A comprehensive model of disordered eating among aesthetic athletic girls: Exploring the role of body image-related cognitive fusion and perfectionistic self-presentation

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Abstract
The incidence of disordered eating among athlete populations is considerably higher than in the general population. Less well understood is the body image-related emotional processes that might lead to disordered eating attitudes and behaviours, specifically among aesthetic athletic girls. Thus, the aim of the present study was to explore the role that body image-related cognitive fusion plays in disordered eating, and the mediating role of body image-related perfectionist self-presentation on this relationship, in aesthetic athletic girls. This study comprised 142 young female athletes from aesthetic sports, who completed self-report measures. A path analysis was conducted to explore the proposed theoretical model, while controlling for age and zBMI. The path model revealed an excellent fit and explained 71% of the severity of disordered eating. Results showed that body image-related cognitive fusion influences disordered eating behaviours, through the mechanism of body image-related perfectionist self-presentation, even when controlling for age and zBMI. Findings suggested that, in aesthetic athletic girls, the entanglement in body image-related thoughts may be associated with the need to present a perfect body image to others, which may lead to disordered eating attitudes and behaviours, adopted as a means to control weight and body shape. The present study highlights the relevance of body image-related processes in disordered eating and suggests the importance of educational programmes that target the development of more adaptive emotion regulation strategies concerning body image in athletes, particularly from aesthetic sports.

Keywords Young athletes · Disordered eating · Body image-related cognitive fusion · Body image-related perfectionist self-presentation

Introduction
Sports participation is widely recognized as a health promotion strategy (World Health Organization, 2011), due to its association with physical, psychological, and emotional well-being (Bartholomew, Morrison, & Ciccolo, 2005; Lee, Pope, & Gao, 2018; Vella, Gardner, Kemp, Schweickle, & Cliff, 2019). Nonetheless, some studies have suggested that athletes are at higher risk of presenting eating disorder symptoms, when compared to non-athletes (Giel et al., 2016; Krentz & Warschburger, 2013). Even in subclinical forms, these types of difficulties are characterized by a significant level of physical, psychological, and social impairment (Petrie & Greenleaf, 2007). Several studies suggest that some conditions associated with sport context might put athletes, especially female athletes, at risk for the development of disordered eating attitudes and/or behaviours (Kerr, Berman, & Souza, 2006).

For athletes, the body is the vehicle to perform and to achieve in sports (Byrne & McLean, 2002). Especially in sports that emphasize leanness and weight, body image has a crucial role in achievement, which might put significant pressure on athletes concerning their body, weight and eating behaviours (Byrne & McLean, 2002). In the case of aesthetic sports, physical appearance is especially viewed as having an impact on performance (Sundgot-Borgen et al., 2013;
attachment to the content of one’s thoughts, which are perceived as facts, rather than subjective and transitory interpretations of reality (Gillanders et al., 2014). This emotional process may occur in relation to a specific domain, like body image (Ferreira, Ornelas, & Trindade, 2015a; Ferreira, Trindade, et al., 2015b). When this happens, individuals tend to get entangled with disturbing body image-related inner events, assuming them as unquestionable facts, instead of experiencing them as subjective and transitory events (Trindade & Ferreira, 2015).

Research has shown that body image-related cognitive fusion is strongly associated with disordered eating and seems to be a good predictor of eating disorders (Ferreira et al., 2014; Melo, Oliveira, & Ferreira, 2019; Scardera, Sacco, Di Sante, & Booij, 2020; Trindade & Ferreira, 2014; Trindade & Ferreira, 2015). In fact, body image-related cognitive fusion may foster maladaptive efforts to avoid or control these unwanted experiences (Trindade & Ferreira, 2014). Nonetheless, the specific impact of body image-related cognitive fusion in athletes (namely from aesthetic sports) on disordered eating attitudes and behaviours was never examined.

Studies have shown that athletes from aesthetic sports tend to demonstrate more disordered eating (such as pathological diet) (Giel et al., 2016; Krentz & Warchburger, 2013). However, it remains unclear which body image-related emotional processes are involved in this relationship. Therefore, the main aim of this study was to clarify the relationship of body image-related cognitive fusion with disordered eating in aesthetic athletic girls, and whether body image-related perfectionist self-presentation acts on this association. It was hypothesized that athletes from aesthetic sports who struggle with their thoughts regarding body image may engage in disordered eating attitudes and behaviours partially due to a need to present a perfect body image to others.

**Methods**

**Participants**

The sample of this study comprised 142 Portuguese young female athletes of aesthetic sports from gymnastics (n = 50), skating (n = 40) and dance (n = 52), with ages ranging from 12 to 18 years old (M = 13.97; SD = 1.67). Regarding their years of education, participants presented an average of 9.18 (SD = 1.76).

