information about ED and their risk factors among athletes to avoid these negative outcomes.

**Tripartite Influence Model**

Many of these established risk factors for ED, including internal and external components, can be understood through the Tripartite Influence Model (van den Berg et al., 2002). This model has found three core sources of pressure to conform to specific body ideals: parents, peers, and media (van den Berg et al., 2002). These sources of pressure are thought to contribute to the development of eating disturbances through the mediating roles of social comparison and internalization of body/beauty ideals (Ata et al., 2015; Scoffier-Mériaux et al., 2018). Palloto et al. (2022) also found that among Division 1 female athletes, pressures from parents, peers, and the media were associated with body dissatisfaction and with DE through greater thin- and muscular-ideal internalization.

Athletes may also face different external pressures compared to the general population. For example, some athletes may face pressure on a weekly basis with sport-related weigh-ins that do not occur in the general population. In a study of 414 collegiate gymnasts and swimmers/divers, 41% of athletes were required to participate in regular weigh-ins. Of those who were required to participate in weigh-ins, 75% reported engaging in at least one type of weight control behavior before weigh-ins (e.g., food restriction, increased exercise, laxatives, vomiting). Studies show that

this external weight-related pressure is highest in sports that place emphasis on either revealing uniforms or aesthetics or whenever thinness is seen as a performance advantage (Hines et al., 2019; Tackett et al., 2016). Additionally, Scoffier-Mériaux et al. (2018), found that one of the external factors, social relationships, were significantly related to the eating attitudes of female aesthetic athletes (Scoffier-Mériaux et al., 2018). It was social relationships with coaches and friends that contributed as risk factors for the development of ED, meanwhile parents and peers played a protective factor (Scoffier et al., 2010). On the other hand, other studies have found that family can contribute as a risk factor for developing an ED (Scoffier et al., 2010), and may be one of the most common sources of critical comments about body/weight (Muscat & Long, 2008). Another source of pressure comes from the powerful media messages where the idealized body in the media creates a pressure among the individual to attain a specific body type/ body ideal (Hazzard et al., 2020). Research supports that social media may be a particularly important source of pressure on athletes (Muscat & Long, 2008).

There is limited literature regarding the body- and weight-related pressure coaches and teammates place on athletes, but it is possible that the expectations from the coach to perform well for the team, and the social comparison and internal competition between teammates could contribute to greater body dissatisfaction and DE behaviors. It was found in the NCAA rules that athletes have 20 hours weekly with their coaches, which creates a huge opportunity for influencing athletes in positive or negative ways, and the importance in researching this relationship and the external pressure coaches might place on the athletes is therefore crucial (Recruiting, 2016). Aside from the weekly required 20 hours, athletes also interact with other athletic staff on a weekly basis (e.g., strength- and conditioning coaches, athletics trainers, physical therapists, and dieticians) suggesting that athletes are spending many additional hours within the sporting environment.

Qualitative work has highlighted the potential negative impact of coaches' comments about body/weight, such as this quote from (Coppola et al., 2014):

> One of the girls on the team she's, she has really really big thighs and she knows it and I feel like she feels self-conscious about it and umm, like [coach] told her … 'Oh, watch out, oh, she's coming through,' things like … I don't think [coach] understands … that that's kind of rude [participant laughs] or it could affect her self-esteem or something like that. (p. 8)

Similarly, others have found that coach communication with female athletes is reported to influence the female athlete's body image and health behaviors (Beckner & Record, 2016). Teammates can also be a source of pressure. Research has found themes related to negative body talk among female athletes' teammates: "I mean [the] girls all the time are very critical of themselves. Like oh my gosh, I am like fat or oh my gosh, like I need to watch what I am eating" (Lucibello et al., 2021, p.67).

Social comparison, a mechanism theorized to link these pressures with DE, is referred to as behavior where we compare ourselves with our surroundings in order to have a better estimation/judgment of ourselves (Festinger, 1954). The theory behind it is that we as human beings are driven to compare our values, opinions, achievements, physical appearance, and abilities with others (Festinger, 1954). Within social comparison there are two main concepts which help to understand it. The first concept is Downward Social Comparison, which is referred to as individuals comparing themselves to others that are worse off than themselves (Festinger et al, 1954). This kind of comparison is shown to be beneficial for mood (Festinger et al., 1954). The second type of social comparison concept is Upward Social Comparison which suggests that individuals are sometimes motivated to seek positive, common characteristics among more successful peers and have those as strong and positive role models to create inspiration to reach their personal goals (Festinger, 1954; Rahimi et al., 2017). Yet, especially when it comes to media comparisons, upward comparisons

may lead to negative self-evaluations and body dissatisfaction (Want, 2009). Athletes who make social comparisons can feel a boost in motivation from upward comparisons, but only if the perceived difference between self and the point of comparison is “moderate” rather than “extreme” (Diel et al., 2021). Qualitative research suggests that athletes tend to compare themselves to other athletes whose success they are trying to imitate, which can be exacerbated by social media (Stoyel et al., 2021).This highlights the potential influence of social comparisons on body image and DE among athletes, where athletes compare themselves to other successful athletes, and feel pressure to attain that ideal in order to perform at the same level as them (Stoyel et al., 2021).

Internalization, another theorized mechanism linking sociocultural pressures to DE, is a concept that is defined as being an unconscious mental process where characteristics, beliefs, feelings, ideas, and attitudes of other peers are assimilated, accepted, and absorbed into your own self so it becomes a part of an individual's personal character (Thompson & Stice, 2001). The internalization of an ideal like thinness is a prominent risk factor for developing a DE pattern (Stice, 2002). Also, internalizing the “athletic” body ideal is also associated with DE in the general population (Bell et al., 2016), and one study found that internalization of a so-called “athletic ideal” is associated with body dissatisfaction and DE among athletes (Ramme et al., 2016).

**Current Study**

To improve mental and physical health among athletes, early ED detection and awareness is crucial. The Tripartite Influence Model may be beneficial to use as a framework to understand why athletes are more vulnerable to develop an ED by understanding the variety of influences that may affect DE, given the unique sources of pressure on athletes. The current study investigated how different sources of pressure described in the Tripartite Model are associated with ED symptoms among athletes. Consistent with previous research in the general population, it was hypothesized that pressures from media, peers, and family would be associated with a greater internalization of

the thin and athletic ideals and greater engagement in appearance comparisons. Secondly, expanding on the Tripartite Model to include new sources of pressure relevant to athletes, we hypothesized that greater pressure from coaches, and teammates would predict greater internalization of the thin and athletic ideals and greater appearance comparisons. Third, it was hypothesized that internalization of the thin ideal, internalization of the athletic ideal, and appearance comparisons would predict DE among athletes.

## METHOD

### Procedure

A power analysis was conducted in G*Power, suggesting that 224 participants would be needed to detect a small effect at $p < .05$ with .80 power. The participants for this study were individuals who self- identified as athletes at any level (professional, NCAA, club, recreational or other) in the age range from 18-25 years old. The participant recruitment for this study was conducted through online recruitment (SONA subject pool, flyers, emails to local and regional athletics organizations, mass university email). Prior to completion of the questionnaires, the participants were provided with information about the study and completed informed consent. Participants completed all self-report measures online, using Qualtrics. Inclusion criteria was English speaking and self-identification as an athlete in the age range from 18-25 years. The participants who participated through SONA received one course credit upon completion and the others were entered into a raffle to win a gift card. Prior to the data collection, the study was approved by the Institutional Review Board at the University of South Alabama.

### Participants

A total of 489 responses were collected. A small number of athletes identified as male or gender nonbinary, thus, only data from female participants were retained. Also, due to either incomplete responses or not meeting eligibility requirements, 418 of the original 489 participants

were removed from the analysis. The final sample contained 71 females remaining with all the data of interest. The average age was 18.9 years old (*SD* = 1.54). The participants self-identified as 82.76% non-Hispanic, and 17.24% Hispanic. 73.24% identified as White, 16.9% identified as Black, 5.63% identified as Asian, 1.41% identified as Native Hawaiian, 1.41% identified as Mexican and 1.41% identified as Puerto Rican. The average Body Mass Index (BMI) for this sample was 23.8 with a *SD* = 4.06.

## Measures

### *Demographics*

The participants were asked to provide information about their age, gender, ethnicity, race, marital status, education, and employment status. They were also asked to provide current height and weight. Height and weight were collected via self-report, and BMI was calculated as (weight (kg)/height $(cm)^2$)*703. Additionally, the participants were asked about athletic identity and to provide information about sports type (e.g., cross-country, soccer, football, dancing, baseball), weekly participation in their sport (time spent practicing, participating in, or competing in their particular sport), and level of sport (e.g., professional, NCAA, club, recreational). Athletic identity was assessed using a single item asking if they identified as an athlete.

