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The impact of critical comments from teammates on athletes' eating and exercise psychopathology



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ABSTRACT

Critical comments from parents or coaches about weight or shape have been associated with athletes' body dissatisfaction and disordered eating. However, research is yet to explore how critical comments from an athlete's *teammates* may impact on eating and exercise psychopathology. This study aimed to (1) explore whether athletes who reported receiving a teammate critical comment have higher eating/exercise psychopathology and poorer psychological wellbeing versus matched athletes who have not, (2) determine whether gender differences exist in the perceived severity of critical comments and (3) evaluate the moderating role of gender when establishing the relative importance of *explicit* teammate critical comments versus *implicit* teammate influences (e.g., modelling) on eating/exercise psychopathology. Athletes ($N = 646$, Mage=23 years, $n = 391$ female) completed a survey exploring explicit/implicit teammate influences, psychological wellbeing (self-esteem, anxiety, depression) and eating/exercise psychopathology. Athletes receiving a teammate critical comment ($n = 323$) had significantly higher eating/exercise psychopathology, anxiety, and lower self-esteem compared to those who had not ($n = 323$). Females ($n = 196$) perceived the severity of the comment to be significantly worse than males ($n = 127$). Explicit critical comments had a greater influence on athletes' eating/exercise psychopathology versus implicit teammate influences. Disordered eating/compulsive exercise prevention efforts with athlete populations should highlight the detrimental impact that athletes' comments can have on teammates' wellbeing and body satisfaction.

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1. Introduction

Disordered eating encompasses pathological attitudes and behaviours towards food and weight control, such as the restriction of food intake, the use of laxatives and diuretics, bingeing and purging behaviours, in addition to an over-evaluation of weight, shape and appearance which contribute to body dissatisfaction (Fairburn et al., 2003). Compulsive exercise has been defined as “engagement in exercise which is carried out to an excessive degree and which is associated with psychological and physical risk” (Loumidis & Roxborough, 1995, p.45). While a high frequency, duration and intensity of exercise is considered the norm for athlete populations, exercise can be considered compulsive when there are dysfunctional attitudes and/or behaviours towards exercise (e.g., exercise for weight control, exercise despite injury, craving of exercise, anxiety if sessions missed; Adkins & Keel, 2005). The Multi-dimensional Model

of Compulsive Exercise (Meyer et al., 2011) demonstrates the integral role eating pathology and concerns with weight and shape have in the instigation and maintenance of compulsive exercise. Indeed, disordered eating and compulsive exercise often co-occur and inter-relate (e.g., Gorell & Anderson, 2018). However, compulsive exercise can be problematic in its own right and may occur independently of disordered eating, reflecting a strong desire from the athlete to achieve performance goals. Athletes overtraining for long periods may invertedly fail to fuel themselves, leading to Relative Energy Deficiency Syndrome (RED-S; Mountjoy et al., 2014). Overall, it is clear that research needs to consider both disordered behaviours in tandem.

While variations in prevalence estimates exist due to differences in samples and measurement tools, recent estimates suggest a relatively high prevalence of female athletes from endurance sports (46 %; Krebs et al., 2019) are at risk of an eating disorder, while 21 % of team sport athletes (Labossiere & Thibault, 2020) and 47 % of strength training athletes (Whitehead et al., 2020) have been found to present with symptoms of disordered eating (drive for thinness, dietary restraint, bulimic tendencies and body dissatisfaction). For male athletes, 17 % from endurance sports were found to be at risk of

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an eating disorder (Krebs et al., 2019). However, 47 % of males from lean sports and 62 % from non-lean sports report engaging in pathogenic weight control behaviours (e.g., binge eating, vomiting, laxative use). Furthermore, athletes have a higher prevalence of compulsive exercise (i.e., 6–9 %) compared to non-athletes (3–7 %) (Marques et al., 2019) and this often co-occurs with disordered eating (Plateau et al., 2014a, 2014b).

In particular, research published with the general population has consistently highlighted that disordered eating and compulsive exercise are associated with perceived pressures from peers that perpetuate the thin ideal (Johnson et al., 2015) or muscular ideal (Goodwin et al., 2011) and where the quality of key interpersonal relationships is poor (Cooper & Dalle Grave, 2017). In addition to pressures from their peers and family, as noted in Petrie and Greenleaf's (2012) etiological model of risk factors, athlete populations have compounding pressure from the people in their sporting environments, such as their coach or teammates, which can lead to an increased risk of disordered eating and compulsive exercise. Identifying factors that increase the likelihood that athletes will feel dissatisfied with their bodies and engage in disordered eating/compulsive exercise is vital given the relatively high prevalence of these problematic behaviours compared to the general population (Chapman & Woodman, 2016) and the need to inform effective prevention efforts.

Among athlete populations, researchers have started to investigate the potentially harmful impact conflicting coach/parent relationships can have on athletes' likelihood of engaging in disordered eating (Arthur-Cameselle & Quatromoni, 2011; Coker-Cranney & Reel, 2015). Aside from coaches and parents, athletes' teammates are uniquely positioned to influence eating and exercise psychopathology given the large amount of time typically spent in each other's company. Indeed, from adolescence onwards, teammates replace parents as the primary source of social influence (Chan et al., 2012). It is therefore vital that a deeper understanding of the specific role of teammates is established. There is a vast body of literature demonstrating how disordered eating behaviour can be influenced by mechanisms such as social norms (Higgs, 2015), social facilitation (Herman, 2015), social contagion (Crandall, 1988) and modelling (Cruwys et al., 2015). In recent years, researchers have explored how such mechanisms underpin how athletes influence their fellow teammates' feelings about their bodies and the impact this then has on their disordered eating and exercise practices (Scott et al., 2019). The influence mechanisms can be divided into (1) *implicit*, subtle, social influences (e.g., disordered eating / exercise social norms, modelling of disordered eating / exercise) which are considered to capture habituated subconscious beliefs / perceptions, and (2) *explicit*, non-subtle social influences which are considered to capture what other people say (i.e., direct communication between people) (Brewis et al., 2016).