All participants are active in their sport and presented a mean of 6.3 (SD = 3.55) years of sport practice. Participants reported an average of 4.5 (SD = 3.84) hours of training per week. Concerning body mass index (z scores), 7 participants (4.9%) were underweight, 98 (69.1%) had a normal weight, 29 (20.4%) presented as overweight and 8 (5.6%) presented obesity.
Materials

Participants reported demographic data (sex, age, education level, current height, and weight), sports data (type of sport, years of practice and hours of training per/week) and completed the Portuguese validated versions of the following instruments:

**Body Mass Index z Scores (zBMI)** Participants’ BMI z scores values were calculated by macros available by the World Health Organization (WHO; Onis et al., 2007) to analyse growth data for the age group among 5–19 years, through weight and height provided by the athletes.

**Cognitive Fusion Questionnaire Body Image (CFQ-BI; Ferreira, Ornelas, & Trindade, 2015a, Ferreira, Trindade, et al., 2015b)** CFQ-BI is a 10-item self-report measure designed to assess body image-related cognitive fusion (e.g., “I struggle with my thoughts related to my body or physical appearance”). Participants are asked to rate their accordance with each statement using a 7-point scale (1 = “Never true” to 7 = “Always true”), with higher scores indicating a higher level of cognitive fusion. The CFQ-BI presented an excellent internal consistency in its original study (α = .96) and in the current study (α = .97).

**Perfectionistic Self-Presentation Scale-Body Image (PSPS-BI; Ferreira et al., 2016)** The PSPS-BI is a 19-item self-report questionnaire which measures the need to present a perfect body image to others (e.g., “It is very important for me to present myself (my physical appearance) perfectly in social situations”). This is a 7-point scale (1 = “Strongly disagree”; 7 = “Strongly Agree”), where higher scores indicate greater perfectionist self-presentation. The PSPS-BI revealed an excellent internal consistency in the original (α = .93) and in the current study (α = .93).

**Eating Disorder Examination (EDE-Q; Fairburn & Beglin, 1994; Machado et al., 2014)** EDE-Q is a self-report measure that assesses the frequency and intensity of disordered eating attitudes and behaviours. The EDE-Q focuses on the last 28 days and comprises four sub-scales: restraint, eating concern, weight concern and shape concern. The items are rated on a 7-point Likert-scale, in terms of occurrence (items 1–15, on a scale ranging from 0 = “None” and 6 = “Every day”) and frequency (items 29–36, on a scale ranging from 0 = “None” and 6 = “Extremely”), with higher values indicating higher severity of eating psychopathology (e.g., “Have you been deliberately trying to limit the amount of food you eat to influence your shape or weight (whether or not you have succeeded)”; Has your shape influenced how you think about (judge) yourself as a person?”). The EDE-Q global score presented an excellent internal consistency both in the original and Portuguese version (α = .94 and α = .95 respectively), as well as in the current study (α = .94).

Procedures

This study is part of a wider research project of the emotional regulation processes in sport context, conducted at the Center for Research in Neuropsychology and Cognitive Behavioural Intervention. All the ethics requirements were followed and approved by the Ethics Commission of the Faculty of Psychology and Educational Sciences of the University of Coimbra.

The sample was recruited mainly by contacting a wide range of sports clubs. The first step was to contact, by e-mail or telephone, the managers of the clubs to inform them about the aims and procedures of the study and to ascertain the possibility of data collection with their athletes. Twenty-two different clubs of aesthetic sports (e.g., ballet, gymnastic and figure skating clubs) were contacted, and eight agreed to collaborate. Each club gave the interested participants and their parents/legal tutors detailed information regarding the study (aims, procedures, and its voluntary and confidential nature). Afterwards, a written informed consent was obtained from all athletes’ parents/legal tutors and from all athletes enrolled in this study. The self-report measures were completed during an authorized break (approximately 15 min) approved by their coaches, in the presence of one of the researchers. According to the aims of the present study, the inclusion criteria were: (i) female athletes; (ii) ages between 12 to 18 years old; (iii) Portuguese nationality; (iv) practice of an individual aesthetic sport.

Self-report measures were completed by 146 female athletes. However, four participants were excluded because they did not report their height or weight.

Data Analyses

All analyses were conducted through SPSS (v.22; IBM Corp. Armonk NY) and the software AMOS (v.22, SPSS Inc., Chicago, IL) (Arbuckle, 2008).

