Eating and Weight Disorders - Studies on Anorexia, Bulimia and Obesity (2022) 27:2387–2395
https://doi.org/10.1007/s40519-022-01378-7

ORIGINAL ARTICLE

# Overweight preoccupation is associated with eating pathology in male collegiate athletes with body dissatisfaction

Matthew F. Murray[1] · Hayley Perelman[2] · Danielle Sandhu[1] · Isabel C. Quiñones[1] · Alissa A. Haedt-Matt[1]

Received: 17 August 2021 / Accepted: 1 February 2022 / Published online: 17 February 2022


## Abstract

**Purpose** This study examined specific aspects of body dissatisfaction and drive for muscularity as correlates of eating pathology and explored sport confidence as a moderator of these associations in male collegiate athletes.

**Method** Ninety-three male collegiate athletes who endorsed body dissatisfaction and were enrolled in a body dissatisfaction intervention study completed baseline measures of appearance orientation, appearance evaluation, overweight preoccupation, muscularity-oriented attitudes and behaviors, eating pathology symptoms, and sport confidence.

**Results** There were significant associations between overweight preoccupation and cognitive restraint, purging, binge eating, and excessive exercise, appearance orientation and cognitive restraint, negative appearance evaluation and restricting, muscularity-oriented attitudes and binge eating, and muscularity-oriented behaviors and excessive exercise. Low-to-moderate sport confidence moderated the association between muscularity-oriented behaviors and purging.

**Conclusion** Findings highlight a need for interventions targeting drive for muscularity and body dissatisfaction, especially overweight preoccupation, in male collegiate athletes. Findings additionally suggest a need to further examine the utility of sport confidence in prevention and intervention programs targeting eating pathology in larger samples of male athletes.

**Level of evidence** V, Cross-sectional descriptive study.

**Keywords** Body dissatisfaction · Drive for muscularity · Disordered eating · Athletes · Sports · Male

## Introduction

Male athletes are at risk for eating pathology [1] and known correlates such as body dissatisfaction and drive for muscularity [2], often due to pressures to conform to sport-specific body ideals [3]. These pressures can include regular and mandated weigh-ins [4], revealing uniforms, and other weight-based and performance-focused comments from teammates and coaches [5]. Eating pathology is associated with significant health consequences in male athletes and may negatively impact athletic performance [1]. Thus, further research is needed to understand associations between body dissatisfaction, muscularity concerns, and eating pathology in this population to aid in developing tailored eating disorder prevention and intervention programs.

Body dissatisfaction in male athletes is primarily driven by a desire for both leanness and muscularity [6], a difficult-to-obtain body composition that is often promoted as a method of performance enhancement. [7]. Body dissatisfaction in this population may also depend upon whether a specific sport is weight-sensitive vs. non-weight-sensitive [8]. Weight-sensitive sports (e.g., wrestling) are generally defined by an aesthetic component, utilization of weight classes, or gravitational nature (i.e., where body weight restricts movement [9]). Weight-sensitive and non-weight-sensitive (e.g., football) sports differentially emphasize leanness for performance enhancement, and body dissatisfaction is more pronounced among male athletes in weight-sensitive sports [10], although athletes across sport types report body dissatisfaction and eating pathology [3]. Additionally, focus on body dissatisfaction as a broad construct in prior literature may obscure relevance of specific aspects of body dissatisfaction to male athletes and how those aspects relate to eating pathology. For example, dissatisfaction with

✉ Matthew F. Murray
mmurray8@hawk.iit.edu

[1] Department of Psychology, Illinois Institute of Technology, 213 Tech Central, 3424 S. State St, Chicago, IL 60616, USA

[2] Department of Counseling Psychology and Applied Human Development, Boston University, Boston, MA, USA

musculature and having overweight are noted concerns among male athletes, perhaps due to lean-muscle body ideals emphasized in sporting and cultural contexts [11]. This dissatisfaction may put male athletes at risk for drive for muscularity, a distinct construct defined by attitudes about and behaviors towards achieving a muscular physique [12]. Sport-specific body shape pressures predict eating pathology in male athletes in part through muscularity-oriented behaviors (e.g., frequent weightlifting) and low body satisfaction [2]. Drive for muscularity may therefore be a concern in male athletes who aim or are pressured to embody an athletic ideal and experience body dissatisfaction [13].

