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Comparison of exercise and sports characteristics between binge-eating and healthy people

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ABSTRACT

The present study compared exercise and sports characteristics between subjects with Binge Eating Disorder (BD) classification and a health group without binge eating. A randomized sample of 111 participants (23.1± 7.6 yrs.; 1.6± 0.6 m; 77.0± 16.9 kg) were classified and separated according BD classification (non-binging= 47; moderate binging *n*= 30; severe binging *n*= 40). For this, the BD Scale, Self-perceived Performance Scale, and a Demographic Questionnaire obtained classifications about BD and characteristics of exercise and sports practices. Analysis indicated that the Body Mass Index (BMI) was different between groups ($p \leq 0.001$). Non-binging, with 22.5± 5.1 index, presented lower values than severe binging, with 27.4± 4.9 index and moderate, binging, with 28.1± 8.2 index, while severe binging, with 6 (2; 6) hours/training, had a longer time than moderate, with 4 (2; 6) hours and non-binging groups, with 3 (2; 6) hours/training. With a 3 (2.5; 3) score, the severe binging group presented lower motor control performance than the non-binging with a 3 (3; 4) score. Thus, coaches and psychologists can develop strategies for specific eating disorders, considering present important factors in sports psychology to reduce BD and compensatory strategies.

KEYWORDS: binge-eating disorder; perceptions; psychological and emotional problems; stigma; sports.

INTRODUCTION

According to data from the World Health Organization (WHO, 2019), 4.7 of the population suffers from Binge Eating Disorder (BD) in Brazil. This number is almost twice the world average, around 2.6 people (WHO, 2019). The prevalence of disordered eating behaviors is associated with individual factors in Brazilian university students, and it is highest is among young women aged 14 to 18 years in the country (Kampouri, Kotopoulea-Nikolaidi, Daskou, & Giannopoulou, 2019; Matos, Rodrigues, Fonseca, Ferreira, & Muraro, 2020). This mental disorder is characterized by ad regular eating habits, which negatively affect a person's physical and psychological health (Giannopoulou, Kotopoulea-Nikolaidi, Daskou, Martyn, & Patel, 2020). The BD involves recurrent episodes of eating in a discreet period (e.g., within any 2 hours), and attacks with massive food than most people would eat in a similar time under similar circumstances and in which a lack of control over eating during the episode occurs (Tang, Kim, Hodgins, McGrath, & Tavares, 2020). Recovery from BD is 20 to 60% of cases (Mathisen, Sundgot-Borgen, Rosenvinge, & Bratland-Sanda, 2018).

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Preceding reports consider risk behaviors for eating disorders, food restriction, the use of drugs for weight loss, strenuous physical activity, binge eating, and excessive preoccupation with food (Forney, Schwendler, & Ward, 2019). According to preceding reports, the competitive environment can trigger a high frequency of the sports environment (Gorrell et al., 2019). It can occur due to the enormous stress involving optimizing sporting performance (Whitehead et al., 2020). Some studies show that adolescence is the phase that is more likely to develop eating disorders (Solmi, Melamed, Lewis, & Kirkbride, 2018). At the same time, athletes showed an increased risk to develop other pathologies (Bromley, Drew, Talpey, McIntosh, & Finch, 2018).

Previous authors have evaluated the clinical utility of the DSM-5 severity indicator for BD in an adult treatment-seeking sample (Dalrymple, Walsh, Rosenstein, Chelminski, & Zimmerman, 2017). DSM-5 can classify people with BD into moderate or severity groups, using the individual's weekly frequency of BD episodes and compared in a broad range of variables (Dalrymple et al., 2017; Reas & Rø, 2017). Participants classified with mild (31.2%), moderate (33.3%), severe (18%), and extreme (17.5%) severity of BD differed significantly from each other in BMI, but also in eating disorder features, and had active maintenance factors, mood, anxiety and personality disorder comorbidity, psychological distress and illness-specific functional impairment (medium-to-large effect sizes), with significantly higher levels/rates across the severity groups (Dalrymple et al., 2017; Reas & Rø, 2017). Practicing regular physical activity has rarely been part of the treatment of bulimia nervosa and BD disorder (Mathisen et al., 2018) because of the excessive and compulsive exercise reported in about 20–80% of patients with eating disorders (Gorrell et al., 2019; Kampouri et al., 2019).