On an implicit level, athletes have been found to model their teammates' disordered eating practices leading to increased engagement with the behaviours themselves (Arthur-Cameselle et al., 2017; Engel et al., 2003; Scott et al., 2019, 2022). Furthermore, athletes who simply *perceive* pressure from their teammates to lose weight or obtain a particular body shape are also more likely to engage in disordered eating and compulsive exercise in an attempt to achieve the target body size/shape and meet the perceived expectations of their teammates (Scott et al., 2019, 2020). On the other hand, teammates can also have a negative impact on athletes' eating and exercise behaviours in a far more direct and explicit manner. For example, overt encouragement and discouragement of healthy eating has been associated with increased compulsive exercise (Scott et al., 2019). Teammates may also engage in harmful conversations where pathological methods of weight loss are discussed and potentially encourage athletes' adoption of such

methods if they hear about the success of their teammates (Arthur-Cameselle et al., 2017).

In the general population, the negative impact of critical weight/shape comments on disordered eating has been extensively documented. Findings from both cross-sectional and longitudinal studies demonstrate that individuals who experience hurtful, appearance-related comments from others, such as their peers, family members or romantic partners, present with an increased risk of body dissatisfaction, weight concerns, eating disorder symptomatology and psychosocial problems (Kluck, 2010; Shomaker & Furman, 2009; Taylor et al., 2006).

Such findings are also present in athlete populations where qualitative evidence has suggested that negative verbal commentary from significant others (e.g., coach, teammates, parents) in the form of feedback or messages made about the athletes' physical appearance were highly influential in the development or worsening of their clinical eating disorder (Arthur-Cameselle & Quatromoni, 2011; Muscat, 2001). Indeed, up to 19% of athletes reported that receiving a critical weight/shape comment was a contributor to the onset of their disordered eating (Sundgot-Borgen, 1994). However, studies have typically limited their focus to the experiences of young, female, lean sport athletes, where the prevalence of receiving a critical weight/shape comment is very high (e.g., 73% in a dance population; Goodwin et al., 2014). For example, Ryan (1995) conducted interviews with elite gymnasts and figure skaters who identified comments made by their predominantly male coaches (e.g., "Pillsbury dough boy"; "fat cows") and reflected on how such comments transmitted the socio-cultural thin ideal and placed a strong importance on looking attractive and being thin. More recently, further qualitative research has revealed that comments such as "move your fat ass off the baseline" (Vani et al., 2020) are still being received by female athletes from their coaches, highlighting that very little has changed. Most concerning are the revelations of verbal and sexual abuse found in elite level gymnastics and the devastating long term impact this has had on athletes' disordered eating behaviours (Stirling et al., 2020).

Quantitative research with female athletes has also mirrored findings from the general population where perceiving pressure to be thin and receiving negative body commentary from coaches/parents predicts significantly lower levels of self-esteem and body satisfaction (Francisco et al., 2012). In line with this, a large proportion (94%) of dancers report feeling conscious of their body shape and the need to diet as a result of commentary primarily from their dance teacher, with 92% reporting subsequent attempts to change their body (Goodwin et al., 2014). A handful of studies have compared the prevalence of disordered eating and poor psychological wellbeing in groups of athletes who have and have not received critical appearance related comments. In line with expectations, critical comment athlete groups have significantly higher levels of body dissatisfaction, disordered eating (Goodwin et al., 2014; Kerr et al., 2006; Muscat & Long, 2008) and lower levels of self-esteem (Goodwin et al., 2014). However, the impact of critical comments on other indices of wellbeing (e.g., anxiety, depression, compulsive exercise) that are thought to play a maintaining role in disordered eating (Fairburn et al., 2003; Meyer et al., 2011) are yet to be determined, along with the specific impact that receiving critical comments from *teammates* might have.

When exploring the impact of such comments on athlete wellbeing, it is vital that researchers account for potential demographic variables which may affect an athlete's susceptibility to the harmful effects of such comments. For example, in the general population, a high BMI has been associated with increased likelihood of recalling a critical comment (Eisenberg et al., 2017; Taylor et al., 2006), while the frequency and emotional impact of weight-related comments have been found to decrease with age (e.g., Haines et al., 2008).

Table 1
Participant Characteristics for the Critical Comment (CC) and No-Critical Comment (No-CC) groups.

Participant Characteristic	CC group (n = 323)	No-CC group (n = 323)
Age (years)	23.27 (8.34)	23.20 (8.67)
Body Mass Index (BMI)	22.70 (3.83)	22.56 (3.55)
Gender	Female - 61 % (n = 196) Male - 39 % (n = 127)	Female - 61 % (n = 196) Male - 39 % (n = 127)
Ethnicity	White - 91 % (n = 295) Non-White - 9 % (n = 28)	White - 94 % (n = 302) Non-White - 6 % (n = 21)
Sport type	Non-Lean - 62 % (n = 201) Lean - 38 % (n = 122)	Non-Lean - 66 % (n = 212) Lean - 34 % (n = 111)
Competitive level	Non-elite - 72 % (n = 231) Elite 28 % - (n = 92)	Non-elite - 72 % (n = 231) Elite - 28 % (n = 92)
Currently receiving ED treatment	3 % (n = 10)	0.6 % (n = 2)
Previously received ED treatment	7 % (n = 23)	3 % (n = 11)
No. hours training a week	Mean = 9.61 (SD=6.65)	Mean = 8.29 (SD=5.46)
No. years participating in sport	Mean = 7.35 (SD=6.41)	Mean = 6.12 (SD=5.58)

Note. Elite = national or international level; Non-Elite = local club, school, university; Non-Lean = ball game, power, technical sports and Lean = aesthetic, endurance, weight class sports (as defined by Sundgot-Borgen & Larsen, 1993); ED = Eating Disorder.