Descriptive statistics (means and standard deviations) assessed the sample’s characteristics. Pearson product-moment correlations were conducted to examine associations among age, zBMI, body image-related cognitive fusion (CFQ-BI), body image-related perfectionistic self-presentation (PSPS-BI) and disordered eating (EDE-Q) (Cohen, Cohen, West, & Aiken, 2003). A Path analysis was performed to estimate presumed theoretical relationships among the study variables. The path model examined whether body image-related cognitive fusion was associated with disordered eating and whether this relationship was mediated by body image-related perfectionistic self-presentation, while controlling for age and BMI (Fig. 1).
The Maximum Likelihood estimation method was used to test path model coefficients’ significances and fit statistics, with a 95% confidence interval. The adequacy of the model was assessed by the chi-square ($\chi^2$; in which a $p$ value above .05 indicates a good fit), the normed chi-square (CMIN/DF; which should stand below 3), the Tucker Lewis Index (TLI) and the Comparative Fit Index (CFI), in which values above 0.90 indicate a good fit, and the Root-Mean Square Error of Approximation (RMSEA; which should stand below 0.08), using a 95% confidence interval (Hu & Bentler, 1999). Moreover, significance of mediational paths was further analysed using the Bootstrap resampling method, with 5000 Bootstrap samples and 95% bias-corrected confidence intervals around the standardized estimates of direct, indirect and total. A significant mediation effect ($p < .05$) was considered when zero was not included in the interval between the lower and upper bound of the confidence interval (Nevitt & Hancock, 2001).

**Results**

**Preliminary Analyses**

The assumption of the normality of the distribution of the variables was established by the analysis of Skewness and Kurtosis (Kline, 2016). Preliminary analyses assumed that data followed the assumptions of homoscedasticity, normality, linearity, independence of errors and multicollinearity and singularity between the variables (Field, 2013).

**Descriptive and Correlational Analyses**

The means, standard deviations and Pearson correlation coefficients between the study variables are presented in Table 1. Results showed that body image-related cognitive fusion was significant and positively associated with body image-related perfectionistic self-presentation and with disordered eating, with strong magnitudes. Furthermore, body image-related cognitive fusion presented a significant and positive, albeit weak, association with age and a non-significant association with zBMI. Moreover, body image-related perfectionistic self-presentation presented a significant positive and strong association with disordered eating, as well as a significant positive and weak association with zBMI scores and with age. Results also showed that disordered eating revealed significant and positive associations with zBMI and age, with weak magnitudes. Finally, zBMI presented a non-significant association with age (Table 1).

**Path Analysis**

A path analysis was conducted to test whether body image-related perfectionistic self-presentation (PSPS-BI) mediated the link between body image-related cognitive fusion (CFQ-BI) and disordered eating severity (EDE-Q), while controlling for age and zBMI. The proposed model was first tested through a fully saturated model (with zero degrees of freedom) with 20 parameters.

Results indicated that two paths were not significant: the direct association between age and EDE-Q ($b_{age} = .003; SE_{b} = .04; Z = .09; p = .926$); and the direct association between age and PSPS-BI ($b_{age} = -.31; SE_{b} = .93; Z = .34; p = .73$). These paths were progressively eliminated, and the model was readjusted.

The final model (Fig. 1) presented an excellent fit with a non-significant Chi-Square ($\chi^2 = .126; p = .939$), and an excellent fit to the empirical data, as indicated by the analysis of well-known and recommended goodness of fit indices.
from aesthetic sports (Robins et al., 2002; Sundgot-Borgen et al., 2019; Trindade & Ferreira, 2014). Moreover, data seems to suggest that aesthetic athletic girls present higher levels of fusion with body image-related thoughts tend to show greater need to present a perfect body image to others.

To further understand the relationship among these body image-related emotional processes (i.e., cognitive fusion and perfectionistic self-presentation) and disordered eating, a theoretical model was explored in a sample of aesthetic athletic girls. In this model, it was hypothesized that the relationship between body image-related cognitive fusion and disordered eating severity, was mediated by body image-related perfectionist self-presentation while controlling for zBMI and age.

Path analysis results demonstrated that the proposed model presents an excellent fit to the empirical data, accounting for 71% of the variance of disordered eating attitudes and behaviours, corroborating the initial hypothesis. Additionally, results revealed that 46% of body image-related perfectionist self-presentation was explained by body image-related cognitive fusion.