Body dissatisfaction and drive for muscularity are documented risk factors for eating pathology in male athletes [2]. Thus, it is essential to identify potential protective factors against these constructs. One such target that has gained attention in studies investigating body dissatisfaction is sport confidence. Sport confidence is a self-evaluation framework including sport competence (i.e., confidence in athletic ability) and dispositional optimism (i.e., belief in positive future events), and is derived from physical and socioenvironmental factors such as positive feedback and perceived body preparedness for sport [14, 15]. Sport confidence is related to sporting success [15] and is thus of interest in context of negative self-evaluation sources such as body dissatisfaction and eating pathology, which can hinder athletic performance. Research suggests that sport confidence is negatively related to body dissatisfaction and appearance orientation, and positively related to appearance evaluation, body appreciation, and body functionality appreciation [16, 17]. These findings are promising as they suggest that fostering sport confidence in athletes may be an effective strategy to attenuate the association between body dissatisfaction and eating pathology. For example, even in male athletes who endorse body dissatisfaction, they may be less likely to engage in maladaptive eating behaviors if they have a greater sense of sport competence or positive perception of their athletic body and functionality [18], components of sport confidence.

To better understand relations among specific body dissatisfaction and drive for muscularity facets, and eating pathology symptoms, and explore sport confidence as a moderator of these associations, this study: (1) examined associations between appearance evaluation, appearance orientation, and overweight preoccupation aspects of body dissatisfaction, muscularity-oriented attitudes and behaviors, and eating pathology (i.e., cognitive restraint, restricting, binge eating, purging, and excessive exercise); and (2) tested the moderating role of sport confidence on these associations in a sample of male collegiate athletes who endorsed at least minimal body dissatisfaction. It was hypothesized that after adjusting for sport type (i.e., weight- and non-weight-sensitive): (1) appearance evaluation, appearance orientation, overweight preoccupation, and muscularity-oriented attitudes and behaviors are positively associated with cognitive restraint, restricting, excessive exercise, binge eating, and purging; and (2) higher sport confidence attenuates these associations.

## Methods

### Participants

The sample included 93 collegiate athletes who (a) identified as male and members of university-sponsored varsity athletic teams, (b) were over age 18 years, and (c) endorsed body dissatisfaction (i.e., scores greater than 1 on the Overweight Preoccupation or Appearance Orientation subscales of the Multidimensional Body-Self Relations Questionnaire, or scores greater than 5 on the Appearance Orientation subscale).

Forty-one (44%) participants were enrolled in an NCAA Division III and 52 (56%) were enrolled in an NCAA Division II university. Forty-three participants played weight-sensitive sports (46%) and 50 played non-weight-sensitive sports (54%). In this study, weight-sensitive sports included: cross country/track and field ($n=27$, 29.0%), swimming and diving ($n=8$, 8.6%), volleyball ($n=4$, 4.3%), and wrestling ($n=4$, 4.3%); non-weight-sensitive sports included: soccer ($n=14$, 15.1%), golf ($n=1$, 1.1%), football ($n=4$, 4.3%), lacrosse ($n=4$, 4.3%), baseball ($n=15$, 16.1%), basketball ($n=7$, 7.5%), and tennis ($n=5$, 5.4%). Participants ranged in age from 18 to 23 years ($M=19.47$, $SD=1.19$) and body mass indexes (BMI) ranged from 17.42 to 35.90 kg/m$^2$ ($M=21.72$, $SD=3.12$). Most of the sample was White, non-Hispanic, (70%), followed by Black or African American, non-Hispanic, (15%), Asian, non-Hispanic, (8%), Hispanic (5%), and "Other" (2%). See Table 1 for demographic characteristics within each sport type.