### *Sociocultural Pressures*

Sociocultural pressures were measured using the SATAQ-4R (Sociocultural Attitude Towards Appearance Questionnaire; Schaefer et al., 2017). It includes the following sociocultural pressures: Pressure- Family (6 items) including parents, brothers, sisters and relatives, Pressure-Peers (6 items) including close friends, classmates and other individuals in the same age group, and Pressure- Media (6 items) including television, magazines, the internet, movies, billboards and advertisements. The participants were required to rate on a scale from 1 to 5 to which extend they agreed with the items on the scale where 1 = definitely disagree and 5 = definitely agree. Some

example items on the scale were as follows: “I feel pressure from family members to look thinner” (Pressure- Family); “I feel pressure from my peers to improve my appearance” (Pressure- Peers); “I feel pressure from the media to look in better shape” (Pressure- Media). Items on each scale were summed to form a total score, with higher scores indicating greater perceived pressure.

The original SATAQ-4R does not assess pressure from teammates or coaches. These subscales were created by the primary investigator of this study. The created subscales with items measuring the added sources of pressure were not pilot tested prior to use. Each subscale included 6 items such as: “I feel pressure from the coaches to look thinner” & “I feel pressure from the coaches to improve my appearance” (Pressure Coaches) and “I feel pressure from my teammates to look in better shape” & “I feel pressure from my teammates to decrease my level of body fat” (Pressure Teammates). Items were rated on the same scale from 1 to 5 where 1 = definitely disagree and 5 = definitely agree. Items on each scale were summed to form a total score, with higher scores indicating greater perceived pressure.

With regard to internal consistency, Cronbach’s alpha values were excellent across all sources of pressure: Family Pressure ($\alpha = 0.93$), Peer Pressure ($\alpha = 0.93$), Media Pressure ($\alpha = 0.94$), Coach Pressure ($\alpha = 0.95$), and Teammate Pressure ($\alpha = 0.96$).

***Internalization of Thin Ideal***

The internalization of the thin ideal was measured by using the Internalization Thinness subscale of the SATAQ-4R. The scale consists of 15 items, such as “I think a lot about my appearance” and “I think a lot about looking thin”. The participants were asked to rate their agreement with the different items on a scale from 1 to 5 where 1 = definitely disagree and 5 = definitely agree. The items were summed, with a higher score demonstrating a greater level of thin ideal internalization. With regard to internal consistency, the Cronbach's alpha value was acceptable for the internalization of the thin ideal: ($\alpha = 0.77$).

***Internalization of Athletic Ideal***

Athletic ideal internalization was measured by using the Internalization Muscular/Athletic subscale of the SATAQ-4. The scale consisted of 10 items, such as “It is important for me to look athletic” and “I think a lot about looking athletic”. The respondents were asked to rate their agreement with the items on a scale ranging from 1 to 5 where 1= definitely disagree and 5 = definitely agree. The items were summed up with a higher score demonstrating a greater level of athletic ideal internalization. With regard to internal consistency, the Cronbach's alpha value was excellent for the internalization of the athletic ideal: ($\alpha = 0.91$).

***Appearance Comparisons***

To measure the appearance comparisons, we used the Physical Appearance Comparison Scale (J. Thompson et al., 1991). The scale consists of 11 items such as: “When I’m out in public, I compare my physical appearance to the appearance of others”, “When I meet a new person (same sex), I compare my body size to his/her body sex and “When I’m at work or school, I compare my body fat to the body fat of others”. The respondents were asked to rate their agreement with the items on the scale ranging from 0 to 4, where 0 = Never and 4 = Always. All the items were summed up with a greater score indicating a greater level of comparison of physical appearance with others. With regards to internal consistency, the Cronbach’s alpha value was excellent for the appearance comparisons: ($\alpha = 0.92$).

***Eating Pathology Symptoms Inventory (EPSI):***

To assess the psychopathology of ED, we used the Eating Pathology Symptoms Inventory Scale (EPSI; Forbush et al., 2013). The scale consists of 45 items such as: “I tried to exclude “unhealthy” foods from my diet”, “I made myself vomit in order to lose weight” and “I ate a very large amount of food in a short period of time (e.g., within 2 hours)”. The respondents were asked to rate their agreement with the items on the scale ranging from 0 to 4, where 0 = Never and 4 =

Very Often. The EPSI includes eight subscales (Muscle Building, Binge Eating, Excessive Exercise, Cognitive Restraint, Purging, Body Dissatisfaction, Negative Attitude Towards Obesity, and Restricting). Only five out of the eight subscales were selected for this analysis based on perceived relevance to athletes and DE (Muscle Building, Binge Eating, Excessive Exercise, Purging and Restricting). All items were summed up with a greater score indicating a greater level of ED pathology. With regards to internal consistency, Cronbach's alpha value was excellent for the EPSI item Binge Eating: ($\alpha = 0.92$), and good for Muscle Building ($\alpha = 0.83$), Excessive Exercise ($\alpha = 0.84$), Restricting ($\alpha = 0.88$) and Purging ($\alpha = 0.89$).

**Data Analytic Plan**

All analyses were conducted in SPSS. The threshold for statistical significance for the study was $p < .05$. Cronbach's alpha was used to measure the internal consistency of all scales. Chi-square or independent samples *t*-tests were used to test group differences. A series of hierarchical linear regressions were conducted with the following variables as the dependent variables: internalization of the thin ideal, internalization of the athletic ideal and appearance comparisons. BMI was entered as a covariate in step one. The key predictors were entered at step two including the following sources of sociocultural pressure: media, family, peers, coaches, and teammates. A subsequent set of hierarchical linear regressions were conducted with the EPSI DE subscales as dependent variables. BMI was again entered as a covariate in step one. The key predictors were entered at step two including the following variables: thin ideal internalization, athletic ideal internalization, and appearance comparisons. There was a risk for multicollinearity given that multiple subscales came from the same overall measure (SATAQ-4R). Variance Inflation Factors (VIF) were used to assess multicollinearity.

## RESULTS

### Preliminary results

Among the female participants, the means and standard deviations of all study variables were computed with the following results: Appearance comparison ($M$ = 23.80 and $SD$ = 8.89), Internalization of the Athletic Ideal ($M$ = 3.10 and $SD$ = 1.07), Internalization of the Thin Ideal, ($M$ = 3.46 and $SD$ = 0.97), Pressure from Peers ($M$ = 2.10 and $SD$ = 1.17), Pressure from Family ($M$ = 2.46 and $SD$ = 1.34), Pressure from Media ($M$ = 3.54 and $SD$ = 1.25), Pressure from Coaches ($M$ = 2.55 and $SD$ = 1.26), Pressure from Teammates ($M$ = 2.41 and $SD$ = 1.19), Muscle Building ($M$ = 4.58 and $SD$ = 4.86), Binge Eating ($M$ = 11.21 and $SD$ = 8.32), Purging ($M$ = 3.96 and $SD$ = 5.42), Excessive Exercise ($M$ = 9.70 and $SD$ = 5.47) and Restricting ($M$ = 10.30 and $SD$ = 6.44).

Significant correlational associations were found between all of the sources of sociocultural pressure and appearance comparisons ($r$s ranging from .26-.63). Additionally, there were also significant associations between all sources of sociocultural pressure and athletic ideal internalization, except for Family Pressure and Media Pressure ($r$s ranging from .07-.36). Furthermore, there were significant associations between all the sources of sociocultural pressure and thin ideal internalization ($r$s ranging from .39-.57). All associations between the pressure items were positive. Significant correlations were found between athletic ideal internalization and the EPSI items MB and EE, but not between the EPSI items BE, RE and PU ($r$s ranging from .15-.64). Likewise, there were significant correlations between thin ideal internalization and the EPSI items BE and PU, not between the EPSI items RE, MB and EE ($r$s ranging from .07-.32). Lastly, significant associations were found between appearance comparison and the EPSI items MB, BE and PU but not between the EPSI items RE and EE ($r$s ranging from .06-.48). All associations between the EPSI items were positive. See Table 1.

Table 1. *Correlation Matrix:*

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. BMI | ---- | | | | | | | | | | | | | |
| 2. Family | .16 | ---- | | | | | | | | | | | | |
| 3. Media | .17 | .53** | ---- | | | | | | | | | | | |
| 4. Peers | .21 | .60** | .55** | ---- | | | | | | | | | | |
| 5. Coaches | .15 | .52** | .50** | .64** | ---- | | | | | | | | | |
| 6. Teammates | .13 | .53** | .46** | .70** | .79** | ---- | | | | | | | | |
| 7. Athletic Ideal Internalization | .09 | .07 | .21 | .25* | .33** | .36** | ---- | | | | | | | |
| 8. Thin Ideal Internalization | .19 | .40** | .57** | .44** | .39** | .48** | .13 | ---- | | | | | | |
| 9. Appearance Comparisons | .10 | .41** | .63** | .42** | .30* | .33** | .26* | .49** | ---- | | | | | |
| 10. Muscle Building | .02 | .20 | .26* | .18 | .30* | .26* | .49** | .07 | .25* | ---- | | | | |
| 11. Excessive Exercise | .13 | .24* | .33** | .19 | .32** | .31** | .64** | .14 | .21 | .58** | ---- | | | |
| 12. Binge Eating | .15 | .41** | .47** | .29* | .25* | .31** | .15 | .32** | .48** | .39** | .30* | ---- | | |
| 13. Purging | .12 | .35** | .40** | .33** | .31** | .26* | .16 | .29* | .35** | .65** | .46** | .45** | ---- | |
| 14. Restricting | .02 | .20 | .20 | .22 | .18 | .22 | .21 | .21 | .06 | .32** | .40** | .05 | .38** | ---- |

Note. **. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).