It is unknown what the effect of physical practice habits has in patients classified as moderate or severe BD versus people without binge eating. This knowledge can support treatments and prevention of BD and help in future diagnoses of comorbidities such as bulimia and compulsion for exercise. Therefore, the present study aimed to compare exercise characteristics between people classified as having a BD disorder versus healthy group. We hypothesize that BD classification will have an effect on BMI and hours of physical exercise.

METHODS

Study design

The current study design is cross-sectional and descriptive research, using a questionnaire to verify the physical practices of young people according to the BD classification versus healthy group participants. After applying the questionnaire, participants were classified as healthy or binge-eating and, in sequence, grouped according to binge eating severity. After that, our study analyzed variance, comparing characteristics of physical practices associated with the study participants.

Participants

A randomized sample of 111 participants (age: 23.1± 7.6 years-old; height: 1.64± 0.6 m; weight: 77.0± 16.9 kg) were classified and separated according to the BD classification (healthy group, non-binging= 47; moderate binging *n*= 30; severe binging *n*= 40). All participants were selected from five universities of Rio de Janeiro (Universidade Federal do Rio de Janeiro, Universidade Federal Fluminense, Universidade do Estado de Rio de Janeiro, Universidade Federal Rural do Rio de Janeiro, and the Universidade Federal do Estado de Rio de Janeiro). The sample included men and women who participated in federated sports practitioners 67% at recreational, 23% national, and 10% international levels. The sample calculation for 50 thousand federated practitioners obtained an *n*= 96, with a 95% confidence level and 10% margin of error, using the Equation 1 (Jill et al., 2010):

$$n = N Z^2 p (1-p)(N-1) e^2 + Z^2 p (1-p) \quad (1)$$

The interpretation of each of these elements is made as follows:
n= is the sample size obtained through the calculation;
N= total population belonging to the survey;
Z= indicated deviation from the acceptable mean value for the confidence level to be reached;
e= is the maximum margin of error that the search allows;
p= is the proportion we want to find in the calculation.

The participants who were unable to complete the questionnaires during the study and participants who were < 18 years old were excluded from the present study. The current research was submitted to and approved by the Health, Medical &Research Committee of Ethics. All participants were > 18 years old and signed an informed consent document to ensure their understanding of the benefits and risks guaranteeing anonymity, and followed the Declaration of Helsinki.

Procedures

This study is exploratory and attempts to determine the prevalence and risk factors of disordered eating behaviors and identify sedentarism, physical practitioners, and amateur athletes 'at risk' of developing eating disorders at the club level in Rio de Janeiro, Brazil. All participants were recruited via

State or University Sporting Organizations, various social media channels, and word-of-mouth advertising. The questionnaire was not translated into any other languages, and therefore it was a requirement that all participants were fluent Portuguese speakers. The participants signed an informed consent form before being presented with the questionnaires to take part in the present study. Next, the questionnaires (i.e., Binge Eating, Self-perceived Performance Scale, and a Demographic Questionnaire) were distributed by an investigator who explained the study's purpose was to examine the BD disorder and the characteristics associated with each classification. Therefore, the statistical analysis compared participants using a non-parametric variance analysis followed by a post-hoc, $p< 0.05$.

Measures

BD Scale (BES): The BES is a 16-factor questionnaire used to assess the presence of BD behavior indicative of an eating disorder (Giannopoulou et al., 2020). The questions are based upon behavioral characteristics (i.e., amount of food consumed) and the emotional and cognitive response, guilt or shame. Each question has 3-4 different answers assigned a numerical value. The score ranges from 0-46: i) Non-binging: less than 17 scores; ii) Moderate binging: 18-26 score; iii) Severe binging: 27 and more outstanding scores. The BES has good test-retest reliability (r ¼ .87, $p < 0.001$) and moderate associations with BD severity as measured by food records (r ¼ .20–.40, $p < 0.05$) (Williams et al., 2017).