### Procedure

This study is a secondary analysis that utilized baseline data of a research study examining a brief body dissatisfaction intervention for male collegiate athletes [19]. Questionnaires were completed prior to intervention procedures.

### Measures

#### *Demographic form*

Participants self-reported age, sex, race, ethnicity, weight, height, education level and sport(s) participated in.

See Table 2 for descriptive statistics and Cronbach's alphas for each of the measures below.

**Table 1** Subsample demographic characteristics

| Variable | Group | |
|---|---|---|
| | Weight-Sensitive ($n=43$) | Non-Weight-Sensitive ($n=50$) |
| Age (*M*, *SD*) | 19.42 (1.28) | 19.52 (1.13) |
| BMI (*M*, *SD*) | 22.90 (3.11) | 24.42 (2.98) |
| Race/Ethnicity (*n*, column %, row %) | | |
| White, non-Hispanic | 25 (58.1, 38.5) | 40 (80.0, 61.5) |
| Black, non-Hispanic | 9 (20.9, 64.3) | 5 (10.0, 35.7) |
| Asian, non-Hispanic | 4 (9.3, 57.1) | 3 (6.0, 42.9) |
| Hispanic | 4 (9.3, 80.0) | 1 (2.0, 20.0) |
| "Other" | 1 (2.3, 50.0) | 1 (2.0, 50.0) |

#### *Multidimensional body-self relations questionnaire (MBSRQ; [20])*

Specific body dissatisfaction facets were assessed using the Appearance Evaluation, Appearance Orientation, and Overweight Preoccupation subscales of the MBSRQ. Research supports the test–retest reliability and convergent, discriminant, and construct validity of these scale as indicators of specific aspects of body dissatisfaction among samples of men [20].

#### *Drive for muscularity scale (DMS; [21])*

Muscularity-oriented attitudes and behaviors were assessed using the Muscularity-Oriented Body Image Attitudes and Muscularity-Oriented Behaviors subscales of the DMS, which has been validated in young adult men [21]. Research using a French version supported the reliability and construct validity of the DMS among male athletes [22].

#### *Eating pathology symptoms inventory (EPSI; [23])*

Eating pathology was assessed using the Cognitive Restraint, Restricting, Binge Eating, Purging, and Excessive Exercise subscales of the EPSI. Research suggests that scores on the EPSI subscales are reliable and valid indicators of eating pathology among community, college, and clinical samples of men, including varsity athletes [23]. Psychometric evaluation indicated that the self-induced vomiting item may not fit the purging subscale, but this item was retained for conceptual reasons [23]. In this study, internal consistency of the purging subscale without this item was not improved at 0.63 and the full scale was retained.

#### *Carolina sport confidence inventory (CSCI; [24])*

Sport confidence was examined using the CSCI, which assesses dispositional optimism and sport competence. Research supports high test–retest reliability and construct validity of the CSCI as an indicator of sport competence in male and female athlete samples [24, 25].

### Statistical analyses

Analyses were conducted in SPSS v. 27 (Armonk, NY: IBM Corp.). All analyses controlled for sport type (dummy coded as 0 = weight-sensitive vs. 1 = non-weight-sensitive) given evidence of differential symptom manifestation across different sports and literature highlighting the need to account for sport type [1]. Multiple linear regression analyses were used to model associations between all demographic characteristics and each eating pathology symptom to identify potential covariates; however, there were no significant associations (all $ps > 0.05$). Partial correlations were used to test associations between body dissatisfaction, drive for muscularity, and eating pathology symptoms (hypothesis 1), adjusting for sport type. The PROCESS macro for SPSS [26] was used to test the moderating role of sport confidence on these associations (hypothesis 2). Independent variables were mean-centered. The Johnson-Neyman method was used to probe the region of sport confidence values at which interactions were significant. To account for inflated type I error due to 25 comparisons examining sport confidence as a moderator of associations among body dissatisfaction facets, muscularity-oriented attitudes and behaviors, and eating pathology symptoms, analyses were also evaluated using the Benjamini–Hochberg correction at a false discovery rate of 0.05 [27].