**Primary results**

The first regression analysis explored associations between the five sources of sociocultural pressure and internalization of the thin ideal among female athletes. Model 1 (BMI only) accounted for 3.1% of the variance in thin ideal internalization. Model 2 (added sources of pressure) accounted for a total of 39.8% of the variance in thin ideal internalization, suggesting a change of $R^2$=36.7% with a significance level of $p < .001$. Family Pressure, accounting for all the other variables in the model, was not a significant predictor of thin ideal internalization ($p$ = .825). Peer Pressure, accounting for all other variables in the model, was not a significant predictor of thin ideal internalization ($p$ = .922). Media Pressure, accounting for all other variables in the model, *was* a significant predictor of thin ideal internalization ($p < .001$). Coach Pressure, accounting for all the other variables in the model, was not a significant predictor of thin ideal internalization ($p$ = .807). Teammate Pressure, accounting for all other variables in the model, was not a significant predictor of thin ideal internalization ($p$ = .088). Consistent with the first hypothesis, pressure from media was associated with a greater internalization of the thin ideal, but not pressure from the other predictor variables. See Table 2.

The second regression analysis explored associations between the five sources of sociocultural pressure and internalization of the athletic ideal among female athletes. Model 1 (BMI only) accounted for 1.3% of the variance in athletic ideal internalization, meanwhile Model 2 (added sources of pressure) accounted for a total of 17.2% of the variance in athletic internalization, suggesting a change of $R^2$=15.9% with a significance level of $p$ = .045. Family Pressure, accounting for all the other variables in the model, was not a significant predictor of athletic ideal internalization ($p$ = .120). Peer Pressure, accounting for all the other variables in the model, was not a significant predictor of athletic ideal internalization ($p$ = .705).

Table 2:

*Associations between the five sources of sociocultural pressure and the internalization of thin ideal among female athletes:*

| | | *b* | *SE* | *β* | *t* | *p* | Tolerance | VIF |
|---|---|---|---|---|---|---|---|---|
| Model 1 | (Constant) | 2.46 | .69 | | 3.57 | <.001 | | |
| | BMI | .042 | .03 | .18 | 1.47 | .146 | 1.00 | 1.00 |
| Model 2 | (Constant) | 1.32 | .60 | | 2.20 | .032 | | |
| | BMI | .017 | .02 | .07 | .70 | .490 | .95 | 1.05 |
| | Coach Pressure | -.032 | .13 | -.04 | -.25 | .807 | .33 | 3.00 |
| | Family Pressure | .021 | .09 | .03 | .22 | .825 | .56 | 1.77 |
| | Media Pressure | .34 | .10 | .44 | 3.54 | <.001 | .61 | 1.64 |
| | Peer Pressure | -.01 | .13 | -.02 | -.10 | .922 | .40 | 2.52 |
| | Teammate Pressure | .24 | .14 | .30 | 1.74 | .088 | .32 | 3.11 |

Note. SE = standard error; BMI = body mass index

Media Pressure, accounting for all other variables in the model, was also not a significant predictor of athletic ideal internalization ($p$ = .449). Coach Pressure, accounting for all other variables in the model, was not a significant predictor of athletic ideal internalization ($p$ = .855). Teammate Pressure, accounting for all other variables in the model, was not a significant predictor of athletic ideal internalization ($p$ = .084). Inconsistent with expectations, the five different predictor variables (sources of sociocultural pressure), were not associated with a greater internalization of the athletic body ideal. Likewise, inconsistent with the second hypothesis, greater pressure from coaches and teammates did not predict greater internalization of the athletic body ideal. See Table 3.

The third regression analysis explored associations between the five sources of sociocultural pressure and appearance comparisons among female athletes. Model 1 (BMI only) accounted for 1.2% of the variance in appearance comparisons, meanwhile Model 2 (added sources of pressure) accounted for a total of 44.4% of the variance in appearance comparisons,

Table 3:

*Associations between the five sources of sociocultural pressure and the internalization of the athletic ideal among female athletes:*

| | | *b* | *SE* | *β* | *t* | *p* | Tolerance | VIF |
|---|---|---|---|---|---|---|---|---|
| Model 1 | (Constant) | 2.39 | .76 | | 3.12 | .003 | | |
| | BMI | .03 | .03 | .11 | .95 | .345 | 1.00 | 1.00 |
| Model 2 | (Constant) | 1.85 | .77 | | 2.38 | .020 | | |
| | BMI | .02 | .03 | .07 | .56 | .577 | .95 | 1.05 |
| | Coach Pressure | .03 | .17 | .04 | .18 | .855 | .33 | 3.00 |
| | Family Pressure | -.19 | .12 | -.24 | -1.58 | .120 | .56 | 1.77 |
| | Media Pressure | .10 | .13 | .11 | .76 | .449 | .61 | 1.64 |
| | Peer Pressure | .06 | .17 | .07 | .38 | .705 | .40 | 2.52 |
| | Teammate Pressure | .32 | .18 | .35 | 1.75 | .084 | .32 | 3.11 |

Note. SE = standard error; BMI = body mass index

suggesting a change of $R^2$=43.2% with a significance level of $p < .001$. Pressure Peers, accounting for all other variables in the model, was not a significant predictor of appearance comparisons ($p = .355$). Pressure Family, accounting for all other variables in the model, was not a significant predictor of appearance comparisons ($p = .426$). Pressure Media, accounting for all other variables in the model, *was* a significant predictor of appearance comparisons ($p < .001$). Pressure Coaches, accounting for all other variables in the model, was not a significant predictor of appearance comparisons ($p = .121$). Pressure Teammates, accounting for all other variables in the model, was not a significant predictor of appearance comparisons ($p = .493$). Consistent with expectations, as hypothesized, pressure from media was associated with a greater engagement in appearance comparisons. Inconsistent with the second hypothesis, greater pressure from coaches and teammates did not predict greater appearance comparisons. See Table 4.

The fourth regression analysis explored the prediction of muscle building (MB) (behavioral feature of ED) by appearance comparisons, internalization of thin ideal, and internalization of athletic ideal. BMI was entered as a covariate in Step 1 (Model 1).

Table 4:

*Associations between the five sources of sociocultural pressure and appearance comparisons among female athletes:*

| | | *b* | *SE* | *β* | *t* | *p* | Tolerance | VIF |
|---|---|---|---|---|---|---|---|---|
| Model 1 | (Constant) | 18.05 | 6.37 | | 2.83 | .006 | | |
| | BMI | .24 | .26 | .11 | .91 | .364 | 1.00 | 1.00 |
| Model 2 | (Constant) | 7.68 | 5.29 | | 1.45 | .151 | | |
| | BMI | .00 | .21 | .00 | .00 | .999 | .95 | 1.05 |
| | Coach Pressure | -1.81 | 1.15 | -.26 | -1.57 | .121 | .33 | 3.00 |
| | Family Pressure | .67 | .83 | .10 | .80 | .426 | .56 | 1.77 |
| | Media Pressure | 4.19 | .85 | .59 | 4.90 | <.001 | .61 | 1.64 |
| | Peer Pressure | 1.06 | 1.13 | .14 | .93 | .355 | .40 | 2.52 |
| | Teammate Pressure | .85 | 1.24 | .11 | .69 | .493 | .32 | 3.11 |

Note. SE = standard error; BMI = body mass index

BMI accounted for 0.1% of the variance in muscle building, meanwhile Model 2 (added primary predictor variables) accounted for a total of 25.7% of the variance in muscle building, suggesting a change of $R^2$=25.6% with a significance level of $p < .001$. Thin ideal internalization, accounting for all other variables in the model, was not a significant predictor of engaging in muscle building behavior ($p = .614$). Athletic ideal internalization, accounting for all other variables in the model, *was* a significant predictor of engaging in muscle building behavior ($p < .001$). Specifically, greater athletic ideal internalization was associated with greater engagement in muscle building behavior ($b = 2.04$). Appearance comparison, accounting for all other variables in the model, was not a significant predictor of engaging in muscle building behavior ($p = .197$). See Table 5.