Demographic questionnaire: a demographic questionnaire was used to characterize the participants regarding gender, age, modality, body mass, height, competitive level, educational qualifications, training hours per week, and frequency per week (Arnold et al., 2019).

Self-Perceived Performance Scale (SPS): adapted from preceding authors, the SPS objectives to describe the self-perceived performance (Esteves et al., 2020). This assessment uses the theory of self-efficacy with the judgments that individuals have about themselves. The athlete had to indicate the frequency with which each of the characteristics occurs in the proposed situation according to a Likert scale of 7 points (e.g., self-performance until now, physical, technical, tactical, psychological, disciplinary, and the self-performance in a team). The original version of the SPS was used, consisting of 7 principal items. We obtained direct scores and subsequently calculated a scale that offers a ranking for each subject in each measure.

Statistical analysis

The Kolmogorov-Smirnov test (K-S) indicated a non-normal distribution of data. Descriptive data are presented as median [25th percentile; 75th percentile] values, and the Kruskal-Wallis and Dunn's post hoc tests were performed to compare frequencies between the groups. A significance level of $p\leq 0.05$ was used. All analyses were realized using SPSS 20.0 for Windows.

RESULTS

Significant differences were observed between BD severity groups on exercise and sports characteristics. The analysis indicated that BMI was different between groups ($\chi^2= 18.405$, $p\leq 0.001$), non-binging, with 22.5± 5.1 index presented lower values than severe binging, with 27.4± 4.89 index ($p= 0.026$), and moderate binging, with 28.1± 8.2 index ($p= 0.003$). Table 1 presents the relationship between factors associated with training and their association with binge eating disorder.

Analysis indicated significant differences between groups in motor abilities performance ($\chi^2= 8.844$, $p= 0.031$). Severe binging presented lower motor performance self-perception than

Table 1. Descriptive analysis of dependent factors of people with Binge Eating Disorder (BD) severity groups.

Depedent factors	Non-biging			Moderate biging			Severe biging		
	50°	25°	75°	50°	25°	75°	50°	25°	75°
Training / week	4.0	3.0	5.0*	4.0	3.0	5.0*	3.0	3.0	5.0
Hours/training	3.0	2.0	6.0*	4.0	2.0	6.0*	6.0	2.0	6.0
Rapid weight loss	2.0	2.0	2.0*#	2.0	2.0	3.0	2.0	2.0	3.0
Physical performance	3.0	2.0	4.0	3.0	2.0	3.0	2.0	1.0	3.0
Motor habilities performance	3.0	3.0	4.0*	3.0	3.0	4.0	3.0	2.5	3.0
Technical-tactical performance	4.0	3.0	4.0	3.5	3.0	4.0	4.0	3.0	4.0
Cognitive performance	4.0	3.0	4.0	3.0	2.3	4.0	3.0	2.5	4.0

*Significant difference from severe binging, #significant difference from moderate binging, $p< 0.05$.

non-binging (p= 0.05). No differences between groups were indicated by self-perception on physical (p= 0.262), tactical (p= 0.485), or cognitive performance (p= 0.054).

Significant differences were observed in training/week (χ^2= 115.710, p= 0.031). Severe binging presented lower session quantities than moderate ($p \leq 0.001$) and non-binging ($p \leq 0.001$). On the other hand, comparisons indicated significant effects on hours/training (χ^2= 109.373, $p \leq 0.01$) with a longer time for the severe binging group than moderate ($p \leq 0.001$) or non-binging groups ($p \leq 0.001$).