## Results

***Hypothesis 1*** See Table 2 for partial correlation coefficients, which ranged from small (e.g., $r=0.23$) to moderate (e.g., $r=0.46$). Appearance orientation was positively related to cognitive restraint but no other eating pathology symptoms. Appearance evaluation was negatively related to restricting, but no other symptoms. Overweight preoccupation was positively related to cognitive restraint, binge eating, purging, and excessive exercise, but not restricting. Muscularity-oriented attitudes were positively related to binge eating and muscularity-oriented behaviors were positively related to excessive exercise, but no other symptoms.

***Hypothesis 2*** See Table 3 for moderation interaction statistics. Sport confidence moderated the association between appearance orientation and excessive exercise ($b=-0.22$,

**Table 2** Descriptive statistics and partial correlations of study variables

| | *M* | *SD* | $\alpha$ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Appearance orientation | 3.22 | 0.59 | .84 | – | | | | | | | | | |
| 2. Appearance evaluation | 3.91 | 0.68 | .89 | − 0.13 | – | | | | | | | | |
| 3. Overweight preoccupation | 2.06 | 0.87 | .76 | 0.42*** | − 0.30** | – | | | | | | | |
| 4. Muscularity-oriented attitudes | 3.36 | 1.18 | .89 | 0.27* | − 0.38*** | 0.11 | – | | | | | | |
| 5. Muscularity-oriented behaviors | 2.67 | 0.80 | .77 | 0.13 | 0.10 | 0.23* | 0.33** | – | | | | | |
| 6. Cognitive restraint | 3.93 | 2.62 | .70 | 0.21* | − 0.20 | 0.54*** | 0.05 | 0.19 | – | | | | |
| 7. Restricting | 5.00 | 4.65 | .81 | − 0.06 | − 0.46*** | 0.12 | 0.20 | -0.11 | 0.09 | – | | | |
| 8. Binge eating | 10.15 | 5.50 | .79 | 0.11 | − 0.14 | 0.28** | 0.21* | 0.13 | 0.02 | 0.26* | – | | |
| 9. Purging | 0.30 | 1.22 | .60 | 0.07 | − 0.22* | 0.40*** | − 0.01 | 0.08 | 0.33** | 0.19 | 0.19 | – | |
| 10. Excessive exercise | 11.87 | 4.42 | .79 | 0.09 | 0.08 | 0.25* | 0.03 | 0.34*** | 0.35*** | 0.02 | 0.12 | 0.23* | – |
| 11. Sport confidence | 40.51 | 6.50 | .87 | − 0.27** | 0.34*** | − 0.18 | − 0.29** | 0.02 | − 0.02 | − 0.21* | − 0.22* | 0.06 | 0.11 |