The fifth regression analysis explored the prediction of excessive exercise (EE) by appearance comparisons, internalization of thin ideal, and internalization of athletic ideal. BMI was entered as a covariate in Step 1 (Model 1). BMI accounted for 1.7% of the variance in excessive exercise, meanwhile Model 2 (added primary predictor variables) accounted for a total

Table 5:

*Associations between primary predictor variables (thin ideal internalization, athletic ideal internalization, and appearance comparisons) and muscle building:*

| | | *b* | *SE* | *β* | *t* | *p* | Tolerance | VIF |
|---|---|---|---|---|---|---|---|---|
| Model 1 | (Constant) | 3.88 | 3.48 | | 1.11 | .269 | | |
| | BMI | .03 | .14 | .02 | .20 | .839 | 1.00 | 1.00 |
| Model 2 | (Constant) | -2.28 | 3.50 | | -.65 | .516 | | |
| | BMI | -.02 | .13 | -.02 | -.19 | .851 | .96 | 1.04 |
| | Appearance Comparison | .09 | .07 | .16 | 1.30 | .197 | .72 | 1.39 |
| | Athletic Ideal Internalization | 2.04 | .49 | .45 | 4.13 | <.001 | .93 | 1.08 |
| | Thin Ideal Internalization | -.31 | .61 | -.06 | -.51 | .614 | .74 | 1.36 |

Note. SE = standard error; BMI = body mass index

of 41.2% of the variance in excessive exercise, suggesting a change of $R^2$=39.5% with a significance level of $p > .001$. Thin ideal internalization, accounting for all other variables in the model, was not a significant predictor of engaging in excessive exercise ($p = .707$). Athletic ideal internalization, accounting for all other variables in the model, *was* a significant predictor of engaging in excessive exercise ($p < .001$). Specifically, greater athletic ideal internalization was associated with greater engagement in excessive exercise behavior ($b = 3.13$). Appearance comparison, accounting for all other variables in the model, was not a significant predictor of engaging in excessive exercise ($p = .881$). See Table 6.

Table 6:

*Associations between primary predictor variables (thin ideal internalization, athletic ideal internalization, and appearance comparisons) and excessive exercise:*

| | | *b* | *SE* | *β* | *t* | *p* | Tolerance | VIF |
|---|---|---|---|---|---|---|---|---|
| Model 1 | (Constant) | 5.53 | 3.89 | | 1.42 | .159 | | |
| | BMI | .18 | .16 | .13 | 1.09 | .280 | 1.00 | 1.00 |
| Model 2 | (Constant) | -3.22 | 3.51 | | -.92 | .363 | | |
| | BMI | .09 | .13 | .06 | .67 | .506 | .96 | 1.04 |
| | Appearance Comparison | .01 | .07 | .02 | .15 | .881 | .72 | 1.39 |
| | Athletic Ideal Internalization | 3.13 | .50 | .62 | 6.32 | <.001 | .93 | 1.08 |
| | Thin Ideal Internalization | .23 | .61 | .04 | .38 | .707 | .74 | 1.36 |

Note. SE = standard error; BMI = body mass index

The sixth regression analysis explored the prediction of binge eating (BE) by appearance comparisons, internalization of thin ideal, and internalization of athletic ideal. BMI was entered as a covariate in Step 1 (Model 1). BMI accounted for 2.4% of the variance in binge eating, meanwhile Model 2 (added primary predictor variables) accounted for a total of 24.8% of the variance in binge eating, suggesting a change of $R^2$=22.4% with a significance level at $p < .001$. Thin ideal internalization, accounting for all other variables in the model, was not a significant predictor of engaging in binge eating behavior ($p = .459$). Athletic ideal internalization, accounting for all other variables in the model, was not a significant predictor of engaging in binge eating behavior ($p = .834$). Appearance comparisons, accounting for all other variables in the model, *was* a significant predictor of engaging in binge eating behavior ($p = .001$). Greater appearance comparison was positively associated with greater engagement in binge eating behavior ($b = .39$). See Table 7.

Table 7:

*Associations between primary predictor variables (thin ideal internalization, athletic ideal internalization, and appearance comparisons) and binge eating:*

| | | *b* | *SE* | *β* | *t* | *p* | Tolerance | VIF |
|---|---|---|---|---|---|---|---|---|
| Model 1 | (Constant) | 3.66 | 5.89 | | .62 | .536 | | |
| | BMI | .32 | .24 | .15 | 1.30 | .198 | 1.00 | 1.00 |
| Model 2 | (Constant) | -6.05 | 6.04 | | -1.00 | .320 | | |
| | BMI | .19 | .22 | .09 | .87 | .389 | .96 | 1.04 |
| | Appearance Comparison | .39 | .12 | .42 | 3.32 | .001 | .72 | 1.39 |
| | Athletic Ideal Internalization | .18 | .85 | .02 | .21 | .834 | .93 | 1.08 |
| | Thin Ideal Internalization | .79 | 1.06 | .09 | .74 | .459 | .74 | 1.36 |

Note. SE = standard error; BMI = body mass index

The seventh regression analysis explored the prediction of restricting (RE) by appearance comparisons, internalization of thin ideal, and internalization of athletic ideal. BMI was entered as a covariate in Step 1 (Model 1). BMI accounted for 0% of the variance in restricting, meanwhile Model 2 (added primary predictor variables) accounted for a total of 9% of the

variance in restricting, suggesting a change of $R^2$ = 9% with a significance level at $p$ = .100. Thus, this model was not interpreted.

The eighth regression analysis explored the prediction of purging (PU) by appearance comparisons, internalization of thin ideal and internalization of athletic ideal. BMI was entered as a covariate in Step 1 (Model 1). BMI accounted for 1.5% of the variance in purging, meanwhile Model 2 (added primary predictor variables) accounted for a total of 15.1% of the variance in purging suggesting a change of $R^2$=13.6% with a significance level of $p$ = .022. Thin ideal internalization, accounting for all other variables in the model, was not a significant predictor of engaging in purging behavior ($p$ = .278). Athletic ideal internalization, accounting for all other variables in the model, was not a significant predictor of engaging in purging behavior ($p$ = .558). Appearance comparisons, accounting for all other variables in the model, was not a significant predictor of engaging in purging behavior ($p$ = .061). See Table 8.

Table 8:

*Associations between primary predictor variables (thin ideal internalization, athletic ideal internalization, and appearance comparisons) and Purging:*

| | | *b* | *SE* | *β* | *t* | *p* | Tolerance | VIF |
|---|---|---|---|---|---|---|---|---|
| Model 1 | (Constant) | .04 | 3.85 | | .01 | .991 | | |
| | BMI | .16 | .16 | .12 | 1.03 | .306 | 1.00 | 1.00 |
| Model 2 | (Constant) | -5.67 | 4.17 | | -1.36 | .179 | | |
| | BMI | .09 | .15 | .06 | .56 | .577 | .96 | 1.04 |
| | Appearance Comparison | .16 | .08 | .26 | 1.91 | .061 | .72 | 1.39 |
| | Athletic Ideal Internalization | .35 | .59 | .07 | .59 | .558 | .93 | 1.08 |
| | Thin Ideal Internalization | .80 | .73 | .14 | 1.09 | .278 | .74 | 1.36 |

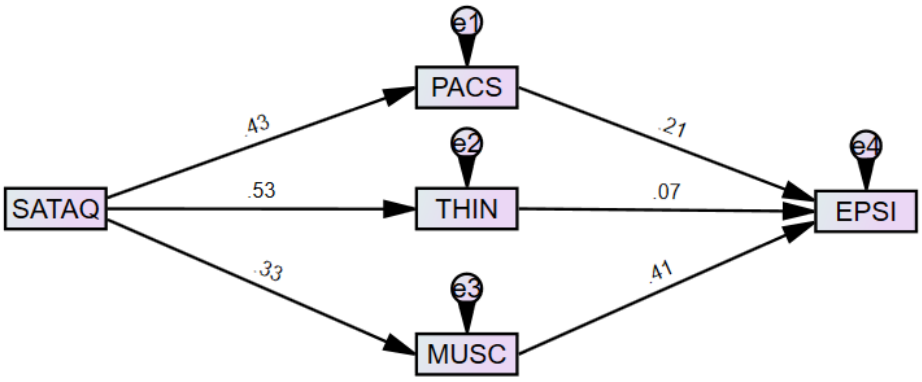
Note. SE = standard error; BMI = body mass index

**Exploratory Analyses**

Though these analyses were not adequately powered due to the small sample size, a preliminary path model was computed examining associations between SATAQ sociocultural pressures and DE (EPSI), mediated by appearance comparisons (PACS), thin ideal

internalization (THIN), and athletic ideal internalization (MUSC), consistent with the Tripartite Model. A factor analysis was conducted to reduce the number of sources of pressure and number of DE constructs in the model. Two distinct factors emerged, one representing sources of sociocultural pressure (SATAQ pressure items) and the other representing DE (EPSI items). The results of the path analysis are presented below but considered very preliminary due to the small sample size. All paths were positive, and small in size. The strongest predictor of EPSI scores was the Athletic Ideal Internalization ($b$ = .41); however, SATAQ sociocultural pressures were more strongly associated with Appearance Comparisons ($b$ = .43) and Thin Ideal Internalization ($b$ = .53).