Furthermore, females are more likely to report receiving critical comments from their family and significant other compared to males (Eisenberg et al., 2011). Among athlete populations, research in this area has typically sampled females (Goodwin et al., 2014; Kerr et al., 2006; Muscat & Long, 2008) and males (Menees et al., 2013) separately. As such, gender differences in the occurrence, impact and perceived severity of critical comments from teammates are yet to be conclusively determined within the same study.

To address the gaps and limitations of existing literature, the first aim of the present study was to explore whether athletes who had received a critical comment from a teammate differed from matched controls with regard to their wellbeing. It was hypothesised that those receiving a critical comment would have increased levels of disordered eating (i.e., drive for thinness, bulimic tendencies, body dissatisfaction) and exercise (i.e., exercise to avoid negative affect, improve mood, lose weight) and poorer psychological wellbeing (i.e., self-esteem, anxiety, depression) compared to matched controls. A second aim was to determine whether there were any gender differences in the occurrence and perceived severity of critical comments between male and female athletes. Given the lack of prior literature, no a priori hypotheses were made. A final aim was to explore the moderating role of gender in the relationships between teammate influences and eating/exercise psychopathology after controlling for potential covariates. Again, no gender a priori hypotheses were made. However, in accordance with prior literature, the negative effects of receiving an explicit critical comment were hypothesised to emerge as a stronger statistical predictor of eating and exercise psychopathology than implicit teammate influences.

2. Method

2.1. Participants

The sample for this study was drawn from a larger study exploring a broad range of teammate influences on athlete eating and exercise psychopathology (see Scott et al., 2019). A total of 323 athletes from this original sample reported receiving a critical comment from a teammate concerning their weight and/or shape and will henceforth be referred to as the Critical Comment group (CC group). The CC group was matched based on age, BMI, gender, ethnicity, sport type (lean vs non-lean) and competitive level (elite vs non-elite) to a group of athletes (also drawn from the original sample) who had not received a critical comment (n = 323). This group will henceforth be referred to as the No-Critical Comment group (No-CC group). Accurate matching was possible here due to the large athlete dataset (N = 1176) that this sample was taken from

(see Scott et al., 2019). However, those in the CC group had been training for a significantly longer amount of time compared to the No-CC group ($Z = -2.72, p = 0.01, r = 0.11$) and were significantly more likely to currently or have previously received ED treatment ($\chi^2 = 9.43, p = 0.002, \phi = 0.12$). See Table 1 for a summary of participant characteristics for each group.

2.2. Procedure

Ethical approval was granted by the Institutional Ethics Approvals (Human Participants) Sub-Committee. Adults (aged 18 and over; CC group n = 257, No-CC group n = 240) were recruited via adverts about the study which were emailed to local sport clubs, posted on social media or distributed in person at training sessions/competitions. Adolescents (aged 15–17; CC group n = 69; No-CC group n = 83) were recruited via key gatekeepers (e.g., coaches, sport club chairpersons) in the local area between April 2017 and January 2018. For further details about the procedure for data collection see Scott et al. (2019).

2.3. Measures

2.3.1. Teammate influences

2.3.1.1. *Social Hassles Questionnaire* (Muscat & Long, 2008). The SHQ examines the presence and consequences of weight and body-related comments (an explicit teammate influence). It has been previously employed with female athlete (Goodwin et al., 2014; Muscat & Long, 2008) and exercising male (Menees et al., 2013) populations. For the present study, the SHQ comprised nine items and athletes were asked to focus on comments received specifically from teammates. Answers to item 1: “Do you ever remember a teammate making a critical comment that your body should be a certain shape, weight, or that there was need to diet to lose weight or increase food intake to gain weight/muscle mass?” were used to dichotomise the sample into the Critical Comment (CC Group) and No Critical Comment Group (No-CC Group). Following this, for participants who answered yes to item 1, a further seven items were answered on a four-point Likert scale with varying anchors (e.g., 1 = “No impact at all”, 4 = “A lot of impact”). These items were used to assess the degree to which the comment: (1) was well remembered, (2) had an impact on their behaviour/attitude towards their body, (3) made them feel upset, (4) made them feel self-conscious about their body shape, diet, or need to change weight, (5) resulted in attempting to make changes to their body, (6) made them feel their self-esteem was threatened, and (7) made them feel they had failed their teammates’ expectations. Finally, participants reported how long ago the critical comment was received. A

Table 2
Descriptive statistics and tests of difference between the Critical Comment (CC) and the No-Critical Comment (No-CC) groups on study variables.

Measure	Total (N = 646)	CC group (n = 323) Mean (SD)	No-CC group (n = 323) Mean (SD)	Mann-Whitney U		
				Z	p	Effect size (r)
Age (years)	23.23 (8.50)	23.27 (8.34)	23.20 (8.67)	-0.61	0.51	0.03
Body Mass Index (BMI)	22.63 (3.69)	22.70 (3.83)	22.56 (3.55)	-0.33	0.74	0.02
SHQ - Severity of comment	-	5.86 (2.30)	-	-	-	-
PSPS - Teammate Pressure	1.47 (0.64)	1.72 (0.72)	1.23 (0.42)	-11.10	< 0.001	0.44
BMS-A - Bulimia Modelling	2.31 (0.82)	2.57 (0.83)	2.05 (0.72)	-8.60	< 0.001	0.34
EDI-2-Drive for Thinness	3.60 (4.64)	4.33 (4.91)	2.86 (4.23)	-4.50	< 0.001	0.18
EDI-2-Bulimia	2.84 (3.90)	3.24 (4.08)	2.44 (3.68)	-3.12	< 0.01	0.12
EDI-2-Body Dissatisfaction	8.21 (6.75)	9.16 (7.06)	7.26 (6.29)	-3.39	< 0.01	0.13
CET-A-Avoidance	2.53 (1.29)	2.71 (1.34)	2.35 (1.21)	-3.53	< 0.001	0.14
CET-A-Mood Improvement	3.85 (1.12)	3.86 (1.13)	3.85 (1.11)	-0.21	0.83	0.00
CET-A-Weight Control	2.08 (1.34)	2.21 (1.43)	1.95 (1.24)	-2.12	0.03	0.08
RSES-Self-esteem	29.37 (6.12)	28.19 (6.30)	30.57 (5.71)	-4.88	< 0.001	0.19
HADS-Anxiety	8.63 (4.27)	9.30 (4.18)	7.95 (4.25)	-4.43	< 0.001	0.17
HADS-Depression	3.96 (3.08)	4.26 (3.15)	3.67 (2.98)	-2.48	0.01	0.10