All analyses controlled for sport type

*$p < .05$

**$p < .01$

***$p < .001$

**Table 3** Moderation interaction statistics

| | Cognitive restraint | | Restricting | | Binge eating | | Purging | | Excessive exercise | |
|---|---|---|---|---|---|---|---|---|---|---|
| Independent Variables | *b (SE)* | *p* | *b (SE)* | *p* | *b (SE)* | *p* | *b (SE)* | *p* | *b (SE)* | *p* |
| Appearance orientation | − 0.001 (0.04) | .974 | 0.12 (0.11) | .265 | − 0.10 (0.12) | .416 | 0.005 (0.03) | .867 | − 0.22 (0.10) | .028* |
| Appearance evaluation | − 0.01 (0.05) | .867 | 0.07 (0.10) | .482 | − 0.15 (0.13) | .253 | − 0.03 (0.03) | .393 | − 0.04 (0.11) | .729 |
| Overweight preoccupation | 0.03 (0.04) | .404 | 0.07 (0.09) | .442 | − 0.02 (0.10) | .833 | 0.004 (0.02) | .845 | − 0.10 (0.08) | .227 |
| Muscularity-oriented attitudes | 0.02 (0.04) | .646 | − 0.02 (.680) | .680 | − 0.07 (0.07) | .337 | − 0.02 (0.02) | .127 | 0.02 (0.06) | .769 |
| Muscularity-oriented behaviors | 0.01 (0.07) | .900 | − 0.10 (0.10) | .311 | − 0.10 (0.11) | .401 | − 0.09 (0.03) | .001** | − 0.07 (0.09) | .463 |

Sport type was included as a covariate in each model

*$p < .05$

**$p < .01$

***$p < .001$

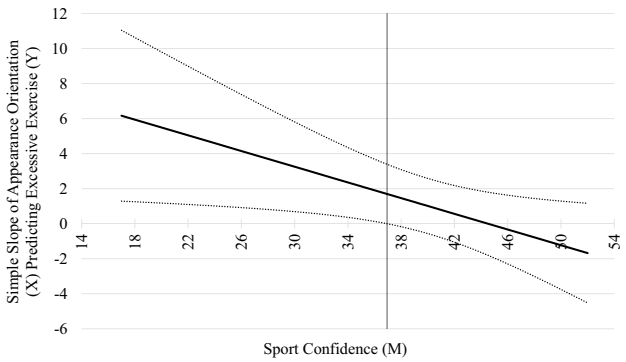


**Fig. 1** Johnson-Neyman plot of the interaction between appearance orientation and sport confidence predicting excessive exercise. The region left of the vertical line represents the significant confidence region

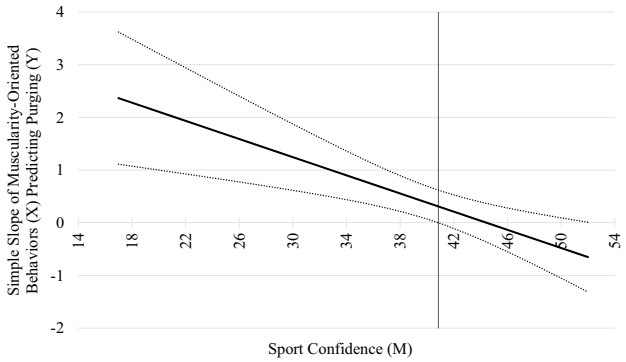


**Fig. 2** Johnson-Neyman plot of the interaction between muscularity-oriented behaviors and sport confidence predicting purging. The region left of the vertical line represents the significant confidence region

$p = .028$). Johnson-Neyman analysis indicated that appearance orientation predicted excessive exercise when sport confidence was low-to-moderate ($\leq 36.94$), with 23.66% of the sample within the significance region (Fig. 1). However, moderation was not significant after correcting for false discovery ($p = .003$).

Additionally, sport confidence moderated the association between muscularity-oriented behaviors and purging ($b = -0.09$, $p = .001$). Johnson-Neyman analysis indicated that muscularity-oriented behaviors predicted purging when sport confidence was low-to-moderate ($\leq 40.84$), with 46.24% of the sample within the significance region (Fig. 2). Moderation was significant after correcting for false discovery ($p = .002$).

## Discussion

The first aim of this study was to expand understanding of the associations between specific aspects of body dissatisfaction, drive for muscularity, and eating pathology symptoms in male collegiate athletes. Results indicated that, adjusting for sport type, overweight preoccupation was associated with the most symptoms relative to appearance orientation and evaluation. This aspect of body dissatisfaction may be salient in male athletes because of unique exposure to weight-related pressures and stigma in *both* sporting and general societal environments [7, 28].