Figure 1. *Associations between sociocultural pressures (SATAQ) and disordered eating (EPSI), mediated by appearance comparisons (PACS), thin ideal internalization (THIN), and athletic ideal internalization (MUSC):*




## DISCUSSION

The current study aimed to investigate how different sources of sociocultural pressure (Family, Media, Peers) described in the Tripartite Model (Thompson et al., 1999), and additional sources of pressure from teammates and coaches were associated with thinness-and muscularity internalization and appearance comparisons among athletes. Subsequently, these potential

mechanisms were explored as predictors of DE among athletes. Findings provided partial support for the original Tripartite Model, and little support for an expanded version of the model which included pressures from coaches and teammates.

Partly consistent with previous findings, media pressure was found to be significantly associated with greater internalization of the thin ideal and associated with greater appearance comparisons, but none of the other pressure related items in the original Tripartite Model were significantly associated with any of the mechanism variables. This finding, with media being significantly associated with greater internalization of the thin ideal and greater appearance comparison, is consistent with previous research that also found it to be the most dominant source of sociocultural appearance pressure among female college students more broadly (Johnson et al., 2014). This association also adds to the large body of research that highlights how powerful, influential and persuasive social media can be among female athletes and females in general (Griffiths et al., 2018; Hausenblas et al., 2013). Social media has grown to be a large part of people's lives (90 minutes daily on average) (Saha & Guha, 2019), with personal devices creating easy access to media content. Previous research found a positive correlation between time spent on social media, symptoms of addiction to it, symptoms of DE, and social comparison among others (Fiedler et al., 2023).

Inconsistent with prior research, peers and family did not exhibit any significant association with thin ideal internalization, athletic ideal internalization, or appearance comparisons. One suggestion for this lack of association could be due to the fact that the family influence, and especially the parents, might not be as operative for this age group, as it might be for younger participants. The Tripartite Influence Model was originally developed among adolescent girls (Keery et al., 2004). Additionally, the age of this sample was different compared

to the original Tripartite Model, which both means that the athletes participating in this study were beyond the adolescent phase and additionally, majority of the sample did not live home with their parents, and therefore they might not be as exposed to family pressure as participants in the original study. The lack of association between peers and the primary predictor variables, could be explained by the group of participants for the study; athletes are spending majority of their time with coaches and teammates (Recruiting, 2016), which may decrease the amount of time they spend with peers, and therefore the exposure to peer pressure might not be as dominant as if the association was measured in the general population. Another suggestion for this lack of association could be due to the daily media exposure athletes might face now, so other sources of pressure were not significant when media pressure was included in the model.

Furthermore, consistent with previous research (Ramme et al., 2016), but inconsistent with the predictions of this study, was the lack of association between any of the sources of sociocultural pressures and the internalization of the *athletic* ideal. A prior study by Ramme et al. (2016), explained this lack of prediction to be due to the fact that the Tripartite Model of influence does not hold for the athletic ideal together with the fact that the SATAQ were mainly developed for the thin ideal internalization, and not for the athletic ideal internalization. Alternatively, it is possible that this ideal is more self-imposed among athletes (not from external pressures), given performance goals and aspects of athletic identity that come with being an athlete.

Inconsistent with the second hypothesis, the new sources of pressure relevant to athletes (coaches and teammates) that were included in the model, were not associated with greater internalization of the thin and athletic ideal, nor associated with greater appearance comparison. The lack of association found between the added sociocultural pressure items and other variables

in the Tripartite Model was unexpected given that previous research found that pressures within the sporting environment were associated with EDs among athletes (Coker-Cranney & Reel, 2015; Walter et al., 2022). One possibility for this lack of association could be due to the fact that we created the measures for the added sociocultural pressure items, and they were not validated. Alternatively, it could be caused by athletes not wanting to disclose feeling appearance related pressures from coaches or teammates, for fear of potential consequences. There is a need for more qualitative work exploring how communication, both overt and more subtle, may lead to feelings of pressure related to appearance/body that may be more nuanced than what was captured in this study. For example, perceived pressures from teammates or coaches that are related to how the body may impact performance might not have been captured here. Likewise, aspects of the environment, such as locker rooms or the nature of some sporting attire (e.g., swimsuits, revealing uniforms) may be contributing to appearance-related pressures in a way that was hard to capture in the items used (e.g., "I feel pressure to improve my appearance"). If not overt, these items were potentially rated as low.

The original Tripartite Model proposes associations between thin ideal internalization, athletic ideal internalization, and appearance comparisons and DE. In the current study, we also tested the associations between these variables and DE behavior. We found direct pathways between athletic ideal internalization and engagement in muscle building- and excessive exercise behavior, together with direct pathways between appearance comparisons and greater engagement in binge eating behavior. Body ideal internalization and appearance comparisons were not associated with the other EPSI outcomes, such as restricting or purging behavior. The lack of association between these sociocultural variables and engagement in restricting- and purging behavior could be due to the fact that engagement in those behaviors could further

weaken the body and decrease performance and athletes may be more discouraged to engage in those ED behaviors. Otherwise, engagement in those behaviors may be more tied to biological or other mental health problems, not sociocultural variables (Haynos et al., 2020). It might be more "normalized" to engage in excessive exercise and muscle building because those behaviors do not stand out as much in an athletic environment compared to restricting- and purging behavior.

**Strengths and Limitations**

Strengths of this study include the extended version of the Tripartite Model of Influence (with pressure from coaches and teammates) even though those pressure items did not reveal any associations, possibly due to a small sample size. Several limitations were present in this study. First, the added sociocultural pressure measures were not yet validated nor were the questions pilot tested to assess their efficacy prior to use. Additionally, the overall sample size was small, below what the power analysis stated, which could be an explanation for the lack of association between the different variables. Another limitation of the study is its cross-sectional design, because it does not create awareness about the effects of sociocultural pressure on the development or maintenance of ED behavior among the athletes. We cannot claim any direct causation between any of the variables. The results could also be different if the surveys were conducted during a particular sport season, compared to off-season, which was not measured. Off season, body-related pressure and emphasis might be different. Additionally, the athletes participating in the study were self-identified athletes from a variety of levels and sport types, which limits the accuracy of determining what levels and sport types are at highest risk of engaging in DE behavior. Likewise, we were not able to separate the athletes by lean vs non lean sports like in previous studies due to the small sample size. Lastly, it was a limitation that the study was based on self-report measures due to the risk of response bias, defensiveness, or desire

to protect teammates/coaches. Future studies should consider qualitative methods to better capture sources of pressure that the measurements used in this study did not capture.

**Conclusions**

Overall, this study provided partial support for the original Tripartite Model of influence among athletes, suggesting that media pressure was significantly associated with thin ideal internalization and significantly associated with appearance comparisons. Additionally, it revealed a significant association between athletic ideal internalization and engagement in muscle building behavior and excessive exercise, together with a significant association between appearance comparisons and binge eating. Future work should explore those significant associations more in depth in order to understand when and which athletes might feel pressure from sociocultural sources like the media, understand other risk factors for thin-and athletic ideal internalization and appearance comparisons, and predictors of DE behavior.

**REFERENCES**

Abbott, W., Brett, A., Brownlee, T. E., Hammond, K. M., Harper, L. D., Naughton, R. J., Anderson, L., Munson, E. H., Sharkey, J. V., Randell, R. K., & Clifford, T. (2021). The prevalence of disordered eating in elite male and female soccer players. *Eating and Weight Disorders: EWD*, *26*(2), 491–498. https://doi.org/10.1007/s40519-020-00872-0

Ahlich, E., Choquette, E., & Rancourt, D. (2019). Body Talk, Athletic Identity, and Eating Disorder Symptoms in Men. *Psychology of Men & Masculinity*, *20*. https://doi.org/10.1037/men0000168

Alhaj, O. A., Fekih-Romdhane, F., Sweidan, D. H., Saif, Z., Khudhair, M. F., Ghazzawi, H., Nadar, M. Sh., Alhajeri, S. S., Levine, M. P., & Jahrami, H. (2022). The prevalence and risk factors of screen-based disordered eating among university students: A global systematic review, meta-analysis, and meta-regression. *Eating and Weight Disorders - Studies on Anorexia, Bulimia and Obesity*, *27*(8), 3215–3243. https://doi.org/10.1007/s40519-022-01452-0

APA (Ed.). (2013). *Diagnostic and statistical manual of mental disorders: DSM-5* (5th ed). American Psychiatric Association.