These findings reinforce the pervasive role of body image-related cognitive fusion on disordered eating (Ferreira et al., 2014; Melo et al., 2019; Trindade & Ferreira, 2014). Moreover, this model demonstrates that the relationship between body image-related cognitive fusion and disordered eating is carried by the endorsement on compensatory perfectionist strategies. Results suggested that, in aesthetic athletic girls, the entanglement with thoughts about their body image may prompt the adoption of defensive and perfectionistic strategies, such as a greater need to present a perfect body image to others, which in turn may lead to disordered eating. Furthermore, data seems to suggest that aesthetic athletic girls tend to engage in disordered eating attitudes and behaviours,

Discussion

Empirical studies have highlighted a higher prevalence of disordered eating in athletes than in non-athletes (Giel et al., 2016; Krentz & Warschburger, 2013), especially in athletes from aesthetic sports (Robins et al., 2002; Sundgot-Borgen et al., 2013; Tiggemann et al., 2000). However, little is known about the body image-related emotional processes that may contribute to disordered eating in aesthetic athletic girls. The present study aimed to explore a comprehensive model to explain disordered eating in aesthetic athletic girls.

Results showed that body image-related cognitive fusion was strongly associated with disordered eating severity, which is in line with previous research (Ferreira et al., 2014; Melo et al., 2019; Trindade & Ferreira, 2014). Moreover, confirming the results of previous empirical studies (Ferreira et al., 2016; Ferreira, Duarte, et al., 2018a; Ferreira, Mendes, & Trindade, 2018b; Ferreira, Ornelas, & Trindade, 2015a; Ferreira, Trindade, et al., 2015b; Marta-Simões & Ferreira, 2016), a strong relationship was found between body image-related perfectionist self-presentation and higher levels of disordered eating. Overall, these results corroborate previous studies that suggest that the entanglement with thoughts about body image and the need to exhibit a perfect body image to others, have a strong association with disordered eating attitudes and behaviours, and extend them by concluding that these relationships are also relevant in a sample of aesthetic athletic girls. Also, this study revealed that athletes who present higher levels of fusion with body image-related thoughts tend to show greater need to present a perfect body image to others.

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as a way to control weight and body shape and attain a perfect body image. Overall these findings suggest that, when aesthetic athletic girls get entangled with unpleasant thoughts about their body image, disordered eating attitudes and behaviours may emerge as a strategy to strive for a perfect body image, perceived as a need to enhance their performance and approval in sport context.

These results should be considered by taking into account some limitations. This is a cross-sectional study, and for that reason limits any causal inferences. Longitudinal studies are necessary to validate the nature and direction of the tested model. Moreover, this study only focused on female participants, for that reason future studies should consider males in the study of these variables. Another limitation was the use of data exclusively based on self-report measures, which may lead to some biases. Finally, and considering that disordered eating is a multi-determined phenomenon, other emotional processes should be considered to explain this phenomenon. Future prospective studies should be conducted to clarify the associations between these variables and propose causal inferences. “Future prospective studies should be conducted to clarify the associations between these variables and propose causal inferences. Also, future research is needed to compare the acceptability and impact of Cognitive-Behavioural Therapy (CBT) and Acceptance and Commitment Therapy-based (ACT) interventions to promote athlete’s adaptive ways to deal with their body image.

Nevertheless, this is the first study examining the mediating role of body image-related perfectionistic self-presentation in the association between body image-related cognitive fusion and disordered eating in aesthetic athletic girls. This study clarified the pervasive role of body image-related cognitive fusion in disordered eating, as well as, in body image-related perfectionistic self-presentation as a maladaptive strategy to deal with cognitive fusion.

Previous studies have reported that the practice of sports is an environment which can increase athlete’s susceptibility for the development of maladaptive eating attitudes and behaviours, especially in female athletes from aesthetic sports (Currie, 2010; Kong & Harris, 2015). Regarding the central role that body image has on adolescence and even more in aesthetic athletic girls (Giel et al., 2016), the present study offers new empirical data that may be relevant for clinical and sport psychology practitioners. This study offers important insights by suggesting that body image-related cognitive fusion may be at the root of perfectionistic self-presentation behaviours and disordered eating. Furthermore, data highlights the relevance of education programmes that promote more adaptive emotional strategies focusing on body image, to increase athlete’s defusion skills and the acceptance of unpleasant thoughts and emotions related to their body image. Moreover, our data seems to indicate that intervention and prevention programs for aesthetic athletes, should focus on

the development of more adaptative strategies related to body image, through the cultivation of a balanced and acceptance relationship with one’s own body characteristics (e.g., Tylka & Wood-Barcalow, 2015) rather than on the adoption of body image-related perfectionist self-presentation strategies.

Data Availability The datasets collected and analysed during the current study are not publicly available due to the present research is part of a wider research, thus the data is still being used by the authors.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethics Approval All the ethics requirements were followed and approved by the Ethics Commission of the Faculty of Psychology and Educational Sciences of the University of Coimbra.

Consent to Participate A written informed consent was obtained from all participants’ parents/legal tutors and from all participants enrolled in this study.

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