Note. SHQ = Social Hassles Questionnaire, PSPS=Perceived Sociocultural Pressures Scale, BMS-A = Bulimia Modelling Scale-Athlete version, EDI-2 = Eating Disorder Inventory-2, CET-A = Compulsive Exercise Test-Athlete, RSES = Rosenberg Self-Esteem Scale, HADS = Hospital Anxiety and Depression Scale.

critical comment “severity” score is obtained by summing responses to items 5, 6 and 7, with total scores ranging from 3 to 12. In the present study, the severity subscale demonstrated satisfactory internal reliability ($\alpha = 0.74$) which is on par with previous studies (Goodwin et al., 2014; Muscat & Long, 2008).

2.3.1.2. Bulimic Modelling Scale-Athlete (BMS-A; Scott et al., 2020). The BMS-A examines the frequency with which athletes model their teammates bulimic-type behaviours (an implicit teammate influence). Five items comprised the original scale (Stice, 1998) which addressed the following (1) dietary restraint, (2) preoccupation with body dimensions, (3) extreme weight control behaviours, (4) binge eating, and (5) vomiting to control weight. For the BMS-A, an item is added to assess the modelling of nutritional supplement use. In addition, item wording is amended to ensure relevance to athletes. Instead of considering their “friends” as per the original scale (BMS; Stice, 1998), athletes answered questions specifically in relation to their teammates. For example, “One or more of my teammates has fasted (not eaten for long periods of time), exercised excessively, or used laxatives (medication to induce bowel movements) or diuretics (medication to increase urination) to lose weight and/or change their shape”. Athletes responded to items using a 5-point Likert scale ranging from “never” (1) to “very often” (5), with higher mean scores demonstrating a greater teammate modelling of bulimic-type behaviours. For the current sample, internal consistency was good ($\alpha = 0.81$) and comparable to other athlete populations (Scott et al., 2020).

2.3.1.3. Perceived Sociocultural Pressures Scale (PSPS; Stice & Bearman, 2001). The degree to which athletes perceived pressure from their teammates to lose weight/change shape was assessed using three items from the PSPS (an implicit teammate influence). This has been previously employed with an athlete population (e.g., Galli et al., 2014). To ensure relevance for athletes, “peers” (original scale) was changed to “teammates”. For example, “I’ve noticed a strong message from my teammates to have a thin/lean body”. Athletes responded to the items with a 5-point Likert scale ranging from “none” (1) to “a lot” (5). Internal consistency was acceptable $\alpha = 0.63$ and comparable to previous research with athletes (Galli et al., 2014).

2.3.2. Psychological wellbeing

2.3.2.1. Rosenberg’s Self Esteem Scale (RSES; Rosenberg, 1965). The RSES has been widely used to assess global levels of self-esteem among athletic populations (e.g., Engel et al., 2003; Scott et al., 2019; 2020). Athletes responded to 10 items using a four-point Likert scale

ranging from 1 (“strongly disagree”) to 4 (“strongly agree”). Responses were totalled with higher scores indicating higher self-esteem. For the present study, internal reliability was excellent ($\alpha = 0.91$) and on par with other athlete samples (Scott et al., 2020).

2.3.2.2. Hospital Anxiety and Depression Scale (HADS; Zigmond & Snaith, 1983). Symptoms of anxiety and depression were assessed using the HADS. Participants responded to 14 items (Anxiety; 7 items; Depression; 7 items) on a four-point Likert scale anchored from 0 to 3. For each subscale, higher total scores indicate greater anxiety or depression symptoms. For the present study, internal reliability was $\alpha = 0.83$ for anxiety and $\alpha = 0.74$ for depression, which is higher than with previous, similar athlete samples (e.g., Scott et al., 2020).

2.3.3. Eating and exercise psychopathology

2.3.3.1. Eating Disorder Inventory-2 (EDI-2; Garner, 1991). The short version of the EDI-2 was employed to assess disordered eating attitudes and behaviours, as it has been reliably used with previous male and female athlete samples (e.g., Scott et al., 2020). The short version comprises three subscales: Drive for Thinness (EDI-DT; 7 items); Bulimia (EDI-BU; 7 items); and Body Dissatisfaction (EDI-BD; 9 items). The Bulimia subscale includes items pertaining to disordered eating behaviours (e.g., bingeing, purging), while the Drive for Thinness and Body dissatisfaction subscales relate to disordered attitudes towards restrictive eating and the body respectively. However, the Drive for Thinness scale consistently correlates with restrictive behaviours (e.g., Palermo et al., 2021). Athletes responded using a six-point Likert scale (from “never” to “always”). For each subscale, higher total scores indicated greater levels of disordered eating attitudes and behaviours. Internal reliability for the present study was good for all three subscales (EDI-DT, $\alpha = 0.88$; EDI-Bulimia, $\alpha = 0.90$; EDI-BD, $\alpha = 0.88$), which is somewhat higher compared to its previous use in athlete populations (Scott et al., 2021).