Aparicio-Martinez, P., Perea-Moreno, A.-J., Martinez-Jimenez, M. P., Redel-Macías, M. D., Pagliari, C., & Vaquero-Abellan, M. (2019). Social Media, Thin-Ideal, Body Dissatisfaction and Disordered Eating Attitudes: An Exploratory Analysis. *International Journal of Environmental Research and Public Health*, *16*(21), 4177. https://doi.org/10.3390/ijerph16214177

Arthur-Cameselle, J., Sossin, K., & Quatromoni, P. (2017). A qualitative analysis of factors related to eating disorder onset in female collegiate athletes and non-athletes. *Eating Disorders*, *25*(3), 199–215. https://doi.org/10.1080/10640266.2016.1258940

Ata, R., Schaefer, L., & Thompson, J. (2015). *Sociocultural Theories of Eating Disorders*. https://doi.org/10.1002/9781118574089.ch21

Bardone-Cone, A. M., Harney, M. B., Maldonado, C. R., Lawson, M. A., Robinson, D. P., Smith, R., & Tosh, A. (2010). Defining recovery from an eating disorder: Conceptualization, validation, and examination of psychosocial functioning and psychiatric comorbidity. *Behaviour Research and Therapy*, *48*(3), 194–202. https://doi.org/10.1016/j.brat.2009.11.001

Bardone-Cone, A. M., Hunt, R. A., & Watson, H. J. (2018). An Overview of Conceptualizations of Eating Disorder Recovery, Recent Findings, and Future Directions. *Current Psychiatry Reports*, *20*(9), 79. https://doi.org/10.1007/s11920-018-0932-9

Becker, C. B., Plasencia, M., Kilpela, L. S., Briggs, M., & Stewart, T. (2014). Changing the course of comorbid eating disorders and depression: What is the role of public health interventions in targeting shared risk factors? *Journal of Eating Disorders*, *2*, 15. https://doi.org/10.1186/2050-2974-2-15

Beckner, B. N., & Record, R. A. (2016). Navigating the thin-ideal in an athletic world: Influence of coach communication on female athletes' body image and health choices. *Health Communication*, *31*(3), 364–373. https://doi.org/10.1080/10410236.2014.957998

Bell, H. S., Donovan, C. L., & Ramme, R. (2016). Is athletic really ideal? An examination of the mediating role of body dissatisfaction in predicting disordered eating and compulsive exercise. *Eating Behaviors*, *21*, 24–29. https://doi.org/10.1016/j.eatbeh.2015.12.012

Berczik, K., Szabó, A., Griffiths, M. D., Kurimay, T., Kun, B., Urbán, R., & Demetrovics, Z. (2012). Exercise addiction: Symptoms, diagnosis, epidemiology, and etiology. *Substance Use & Misuse*, *47*(4), 403–417. https://doi.org/10.3109/10826084.2011.639120

Bratland-Sanda, S., & Sundgot-Borgen, J. (2013). Eating disorders in athletes: Overview of prevalence, risk factors and recommendations for prevention and treatment. *European Journal of Sport Science*, *13*(5), 499–508. https://doi.org/10.1080/17461391.2012.740504

Byrne, S., & McLean, N. (2001, June). *Eating disorders in athletes: a review of the literature—PubMed*. JAMS (Journal of Science and Medicine in Sport). https://pubmed.ncbi.nlm.nih.gov/11548914/

Cetin, M. (2021, March 22). *Comorbidities in eating disorders*. http://psychiatry-psychopharmacology.com/en/comorbidities-in-eating-disorders-132875

Chatterton, J. M., & Petrie, T. A. (2013). Prevalence of disordered eating and pathogenic weight control behaviors among male collegiate athletes. *Eating Disorders*, *21*(4), 328–341. https://doi.org/10.1080/10640266.2013.797822

Coelho, G. M. de O., Gomes, A. I. da S., Ribeiro, B. G., & Soares, E. de A. (2014). Prevention of eating disorders in female athletes. *Open Access Journal of Sports Medicine*, *5*, 105–113. https://doi.org/10.2147/OAJSM.S36528

Coker-Cranney, A., & Reel, J. (2015). Coach Pressure and Disordered Eating in Female Collegiate Athletes: Is the Coach-Athlete Relationship a Mediating Factor? *Journal of Clinical Sport Psychology*, *9*, 213–231. https://doi.org/10.1123/jcsp.2014-0052

Coppola, A., Ward, R. M., & Freysinger, V. (2014). Coaches' Communication of Sport Body Image: Experiences of Female Athletes. *Journal of Applied Sport Psychology*, *26*, 1–16. https://doi.org/10.1080/10413200.2013.766650

Dahlgren, C. L., & Wisting, L. (2016). Transitioning from DSM-IV to DSM-5: A systematic review of eating disorder prevalence assessment. *The International Journal of Eating Disorders*, *49*(11), 975–997. https://doi.org/10.1002/eat.22596

Dakanalis, A., Zanetti, A. M., Riva, G., Colmegna, F., Volpato, C., Madeddu, F., & Clerici, M. (2015). Male body dissatisfaction and eating disorder symptomatology: Moderating variables among men. *Journal of Health Psychology*, *20*(1), 80–90. https://doi.org/10.1177/1359105313499198

Diel, K., Will, L., Raab, M., & Hofmann, W. (2021). Motivational and emotional effects of social comparison in sports. *Psychology of Sport and Exercise*, *57*, 102048. https://doi.org/10.1016/j.psychsport.2021.102048

DiPasquale, L. D., & Petrie, T. A. (2013). Prevalence of disordered eating: a comparison of male and female collegiate athletes and nonathletes. *Journal of Clinical Sport Psychology, 7*(3).

Drabkin, A., Rothman, M. S., Wassenaar, E., Mascolo, M., & Mehler, P. S. (2017). Assessment and clinical management of bone disease in adults with eating disorders: A review. *Journal of Eating Disorders*, *5*, 42. https://doi.org/10.1186/s40337-017-0172-0

Eichstadt, M., Luzier, J., Cho, D., & Weisenmuller, C. (2020). Eating Disorders in Male Athletes. *Sports Health*, *12*(4), 327–333. https://doi.org/10.1177/1941738120928991

Eisenberg, D., Nicklett, E. J., Roeder, K., & Kirz, N. E. (2011). Eating disorder symptoms among college students: Prevalence, persistence, correlates, and treatment-seeking. *Journal of American College Health, 59*(8), 700-707.

Engel, S. G., Johnson, C., Powers, P. S., Crosby, R. D., Wonderlich, S. A., Wittrock, D. A., & Mitchell, J. E. (2003). Predictors of disordered eating in a sample of elite Division I college athletes. *Eating Behaviors*, *4*(4), 333–343. https://doi.org/10.1016/S1471-0153(03)00031-X

Festinger, L. (1954). A theory of social comparison processes. *Human Relations, 7*(2), 117-140.

Fiedler, R., Heidari, J., Birnkraut, T., & Kellmann, M. (2023). Digital media and mental health in adolescent athletes. *Psychology of Sport and Exercise*, *67*, 102421. https://doi.org/10.1016/j.psychsport.2023.102421

Forbush, K. T., Wildes, J. E., Pollack, L. O., Dunbar, D., Luo, J., Patterson, K., Petruzzi, L., Pollpeter, M., Miller, H., Stone, A., Bright, A., & Watson, D. (2013). Development and validation of the Eating Pathology Symptoms Inventory (EPSI). *Psychological Assessment*, *25*(3), 859–878. https://doi.org/10.1037/a0032639

Galli, N., & Reel, J. J. (2009). Adonis or Hephaestus? Exploring body image in male athletes. *Psychology of Men & Masculinity*, *10*(2), 95–108. https://doi.org/10.1037/a0014005

Galmiche, M., Déchelotte, P., Lambert, G., & Tavolacci, M. P. (2019). Prevalence of eating disorders over the 2000-2018 period: A systematic literature review. *The American Journal of Clinical Nutrition*, *109*(5), 1402–1413. https://doi.org/10.1093/ajcn/nqy342

Godoy-Izquierdo, D., Ramírez, M. J., Díaz, I., & López-Mora, C. (2023). A Systematic Review on Exercise Addiction and the Disordered Eating-Eating Disorders Continuum in the Competitive Sport Context. *International Journal of Mental Health and Addiction*, *21*(1), 529–561. https://doi.org/10.1007/s11469-021-00610-2

Greenleaf, C., Petrie, T. A., Carter, J., & Reel, J. J. (2009). Female collegiate athletes: Prevalence of eating disorders and disordered eating behaviors. *Journal of American College Health: J of ACH*, *57*(5), 489–495. https://doi.org/10.3200/JACH.57.5.489-496

Griffiths, S., Castle, D., Cunningham, M., Murray, S. B., Bastian, B., & Barlow, F. K. (2018). How does exposure to thinspiration and fitspiration relate to symptom severity among individuals with eating disorders? Evaluation of a proposed model. *Body Image*, *27*, 187–195. https://doi.org/10.1016/j.bodyim.2018.10.002