During championship moments, significant differences were observed in rapid weight loss (χ^2= 104.622, $p \leq 0.001$), as non-binging presented less amount of rapid weight loss than severe ($p \leq 0.001$) and moderate binging ($p \leq 0.001$).

DISCUSSION

Our study targeted to compare exercise features between participants classified as having a BD disorder versus the healthy group. Results confirmed present hypothesize that BD classification is associated with hours of physical exercise and BMI. The present study points out a limitation of using an online questionnaire that does not explain each question to the participants. The questionnaire is validated and widely used clinically and scientifically without interaction between researcher and participant (Esteves et al., 2020). Analysis indicated differences between BD severity groups on training and sports characteristics.

Regarding factors associated with BD disorder, genetic factors play a role in the emergence of eating disorders, with heritability approaches ranging from 0.4 to 0.7 (Salafia, Jones, Haugen, & Schaefer, 2015). Moreover, emotional and psychological problems were among the leading causes of eating disorders (Buckley, Hall, Lassemillante, Ackerman, & Belski, 2019). The present findings indicate that rapid weight loss during the competitive season is one of the essential characteristics of athletes classified with the binging disorder. The participants' socio-cultural effects with eating disorders during the questionnaire applications included the media, family, and coaches. Although the present article included sports practitioners with weight categories, the socio-cultural judgment was recognized as playing a role. It places on thinness and self-comparison to an ideal body, as indicated in preceding reports (Dalrymple et al., 2017; Esteves et al., 2020).

Our analysis indicated that BMI and rapid weight loss was different between groups. Non-binging presented lower BMI values and instantaneous weight loss frequency than severe binging and moderated binging. Preceding reports indicated that people with Severe binging and dietary energy restriction during ~50 weeks demonstrated a reduction in BD symptoms; however, a small increase in purgative behavior at week ~40 (Tang et al., 2020; Whitehead et al., 2020). The present results agree with preceding reports and demonstrated significant differences in training/week and hours/training variables. Severe binging presented lower session quantities, but with a more extended time of each session than moderate and non-binging (Buckley et al., 2019; Gorrell et al., 2019).

Besides, severe binging presented lower motor performance self-perception than non-binging. Our analysis indicated that BMI and rapid weight loss was different between groups. Non-binging showed lower values and frequency than severe binging and moderated binging. Besides, Severe binging presented lower motor performance self-perception than non-binging. Present knowledge about sports performance is new and agrees with body concerns (i.e., body dissatisfaction and weight preoccupation) (Whitehead et al., 2020). Preceding studies with girls indicated that Body Dissatisfaction and Weight Preoccupation scales were used to predict the change in the Bulimic Behavior scale (Buckley et al., 2019). Findings of retired athletes and compensatory behaviors for the binging disorder (Buckley et al., 2019) agree with the present results. Severe binging presents a long time of each session than moderate and non-binging.

The purpose was to make our questionnaire short and uncomplicated to avoid questions being skipped and get better completion rates. The present research discarded ~10% of all samples because one or more questions were not answered. Moreover, the questionnaire fatigue levels were verified when invitations were refused before the questionnaire begins. Overcome by the growing number of commercial surveys and questionnaires, participants are less inclined to participate in scientific research; thus, we suffered from a lower response rate than usual. Therefore, the present study only included relevant questions to avoid fatigue during the questionnaire, making it easy for participants.

CONCLUSIONS

The present study highlights the differences observed between healthy group versus BD severity groups on exercise and sports characteristics. The main results demonstrated that non-binging presented lower BMI than severe binging and moderated binging. The severe binging group showed lower motor self-perception of performance and longer training sessions than moderate and non-binging groups. Athletes presented significant differences in rapid weight loss during championships, and non-binging presented less rapid weight loss than severe and moderate binging. In practical

applications, the results reinforce the need for monitoring athletes' mental health associated with BD and self-perception. The closer to competitions, the greater the concern with weight loss. From these findings, coaches and psychologists have to create strategies for specific eating disorders, considering the significant features of sports psychology, thereby reducing BD and compensatory strategies.

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