2.3.3.2. Compulsive Exercise Test - Athlete Version (CET-A; Plateau, et al., 2014). Compulsive exercise attitudes and behaviours were assessed using the athlete version of the CET. Participants responded to 15 items via a 6-point Likert scale ranging from 0 (“never true”) to 5 (“always true”). Items related to three subscales: exercise to avoid negative affect (6 items); improve mood (5 items); and control weight (4 items). Higher mean scores for each subscale indicate greater levels of disordered exercise attitudes and behaviours. For the present study, internal consistency was excellent for CET-Avoidance ($\alpha = 0.90$) and CET-Mood Improvement ($\alpha = 0.91$) and

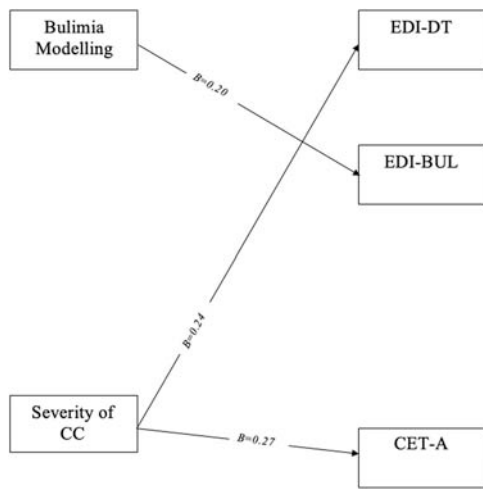


Fig. 1. Structural Equation Model of the significant predictive relationships between teammate influences and disordered eating/compulsive exercise for male athletes ($n = 127$). Note. CC =Critical Comment, EDI =Eating Disorder Inventory, CET =Compulsive Exercise Test. All pathway coefficients are standardised and significant at $p < 0.01$. Significant covariates included in the model but not reflected here. EDI-Body Dissatisfaction, CET-Mood Improvement, CET-Weight Control and Teammate Pressure were included in the model but are not reported here due to lack of significant teammate influence pathways. See [Supplementary Table 4](#) for non-significant pathways.

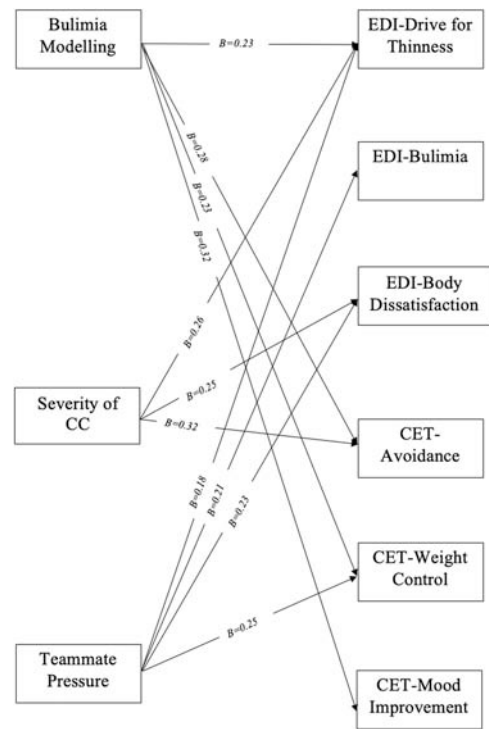


Fig. 2. Structural Equation Model of the significant predictive relationships between teammate influences and disordered eating/compulsive exercise for female athletes ($n = 196$). Note. CC =Critical Comment, EDI =Eating Disorder Inventory, CET =Compulsive Exercise Test. All pathway coefficients are standardised and significant at $p < 0.01$. Significant covariates included in the model but not reflected here. See [Supplementary Table 3](#) for non-significant pathways.

good for CET-Weight Control ($\alpha = 0.86$) which is on par with what has been found previously with athlete samples (Scott et al., 2021).

2.4. Data analyses

All analyses were conducted using SPSS 24 and AMOS 28. Hypotheses were specified before data were collected. Given that few of the study variables were normally distributed according to Shapiro-Wilk tests, non-parametric statistics were used where possible. Due to the large number of analyses run, a p value of $p < 0.01$ was employed to reduce the chance of a type 1 error. Descriptive statistics were calculated for study variables and the nature of critical comments. Preliminary two-tailed Spearman’s rho correlations were conducted to examine whether covariates (age, BMI, self-esteem, anxiety and depression) were significantly associated with eating and exercise psychopathology variables, given evidence to suggest that age, BMI and psychological wellbeing are associated with elevated eating and exercise psychopathology (Fairburn et al., 2003; Meyer et al., 2011) (see [Supplementary Table 1](#)). Significant covariates were then included in the structural models detailed below. Multicollinearity among teammate influence variables was also assessed and the largest correlation ($r = 0.40$) was found to be well below the $r = 0.90$ recommended cut off value (Pallant, 2010) (See [Supplementary Table 1](#)).

2.4.1. Tests of difference (Aims 1 & 2)

To test the first aim examining whether athletes in the CC group demonstrated higher levels of eating/exercise psychopathology and poorer psychological wellbeing than those in the No-CC group, a series of Mann-Whitney U tests of difference were conducted. Mann-Whitney U tests were also employed to test the second aim, investigating whether perceived severity of the comment differed based on gender (male, $n = 127$ vs female, $n = 196$).

2.4.2. Structural equation modelling (Aim 3)

To test the final aim exploring the moderating role of gender on the impact of explicit critical comments relative to other implicit negative teammate influences when predicting disordered eating/compulsive exercise, structural equation modeling (SEM) was

employed using manifest variables to test and compare models. To ensure an accurate evaluation of model fit, a range of fit indices were examined in line with Hu and Bentler (1999). In the present study, comparative fit index (CFI), standardized root mean square residual (SRMR), root mean square error of approximation (RMSEA), and chi-square were evaluated. The following cut off values were used as benchmarks for an acceptable model fit: CFI > 0.90; SRMR < 0.10 (Marsh et al., 2004); RMSEA < 0.80 (Browne & Cudeck, 1992). AMOS multigroup moderation analysis was employed to examine if the constrained models differed from the unconstrained model by an amount equal to or larger than .01 for the CFI model fit indicator. This confirms that the model differs between genders (Milfont & Fischer, 2010). Standardized regression weights were then inspected for each gender to establish where differences in the pathways between teammate influences and eating/exercise psychopathology were occurring. Mardia’s coefficient for the structural model was 32.80 with a critical ratio of 8.73 indicating significant deviations of the data from multivariate normality (Bentler & Eric, 2005). As a result, all models were tested in AMOS using the maximum likelihood estimation and employed bootstrapped 95 % bias-corrected confidence intervals which are robust to nonnormality.