Guillaume, S., Jaussent, I., Olié, E., Genty, C., Bringer, J., Courtet, P., & Schmidt, U. (2011). Characteristics of Suicide Attempts in Anorexia and Bulimia Nervosa: A Case–Control Study. *PLoS ONE*, *6*(8), e23578. https://doi.org/10.1371/journal.pone.0023578

Halliwell, E. (2012). Social Comparison Theory and Body Image. In T. Cash (Ed.), *Encyclopedia of Body Image and Human Appearance* (pp. 751–757). Academic Press. https://doi.org/10.1016/B978-0-12-384925-0.00119-X

Hambleton, A., Pepin, G., Le, A., Maloney, D., National Eating Disorder Research Consortium, Touyz, S., & Maguire, S. (2022). Psychiatric and medical comorbidities of eating disorders: Findings from a rapid review of the literature. *Journal of Eating Disorders*, *10*(1), 132. https://doi.org/10.1186/s40337-022-00654-2

Hamel, A. E., Zaitsoff, S. L., Taylor, A., Menna, R., & Grange, D. L. (2012). Body-Related Social Comparison and Disordered Eating among Adolescent Females with an Eating Disorder, Depressive Disorder, and Healthy Controls. *Nutrients*, *4*(9), Article 9. https://doi.org/10.3390/nu4091260

Hausenblas, H. A., Campbell, A., Menzel, J. E., Doughty, J., Levine, M., & Thompson, J. K. (2013). Media effects of experimental presentation of the ideal physique on eating disorder symptoms: A meta-analysis of laboratory studies. *Clinical Psychology Review*, *33*(1), 168–181. https://doi.org/10.1016/j.cpr.2012.10.011

Haynos, A. F., Lavender, J. M., Nelson, J., Crow, S. J., & Peterson, C. B. (2020). Moving towards specificity: A systematic review of cue features associated with reward and punishment in anorexia nervosa. *Clinical Psychology Review*, *79*, 101872. https://doi.org/10.1016/j.cpr.2020.101872

Hazzard, V. M., Schaefer, L. M., Mankowski, A., Carson, T. L., Lipson, S. M., Fendrick, C., Crosby, R. D., & Sonneville, K. R. (2020). Development and validation of the Eating Disorders Screen for Athletes (EDSA): A brief screening tool for male and female athletes. *Psychology of Sport and Exercise*, *50*, 101745. https://doi.org/10.1016/j.psychsport.2020.101745

Hines, J. C., Wendorf, W. L., Hennen, A. N., Hauser, K. L., Mitchell, M. M., & Homa, J. M. (2019). How do lean and non-lean female collegiate athletes view the eating disorder education they receive from their coaches? *International Journal of Sports Science & Coaching*, *14*(2), 169–178. https://doi.org/10.1177/1747954118825060

Hoerr, S. L., Bokram, R., Lugo, B., Bivins, T., & Keast, D. R. (2002). Risk for disordered eating relates to both gender and ethnicity for college students. *Journal of the American College of Nutrition*, *21*(4), 307–314. https://doi.org/10.1080/07315724.2002.10719228

Izydorczyk, B., Głomb, K., Bętkowska-Korpała, B., Yablonska, T., Bulatevych, N., Opałka, R., Lizińczyk, S., Sitnik-Warchulska, K., Radtke, B. M., Sajewicz-Radtke, U., & Lipowska, M. (2023). Internalization of athletic body ideal as a mediating variable between family influence and body image of young women. A cross-cultural study of polish, Italian, and Ukrainian women. *Frontiers in Psychiatry*, *14*. https://www.frontiersin.org/articles/10.3389/fpsyt.2023.1136079

Johnson, S., Edwards, K., & Gidycz, C. (2014). Interpersonal Weight-Related Pressure and Disordered Eating in College Women: A Test of an Expanded Tripartite Influence Model. *Sex Roles*, *72*, 15–24. https://doi.org/10.1007/s11199-014-0442-0

Karrer, Y., Halioua, R., Mötteli, S., Iff, S., Seifritz, E., Jäger, M., & Claussen, M. C. (2020). Disordered eating and eating disorders in male elite athletes: A scoping review. *BMJ*

*Open Sport — Exercise Medicine*, *6*(1), e000801. https://doi.org/10.1136/bmjsem-2020-000801

Keery, H., van den Berg, P., & Thompson, J. K. (2004). An evaluation of the Tripartite Influence Model of body dissatisfaction and eating disturbance with adolescent girls. *Body Image*, *1*(3), 237–251. https://doi.org/10.1016/j.bodyim.2004.03.001

Krane, V., Choi, P. Y. L., Baird, S. M., Aimar, C. M., & Kauer, K. J. (2004). Living the Paradox: Female Athletes Negotiate Femininity and Muscularity. *Sex Roles*, *50*(5/6), 315–329. https://doi.org/10.1023/B:SERS.0000018888.48437.4f

Lefkowich, M., Oliffe, J. L., Hurd Clarke, L., & Hannan-Leith, M. (2017). Male Body Practices: Pitches, Purchases, and Performativities. *American Journal of Men's Health*, *11*(2), 454–463. https://doi.org/10.1177/1557988316669042

Levine, M. P. (2012). Loneliness and eating disorders. *The Journal of Psychology: Interdisciplinary and Applied*, *146*(1–2), 243–257. https://doi.org/10.1080/00223980.2011.606435

Lichtenstein, M. B., Hinze, C. J., Emborg, B., Thomsen, F., & Hemmingsen, S. D. (2017). Compulsive exercise: Links, risks and challenges faced. *Psychology Research and Behavior Management*, *10*, 85–95. https://doi.org/10.2147/PRBM.S113093

Lichtenstein, M. B., Johansen, K. K., Runge, E., Hansen, M. B., Holmberg, T. T., & Tarp, K. (2022). Behind the athletic body: A clinical interview study of identification of eating disorder symptoms and diagnoses in elite athletes. *BMJ Open Sport — Exercise Medicine*, *8*(2), e001265. https://doi.org/10.1136/bmjsem-2021-001265

Lichtenstein, M. B., & Melin, A. (n.d.). *SYMPTOMER, UDLØSENDE FAKTORER OG FORSLAG TIL INDSATSER*.

Lin, J. A., Woods, E. R., & Bern, E. M. (2021). Common and Emergent Oral and Gastrointestinal Manifestations of Eating Disorders. *Gastroenterology & Hepatology*, *17*(4), 157–167.

Lipson, S. K., & Sonneville, K. R. (2020). Understanding suicide risk and eating disorders in college student populations: Results from a national study. *International Journal of Eating Disorders*, *53*(2), 229–238. https://doi.org/10.1002/eat.23188

Lucibello, K. M., Koulanova, A., Pila, E., Brunet, J., & Sabiston, C. M. (2021). Exploring adolescent girls' experiences of body talk in non-aesthetic sport. *Journal of Adolescence*, *89*, 63–73. https://doi.org/10.1016/j.adolescence.2021.04.003

Mancine, R. P., Gusfa, D. W., Moshrefi, A., & Kennedy, S. F. (2020). Prevalence of disordered eating in athletes categorized by emphasis on leanness and activity type – a systematic review. *Journal of Eating Disorders*, *8*(1), 47. https://doi.org/10.1186/s40337-020-00323-2

McDonald, A. H., Pritchard, M., & McGuire, M. K. (2020). Self-reported eating disorder risk in lean and non-lean NCAA Collegiate Athletes. *Eating and Weight Disorders: EWD*, *25*(3), 745–750. https://doi.org/10.1007/s40519-019-00681-0

Muscat, A. C., & Long, B. C. (2008). Critical Comments About Body Shape and Weight: Disordered Eating of Female Athletes and Sport Participants. *Journal of Applied Sport Psychology*, *20*(1), 1–24. https://doi.org/10.1080/10413200701784833

Pallotto, I. K., Sockol, L. E., & Stutts, L. A. (2022). General and sport-specific weight pressures as risk factors for body dissatisfaction and disordered eating among female collegiate athletes. *Body Image*, *40*, 340–350. https://doi.org/10.1016/j.bodyim.2022.01.014

Qian, J., Wu, Y., Liu, F., Zhu, Y., Jin, H., Zhang, H., Wan, Y., Li, C., & Yu, D. (2022). An update on the prevalence of eating disorders in the general population: A systematic review and meta-analysis. *Eating and Weight Disorders*, *27*(2), 415–428. https://doi.org/10.1007/s40519-021-01162-z

Rahimi, S., Hall, N. C., Wang, H., & Maymon, R. (2017). Upward, downward, and horizontal social comparisons: Effects on adjustment, emotions and persistence in teachers. *Interdisciplinary Education and Psychology, 1*(1).