It is interesting that overweight preoccupation was related to cognitive restraint but not restricting. Cognitive restraint refers to mental effort to regulate food intake regardless of actual eating behavior, while restricting refers to behaviors to deliberately avoid food [29]. Athletes generally require high nutritional intake for energy availability [30] and may increase food intake to build musculature. Thus, weight-related concerns may correlate with

attitudes about food restraint (e.g., "I should try to avoid 'unhealthy' foods") but not necessarily behavioral restrictions in food quantity. It is also possible that associations between overweight preoccupation and eating pathology are driven by sport-specific appearance pressures rather than body dissatisfaction. For example, male wrestlers' body satisfaction is associated with restrictive eating but not binge eating or purging, while sport-related pressures predict binge eating and purging [31]. These findings, and our similar finding that negative appearance evaluation was associated with restricting but no other symptoms, suggest distinctions between overweight preoccupation and broader body dissatisfaction and their respective associations with eating pathology. Regardless, efforts to limit food or caloric intake put athletes at risk for low energy availability, potentially compromising their health and performance [30].

Consistent with prior literature [2, 32], we also found that muscularity-oriented attitudes and behaviors were associated with binge eating and excessive exercise, respectively. These associations may be explained by the normalization of behaviors typically required to increase muscularity in sporting contexts. High caloric intake may be used to increase sheer body size [33], coupled with excessive exercise to regulate body size and increase musculature. Nutritional needs in athletes are complex [34]. Without adequate training and support, muscularity-oriented attitudes could contribute to disinhibited eating behaviors to increase caloric intake, which could become pathological in individuals with other predisposing factors such as body dissatisfaction. This could, in turn, increase weight-related concerns [35], which may explain why muscularity-oriented behaviors and overweight preoccupation were correlated in this study.

Unexpectedly, neither muscularity-oriented attitudes nor behaviors were associated with restricting, which has been observed in male wrestlers [31]. Size-increasing efforts are typically coupled with leanness efforts, otherwise known as weight cycling [36]. This discrepancy may be because athletes' nutritional needs change throughout their competitive cycles [37]. Whether drive for muscularity is associated with binge eating and restriction may depend upon the specific sport examined or time at which athletes are sampled, which our cross-sectional study of athletes in multiple sports and the same seasonal period may have been unable to capture.

Overall, correlational findings reify the complexity of body-related concerns in male collegiate athletes and indicate that they may be problematic given associations with certain eating pathology symptoms. How best to address these concerns among male athletes remains understudied. Thus, findings regarding sport confidence are important, as they illuminate a potential prevention and intervention target requiring further study. Results indicated that appearance orientation predicted excessive exercise and muscularity-oriented behaviors predicted purging at low levels of sport confidence. Findings should be interpreted cautiously given the small sample size and that only the purging model was retained after adjusting for multiple tests. It is possible that athletes who are more appearance-oriented or engage in muscularity-oriented behaviors use more extreme weight control behaviors when their sport confidence is low-to-moderate, while athletes with high sport confidence may not engage in these behaviors even in the presence of body dissatisfaction or drive for muscularity. Present findings, in addition to direct associations between sport confidence, appearance orientation and evaluation, muscularity-oriented attitudes, and restricting and binge eating, suggest a need to explore these associations further. Self-confidence in sport is important for athletes' performance, and cognitive, emotional, and behavioral health [38]. Sources of sport confidence include several factors, with male athletes reporting influence and observation of others as particularly important [39]. Given that interpersonal stressors predict eating pathology in athletes [40], it may be that higher sport confidence minimizes the effect of such stressors on the associations between body-related concerns and eating pathology. Present findings should be used to inform further examination of these variables with larger samples.