3. Results

3.1. Critical comment descriptives

Of those athletes who reported a critical comment ($n = 323$), the majority were female ($n = 196$; 60 %). For the CC-group, 35 % of athletes reported that the critical comments they received about their weight/shape had either “quite a bit of impact” or “a lot of impact” on the perception of their bodies. This frequency is lower in comparison to the impact identified by dancers previously (59%; Goodwin et al., 2014). Only 17 % of participants in the current study

reported that the comment had *not* made them feel self-conscious of their body shape, diet or need to change weight and not led them to attempt changes to their body, while 63% reported being at least “a little upset” by the comment. Over a third (39%) of the participants reported that the negative comment was “fairly clear in my mind” or that they “remember the event very clearly – as if it happened yesterday”, despite the fact that, on average, critical comments occurred more than a year ago (mean=1.2 years).

3.2. Tests of difference (Aims 1 & 2)

Descriptive statistics and Mann-Whitney U tests of difference for the CC group and No-CC groups for age, BMI, critical comment severity, eating and exercise psychopathology and psychological wellbeing are presented in [Table 2](#).

Mann-Whitney U tests of difference between the CC group and No-CC group confirmed that, importantly, groups were matched for age and BMI ($p > 0.43$, [Table 2](#)). Significant group differences with small effect sizes ($r = 0.012$ – 0.18) were identified for CET-Avoidance, RSES-Self-esteem, HADS-Anxiety and all EDI variables, while effect sizes were medium for Teammate Pressure and Bulimia Modelling. CC group athletes scored significantly higher than No-CC group athletes on all of the aforementioned variables aside from self-esteem where they scored significantly lower.

For those athletes who had received a Critical Comment (CC group), Mann-Whitney U tests of difference were also conducted to establish whether gender differences existed on how severe athletes perceived the comment to be (SHQ-Severity of Comment). Female athletes ($n = 196$, mean=6.38, $SD=2.34$) perceived the critical comment as significantly more severe (i.e., increased threats to their self-esteem, resulted in more changes being attempted to their body, and made them feel they had failed their teammates' expectations) than male athletes ($n = 127$, mean=5.06, $SD=2.01$), $Z = -5.24$, $p < 0.001$, $r = 0.25$ (small effect size).

3.3. Structural equation modelling (Aim 3)

To test aim three and to investigate the moderating role of gender in the importance of explicit critical comments from teammates compared vs *implicit* teammate influence when predicting disordered eating/compulsive exercise, a structural equation model was first conducted with the CC group as a whole ($n = 323$) using manifest variables. In this model, relationships between teammate influences (i.e., severity of critical comment, modelling of teammates' disordered eating, perceived teammate pressure to lose weight/change shape) covariates (BMI, anxiety, self-esteem, depression) and the six disordered eating / compulsive exercise outcome variables (EDI-Drive for Thinness, EDI-Bulimia, EDI-Body Dissatisfaction, CET-Avoidance, CET-Weight Control, CET-Mood Improvement) were tested if significant associations had first been identified and variables were set to covary if they significantly correlated (see [Supplementary Fig. 1](#) and [Supplementary Table 1](#)). This model yielded an acceptable fit with the data ($\chi^2(28) = 39.26$, $p < 0.001$, CFI= 0.95, RMSEA= 0.10, 90% CI [0.08–0.12], SRMR= 0.06).

Multigroup invariance testing was then used to explore the potential moderating role of gender. This confirmed that group differences did indeed exist in the model fit between genders. The fully constrained models differed from the unconstrained model by > 0.01 for the CFI (see [Supplementary Table 2](#)). In addition, a chi-square test of difference between the unconstrained and fully constrained models using an Excel macro ([Gaskin, 2016](#)) confirmed a significant difference in model fit ($p < 0.001$). The model was a significantly better fit for male athletes ($\chi^2(28) = 47.14$, $p = 0.01$; CFI= 0.97; RMSEA= 0.07, 90% CI [0.03, 0.11]; SRMR= 0.05) (see [Fig. 1](#)) than it was for female athletes (see [Fig. 2](#)) ($\chi^2(28) = 94.78$, $p < 0.001$; CFI= 0.94; RMSEA= 0.11, 90% CI [0.09, 0.14]; SRMR= 0.07).

3.3.1. Females

For EDI-Drive for Thinness, EDI-Body Dissatisfaction and CET-Avoidance, Severity of Critical Comment was the strongest teammate influence statistical predictor ($\beta = 0.25$ – 0.32), where a higher perceived severity of Critical Comment predicted higher levels of these disordered eating and exercise behaviours. This was followed by greater Bulimia Modelling ($\beta = 0.23$) and Teammate Pressure ($\beta = 0.18$) predicting higher levels of EDI-Drive for Thinness, greater Teammate Pressure ($\beta = 0.23$) predicting higher levels of EDI-Body Dissatisfaction and greater Bulimia Modelling ($\beta = 0.28$) predicting higher levels of CET-Avoidance. For CET-Weight Control and EDI-Bulimia, the strongest teammate influence predictor was greater Teammate Pressure ($\beta = 0.21$ – 0.25), followed by greater Bulimia Modelling for CET-Weight Control ($\beta = 0.23$). Finally, the only significant teammate influence predictor of CET-Mood Improvement was higher levels of Bulimia Modelling ($\beta = 0.32$). See [Supplementary Table 3](#) for a summary of beta and p values for all variables (i.e., covariates and non-significant predictors) included in the model.

3.3.2. Males

A greater perceived severity of Critical Comment was the only significant predictor ($p < 0.01$) of higher EDI-Drive for Thinness ($\beta = 0.24$) and CET-Avoidance ($\beta = 0.27$). In addition, greater levels of Bulimia Modelling was the only significant predictor of increased EDI-Bulimia ($\beta = 0.20$). See [Supplementary Table 4](#) for a summary of beta and p values for all variables (i.e., covariates and non-significant predictors) included in the model.