Ramme, R. A., Donovan, C. L., & Bell, H. S. (2016). A test of athletic internalisation as a mediator in the relationship between sociocultural influences and body dissatisfaction in women. *Body Image*, *16*, 126–132. https://doi.org/10.1016/j.bodyim.2016.01.002

Recruiting, N. C. (2016, June 3). *Study: Time demands of D1 student-athletes are excessive*. https://www.ncsasports.org/blog/study-time-demands-d1-studentathletes-excessive

Reinking, M. F., & Alexander, L. E. (2005). Prevalence of Disordered-Eating Behaviors in Undergraduate Female Collegiate Athletes and Nonathletes. *Journal of Athletic Training*, *40*(1), 47–51.

Saha, S. R., & Guha, A. K. (2019). Impact of Social Media Use of University Students. *International Journal of Statistics and Applications*, *9*(1), 36–43.

Sandoz, E., Wilson, K., & DuFrene, T. (2011). *Acceptance and Commitment Therapy for Eating Disorders: A Process-Focused Guide to Treating Anorexia and Bulimia*. New Harbinger Publications.

Sawyer, S. M., Whitelaw, M., Le Grange, D., Yeo, M., & Hughes, E. K. (2016). Physical and Psychological Morbidity in Adolescents With Atypical Anorexia Nervosa. *Pediatrics*, *137*(4), e20154080. https://doi.org/10.1542/peds.2015-4080

Schaefer, L. M., Harriger, J. A., Heinberg, L. J., Soderberg, T., & Kevin Thompson, J. (2017). Development and validation of the sociocultural attitudes towards appearance questionnaire-4-revised (SATAQ-4R). *The International Journal of Eating Disorders*, *50*(2), 104–117. https://doi.org/10.1002/eat.22590

Scoffier, S., Maïano, C., & d'Arripe-Longueville, F. (2010). The effects of social relationships and acceptance on disturbed eating attitudes in elite adolescent female athletes: The mediating role of physical self-perceptions. *International Journal of Eating Disorders*, *43*(1), 65–71. https://doi.org/10.1002/eat.20597

Scoffier-Mériaux, S., Ferrand, C., & d'Arripe-Longueville, F. (2018). The Internalisation of Sociocultural and Thin-Ideal Standards in Sports Scale: Development and preliminary validation in female aesthetic sports athletes. *International Journal of Sport and Exercise Psychology*, *16*(2), 125–132. https://doi.org/10.1080/1612197X.2015.1133692

Seitz, J., Belheouane, M., Schulz, N., Dempfle, A., Baines, J. F., & Herpertz-Dahlmann, B. (2019). The impact of starvation on the microbiome and gut-brain interaction in anorexia nervosa. *Frontiers in Endocrinology, 10*, 41.

Smink, F. R. E., van Hoeken, D., Oldehinkel, A. J., & Hoek, H. W. (2014). Prevalence and severity of DSM-5 eating disorders in a community cohort of adolescents. *The International Journal of Eating Disorders*, *47*(6), 610–619. https://doi.org/10.1002/eat.22316

Steinfeldt, J. A., Carter, H., Benton, E., & Steinfeldt, M. C. (2011). Muscularity beliefs of female college student-athletes. *Sex Roles: A Journal of Research*, *64*(7–8), 543–554. https://doi.org/10.1007/s11199-011-9935-2

Steinman, J., & Shibli-Rahhal, A. (2019). Anorexia Nervosa and Osteoporosis: Pathophysiology and Treatment. *Journal of Bone Metabolism*, *26*(3), 133–143. https://doi.org/10.11005/jbm.2019.26.3.133

Stice, E. (2002). Risk and maintenance factors for eating pathology: A meta-analytic review. *Psychological Bulletin*, *128*(5), 825–848. https://doi.org/10.1037/0033-2909.128.5.825

Stoyel, H., Delderfield, R., Shanmuganathan-Felton, V., Stoyel, A., & Serpell, L. (2021). A Qualitative Exploration of Sport and Social Pressures on Elite Athletes in Relation to Disordered Eating. *Frontiers in Psychology*, *12*. https://doi.org/10.3389/fpsyg.2021.633490

Striegel-Moore, R. H., Rosselli, F., Perrin, N., DeBar, L., Wilson, G. T., May, A., & Kraemer, H. C. (2009). Gender Difference in the Prevalence of Eating Disorder Symptoms. *The International Journal of Eating Disorders*, *42*(5), 471–474. https://doi.org/10.1002/eat.20625

SturtzSreetharan, C., Agostini, G., Wutich, A., Mitchell, C., Rines, O., Romanello, B., & Brewis, A. (2020). “I need to lose some weight”: Masculinity and body image as negotiated through fat talk. *Psychology of Men & Masculinities*, *21*(1), 148–161. https://doi.org/10.1037/men0000219

Sundgot-Borgen, J., & Torstveit, M. (2010). Aspects of disordered eating continuum in elite high-intensity sports. *Scandinavian Journal of Medicine & Science in Sports, 20*, 112-121.

Swinbourne, J., Hunt, C., Abbott, M., Russell, J., St Clare, T., & Touyz, S. (2012). The comorbidity between eating disorders and anxiety disorders: Prevalence in an eating

disorder sample and anxiety disorder sample. *The Australian and New Zealand Journal of Psychiatry*, *46*(2), 118–131. https://doi.org/10.1177/0004867411432071

Tackett, B. P., Petrie, T. A., & Anderson, C. M. (2016). The frequency of weigh-ins, weight intentionality and management, and eating among female collegiate athletes. *Eating Behaviors*, *23*, 82–85. https://doi.org/10.1016/j.eatbeh.2016.08.007

Thomas, J. J., Vartanian, L. R., & Brownell, K. D. (2009). The relationship between eating disorder not otherwise specified (EDNOS) and officially recognized eating disorders: Meta-analysis and implications for DSM. *Psychological Bulletin*, *135*(3), 407–433. https://doi.org/10.1037/a0015326

Thompson, J., Heinberg, L., & Tantleff-Dunn, S. (1991). The Physical Appearance Comparison Scale. *The Behavior Therapist*, *14*, 174.

Thompson, J. K., Heinberg, L. J., Altabe, M., & Tantleff-Dunn, S. (1999). *Exacting beauty: Theory, assessment, and treatment of body image disturbance* (pp. xii, 396). American Psychological Association. https://doi.org/10.1037/10312-000

Thompson, J. K., & Stice, E. (2001). Thin-Ideal Internalization: Mounting Evidence for a New Risk Factor for Body-Image Disturbance and Eating Pathology. *Current Directions in Psychological Science, 10*(5), 181-183. https://doi.org/10.1111/1467-8721.00144

Torstveit, M. K., & Sundgot-Borgen, J. (2005). The female athlete triad: Are elite athletes at increased risk? *Medicine and Science in Sports and Exercise*, *37*(2), 184–193. https://doi.org/10.1249/01.mss.0000152677.60545.3a

van den Berg, P., Thompson, J. K., Obremski-Brandon, K., & Coovert, M. (2002). The Tripartite Influence Model of body image and eating disturbance: A covariance structure modeling investigation testing the mediational role of appearance comparison. *Journal of*

*Psychosomatic Research*, *53*(5), 1007–1020. https://doi.org/10.1016/s0022-3999(02)00499-3

Velkoff, E. A., Gibler, R. C., Forrest, L. N., & Smith, A. R. (2019). Indirect effects of negative body talk on eating, exercise, and expectations about steroids in a sample of at-risk adult men. *Psychology of Men & Masculinities*, *20*(4), 594–602. https://doi.org/10.1037/men0000189

Walter, N., Heinen, T., & Elbe, A.-M. (2022). Factors associated with disordered eating and eating disorder symptoms in adolescent elite athletes. *Sports Psychiatry*, *1*. https://doi.org/10.1024/2674-0052/a000012

Want, S. C. (2009). Meta-analytic moderators of experimental exposure to media portrayals of women on female appearance satisfaction: Social comparisons as automatic processes. *Body Image, 6*(4), 257-269.

Ward, Z. J., Rodriguez, P., Wright, D. R., Austin, S. B., & Long, M. W. (2019). Estimation of Eating Disorders Prevalence by Age and Associations With Mortality in a Simulated Nationally Representative US Cohort. *JAMA Network Open*, *2*(10), e1912925. https://doi.org/10.1001/jamanetworkopen.2019.12925

WHO. (1995). *Malnutrition in women*. World Health Organization. https://www.who.int/data/nutrition/nlis/info/malnutrition-in-women

Wildes, J. E., & Marcus, M. D. (2013). Alternative methods of classifying eating disorders: Models incorporating comorbid psychopathology and associated features. *Clinical Psychology Review*, *33*(3), 383–394. https://doi.org/10.1016/j.cpr.2013.01.006

Zaccagni, L., & Gualdi-Russo, E. (2023). The Impact of Sports Involvement on Body Image Perception and Ideals: A Systematic Review and Meta-Analysis. *International Journal of*

*Environmental Research and Public Health*, *20*(6), 5228.

https://doi.org/10.3390/ijerph20065228