## Strengths and limits

We controlled for sport type in this study, thereby increasing generalizability to the male athlete population. However, future research would benefit from a larger sample without preset body dissatisfaction criteria to ensure adequate power for moderation, to allow for direct comparison across sport types, positions, and competition levels, and to avoid potential floor effects. Relatedly, participants in this study were 70% White, non-Hispanic. Racial group frequencies in this study are relatively consistent with Division II and III demographic data [41] and can be considered representative of male collegiate athletes. However, shape and weight concerns differ between racial and ethnic groups in college men [42]. It is important to assess whether these differences extend to male athletes.

Causality cannot be inferred from cross-sectional findings and the causality of risk factors for eating pathology in male athletes remains unclear [3]. More longitudinal and mediational designs are needed to model how sport-related pressures relate to these varied correlates. Lastly, internal consistency of the purging subscale of the EPSI was poor ($\alpha = 0.60$). This may be due to low rate of reported purging. Alternately, the items composing this subscale may not adequately reflect compensatory purging behaviors or its underlying motivations in this population [23]. The full subscale was retained to reflect diagnostic understanding of eating pathology, but it is important that the EPSI, in addition to

measures such as the MBSRQ, be psychometrically evaluated in male athletes specifically.

## Conclusions

Despite these limitations, this study clarifies notable correlates, particularly overweight preoccupation, of eating pathology in male athletes and highlights sport confidence as a potential prevention and intervention target. Sport-specific body pressures are pervasive in sporting environments [13] and may put male athletes at risk for eating pathology, which in turn puts them at risk for physiological complications [1] that could inhibit performance and well-being. Athletic trainers may be at risk for eating pathology themselves [43] and thus may inadvertently promote unhelpful messages about eating behaviors. However, while those who care for athletes can perpetuate body ideals, so too can they minimize athletes' risk for eating pathology through supportive relationships [38]. Fostering a positive teammate culture, reinforcing athletes' individual strengths, and minimizing emphasis on appearance for performance in sporting environments may engender greater sport confidence and reduce risk for eating pathology [44, 45]. Efforts to target risk factors and foster sport confidence should include athletes as well as athletic trainers, coaches, nutritionists, and other athletic providers.

### What is already known on this subject?

Male athletes are at risk for eating pathology partly due to sport-specific pressures to maintain a certain body ideal, body dissatisfaction, and drive for muscularity. However, it is unclear how specific aspects of body dissatisfaction relate to eating pathology in male athletes, as well as how sport-specific factors such as sport confidence may relate to these variables.

### What does this study add?

This study has important implications for eating pathology assessment in male athletes by examining how specific body dissatisfaction and drive for muscularity facets relate to eating pathology. Findings suggest that aspects of body dissatisfaction such as overweight preoccupation are particularly important to assess given different patterns of associations among different facets of this construct. Additionally, this study is the first to examine sport confidence with these associations. Findings underscore the importance of eating pathology assessment in male athletes who experience low-to-moderate sport confidence and suggest that sport confidence may be an important target that should be considered in future examination of eating pathology using larger samples of male athletes.

**Acknowledgements** The authors would like to thank the Association for Applied Sport Psychology for financially supporting this work.

**Author contributions** This study was conceptualized and designed by MM. Material preparation, project administration, investigation, data curation, and validation were performed by HP, MM, IQ, and AHM. Data analyses were performed by MM, IQ, and DS. The first draft of this manuscript was written by MM and HP. All authors commented on previous versions of this manuscript and read and approved the final version. Funding acquisition was performed by HP and AHM, who also provided supervision.

**Funding** This work was partially supported by the Association for Applied Sport Psychology Research Grant.

**Availability of data and materials** The data that support the findings of this study are available upon reasonable request from Hayley Perelman, Ph.D.; email: hperelma@bu.edu.

**Code availability** Not applicable.

## Declarations

**Conflict of interest** All authors have no conflicts of interest to report.

**Ethical approval** All procedures in this study were in accordance with the ethical standards of the institutional review boards of the Illinois Institute of Technology and University of Indianapolis, and the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards.

**Consent to participate** Informed consent was obtained from all individual participants included in the study.

**Consent for publication** Not applicable.

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