4. Discussion

The present study sought to highlight the significance of critical weight/shape commentary specifically from teammates on athletes' wellbeing. It fills a gap in the literature by being the first to explore how the occurrence and impact of such comments vary between *male* and female athlete populations, and in relation to *compulsive exercise* as well as disordered eating. As hypothesised, athletes who recalled receiving a critical comment had significantly poorer wellbeing compared to matched controls. In particular, athletes' drive for thinness, levels of body dissatisfaction and bulimic tendencies were higher relative to those who did not recall a critical comment. This finding is unsurprising and lends support to [Petrie and Greenleaf's \(2012\)](#) etiological model of risk factors, where athletes are suggested to experience sport-specific weight pressures, compounding their risk of disordered eating. In addition, this finding extends existing literature by demonstrating the negative impact of critical comments received in a wide range of sports beyond aesthetic athletes. However, the degree of impact on athletes' perception of their bodies was found to be lower in this broader sport sample versus a dancer population, as would be expected given the weight/shape pressures in dance ([Goodwin et al., 2014](#)).

The link between critical weight/shape commentary and disordered eating can be considered in the context of objectification theory ([Frederickson & Roberts, 1997](#)). If the athlete predominantly values their body as an object to be evaluated by others (self-objectification), they may be particularly sensitive to negative comments from their teammates ([McKinley & Hyde, 1996](#)), which may reinforce such self-objectification. Such comments not only reinforce athletes' own feelings of body dissatisfaction but serve to perpetuate sociocultural standards of the thin, muscular or athletic ideal ([Goodwin et al., 2011](#); [Johnson et al., 2015](#); [Sabiston et al., 2020](#)), which in turn may lead to increased likelihood of engagement in disordered eating ([Frederickson & Roberts, 1997](#)). Of course, it is plausible that the degree of self-objectification and sensitivity to comments varies as a function of sport type, where those competing in aesthetic sports (e.g., gymnasts, figure skating) with high levels of body scrutiny are more susceptible. Therefore, future research would

benefit from exploring potential sport type differences. In addition to increased disordered eating, athletes who recalled a critical comment had higher levels of anxiety and lower levels of self-esteem. This more nuanced finding adds novelty to the existing literature which suggests that athletes with poor wellbeing have a greater susceptibility to *general* teammate pressures to lose weight/change shape (Scott et al., 2020). Muscat and Long (2008) postulate that increased negative emotions for those who recall critical comments could be a result of athletes' chronic vigilance over anticipated threats to their appearance.

Novel to this study was the finding of increased compulsive exercise among athletes who had received a critical comment from a teammate. This builds on recent research conducted with child/adolescent athletes where increased compulsive exercise was found in those with *parents* who frequently engage in fat-talk (Lydecker et al., 2021). Given the integral role that compulsive exercise plays in the instigation and maintenance of disordered eating (Meyer et al., 2011), it follows that critical weight/shape commentary could also be related to athletes' engagement in compulsive exercise as these behaviours are interlinked. However, findings from the present study highlight that the impact on exercise may be to a lesser extent when compared to eating.

The second aim of the study was to understand gender differences in the occurrence and perceived severity of critical comments. It was found that female athletes were more likely to report receiving a critical comment (60% of this group was female) and that they perceived the critical comment to be more severe (i.e., threatened their self-esteem, resulted in changes being attempted to their body, and made them feel they had failed their teammates' expectations) when compared to male athletes. While this is a novel addition to the athlete literature, it mirrors findings in the general population which demonstrate that females report receiving more negative comments, and are more likely to internalise and act upon negative commentary (i.e., engage in disordered eating), in comparison to males (Chng & Fassnacht, 2016; Rodgers et al., 2009). Recent evidence suggests that coaches are aware of this increased internalisation risk for females and often monitor their words carefully, to try to ensure that commentary is focused on skill rather than appearance (Sabiston et al., 2020). However, body disparagement and critical weight/shape commentary are still normative among female athlete teammates (Lucibello et al., 2021). Indeed, simply listening to teammates discuss their own bodies in a negative light, or overhearing opponents' critical commentary about teammates, may contribute to an athlete's poor dieting choices (Vani et al., 2020). It is therefore vital that athletes are encouraged to be more complimentary and promote body positivity when interacting with their teammates.

A final aim of this study was to explore the moderating role of gender in the relationships between teammate influences and eating/exercise psychopathology and determine the relative importance of *explicit* teammate critical comments compared to *implicit* negative teammate influences when predicting athletes' eating and exercise psychopathology. Despite the overall structural model providing a better fit for males, a greater number of predictive teammate influence relationships were identified for females. For example, and in partial support of our hypothesis, critical comment severity was found to be more important than implicit teammate influences when explaining increased drive for thinness, body dissatisfaction and exercising to avoid negative affect for female athletes. While it is clear that implicit teammate influences (i.e., Bulimia Modelling and Teammate Pressure) also have an integral role to play in disordered eating/compulsive exercise development among female athletes, it is noteworthy that this is not the case for male athletes, where the severity of the critical comment was the *only* predictor of increased exercise psychopathology and drive for thinness. One possible explanation for the gender differences identified

in the present study can be found in the nature of female versus male teammate relationships. Reflections from sports team coaches indicate that female athletes are more likely to want to "please their teammates and not worry so much about personal glory" (Navarre, 2011, p.150). In contrast, coaches note that male teams are typically far more individual and performance focused; "guys couldn't care less if they were accepted" (p.150). This team (female) versus individual (male) orientation could explain why females may be more susceptible to *implicit* influences (i.e., perceived teammate pressure/modelling) from their teammates as they have a stronger desire to ingratiate.

Gender aside, this study highlights that explicit teammate critical commentary is of greater importance than implicit mechanisms of teammate influence (which have been the focus of extant literature; (Scott et al., 2021, 2022) when predicting athlete eating/exercise psychopathology. In the general population, a similar pattern has been identified whereby explicit conversations with peers about dieting/appearance/weight loss, as well as weight-related teasing/criticism, have more of an impact on the body image concerns and disordered eating attitudes/behaviours of adolescent females when compared to implicit factors (Carey et al., 2013; Paxton et al., 1999). However, it has been argued that implicit social influences (e.g., upwards social comparison) may act as a pre-condition for the operation of explicit social influences rather than being standalone (Polivy & Pliner, 2015). Indeed, compared to the no-CC group, athletes who had received a critical comment also reported a higher perceived pressure to lose weight/change shape and modelling of teammate's bulimic behaviours. Therefore, it is important not to neglect further research into implicit influence mechanisms, despite them appearing to have a relatively smaller impact on disordered eating/compulsive exercise versus explicit influences.

These findings offer several considerations relevant to the development of disordered eating and compulsive exercise prevention strategies among athletes, and indeed the general population. Given the evidence to suggest a more prominent role for explicit peer influence, athletes need to be made aware of how damaging their appearance-related comments (even offhand) may be for their teammates' wellbeing, particularly among females. Indeed, simply over-hearing critical commentary about others is enough to increase the individual's own body weight awareness, despite not being the target of such criticism (Eli et al., 2014). Beyond wellbeing, such critical comments can also reduce athletes' sport confidence and increase the likelihood of sport disengagement (Slater & Tiggemann, 2010). Therefore, it is vital that strategies are put in place to reduce body commentary within sport. Instead, commentary (if provided at all) should be focused on performance and health. Furthermore, athletes and coaches could be mandated by their organisation to attend workshops highlighting how to combat negative body commentary (e.g., a list of justifications for what is/is not appropriate communication; Sabiston et al., 2020) as well as equipping athletes with strategies to reduce body ideal internalisation (e.g., via media literacy training, enhancement of self-compassion, promotion of body image flexibility; Sundgot-Borgen et al., 2020).

The current study is the first to comprehensively assess the impact of critical comments from teammates on athletes' wellbeing (self-esteem, anxiety, depression), eating and exercise psychopathology. In comparison to previous research on female aesthetic athletes (e.g., Goodwin et al., 2014), the large, representative sample (i.e., balanced for gender and sport type) means findings have increased generalisability. Furthermore, by matching athletes who had received critical comment with those who hadn't based on age, BMI, gender, ethnicity, sport type (lean vs non-lean) and competitive level (elite vs non-elite), key confounders were accounted for.

Naturally, however, there are some limitations. First, the critical comment group had a higher prevalence of athletes with an eating

disorder history. While it is plausible that the critical comment described in the present study was antecedent to their eating disorder, the cross-sectional design means that true cause and effect relationships cannot be determined. It is unclear whether receiving a teammate critical comment is predictive of subsequent increased eating and exercise psychopathology; prospective studies are needed to more clearly unpack the temporal relationships between these aspects. Arguably, it could be the case that athletes with higher levels of body image concern and who are already engaging in disordered weight control behaviours are more attuned and sensitive to the appearance comments of their teammates and thus experience more distress as a result of such comments. Alternatively, individual factors could serve to exacerbate the effects of critical comments. For example, those with higher levels of appearance rejection sensitivity are more likely to report being the subject of appearance related teasing/critical comments (Webb et al., 2017). Second, a limitation of the Social Hassles Questionnaire (Muscat & Long, 2008) is that it asks athletes to reflect on the impact of a single, albeit harmful, critical comment. It is therefore not possible to ascertain whether the impact on wellbeing was from this particular comment or, perhaps more likely, from frequent comments received over time. Understanding the frequency of receipt of such comments, in addition to their severity, will be an important next step; as well as exploring by whom such comments are made. For example, are comments from teammates internalised and acted upon to a higher degree than comments from coaches, parents, competitors, or the media? Are elite level athletes more likely to receive and internalise coach appearance-related comments vs recreational level athletes? Finally, the self-report, retrospective nature of the SHQ meant that the accuracy of findings could be limited by poor recall/reconstruction (e.g., some athletes referred to comments made several years ago).

To address these issues, future research should employ longitudinal designs with frequent sampling points which track athletes' wellbeing in response to critical comments they receive from a variety of sources over time. Furthermore, future longitudinal research would benefit from exploring the impact of variables that may potentially mediate the relationship between critical comment severity and eating/exercise psychopathology. For example, poor psychological wellbeing has been found to exacerbate the relationship between negative teammate influences and eating/exercise outcomes (Scott et al., 2020), while self-compassion has been found to protect against the internalisation of weight stigma (Fekete et al., 2021) and social support seeking is a common coping strategy employed to reduce the negative impact of weight-related teasing (Li et al., 2012). Finally, to improve specificity to male athlete populations, researchers should employ measures that assess muscularity enhancing behaviours that are also likely to be driven by critical comments (Menees et al., 2013).

5. Conclusion

In summary, the findings from the present study indicate that critical weight/shape comments received from teammates have a strong negative impact on athletes' wellbeing, with female athletes reporting comments to be more severe compared to males. Notably, explicit critical comments are more important than implicit influences (e.g., teammate modelling/teammate pressure) when predicting increased body dissatisfaction, eating and exercise psychopathology. Disordered weight control prevention strategies implemented with athlete populations should highlight the detrimental impact that critical weight/shape comments can have and equip athletes with strategies to reduce unhealthy body ideal internalisation. Future research should employ prospective designs to disentangle the true cause and effect relationship between the impact of a critical comment and poor wellbeing.

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CRediT authorship contribution statement

Charlotte L. Scott: Conceptualization, Methodology, Formal analysis, Investigation, Writing – original draft, Visualization. **Emma Haycraft:** Conceptualization, Methodology, Writing – review & editing, Supervision. **Carolyn R. Plateau:** Conceptualization, Methodology, Writing – review & editing, Supervision. All authors have approved the final version of this manuscript.

Data Availability

The data are not publicly available due to privacy or ethical restrictions.

Conflict of interest statement

The authors have no conflict of interest to declare.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.bodyim.2022.08.013.

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