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Abstract

Objective: This study compared the different factors associated with eating behaviours among young female and male athletes and non-athletes. **Method:** A total of 580 female and male athletes and 362 female and male non-athletes between 10 and 19 years old participated. We used the subscales of the *Eating Attitudes Test* (EAT-26) to evaluate the factors associated with unhealthy eating behaviours. **Results:** We found higher scores for females on the Diet subscale compared with males, regardless of athletic group ($p < .05$). Non-athlete youths scored higher on this subscale compared with male athletes ($p < .05$). Our findings indicate higher scores for female athletes with regard to the Bulimia and Preoccupation with Food subscale compared with other the groups ($p < .05$). Moreover, we observed that non-athlete males were more likely to engage in binge eating compared with athletes of the same sex ($p < .05$). Finally, females had higher scores on the Oral Self subscale than males, regardless of athletic group ($p < .05$). **Conclusion:** We concluded that the factors associated with eating behaviours differ with regard to sex and group.

Keywords: Eating Disorders; Sports; Adolescents.

Eating Behaviours in Youths: A Comparison between Female and Male Athletes and Non-Athletes

Unhealthy eating behaviours are related to abnormal attitudes associated with maintaining or changing one's body weight (Filaire, Rouveix, Pannafieux, & Ferrand, 2007; Holm-Denoma, Scaringi, Gordon Van Orden, & Joiner, 2009). Examples of these behaviours include self-inflicted vomiting, pathological food restriction, the use of diuretics/laxatives for weight loss, and the use of anabolic steroids to gain lean mass, among others (Fortes & Ferreira, 2011; Torstveit, Rosenvinge, & Sundgot-Borgen, 2008). The perpetuation of these behaviours in everyday life can trigger psychiatric syndromes such as eating disorders (ED; Alves, Vasconcelos, Calvo, & Neves, 2008; Fortes, Paes, Amaral, & Ferreira, 2012).

ED are more commonly known as anorexia nervosa and bulimia nervosa. To meet a clinical diagnosis of anorexia nervosa, a person typically must be considered to have a low body weight, clinically abuse weight loss medications, have an extreme preoccupation with their physical appearance or a distorted perception of their body size. Furthermore, amenorrhea often appears in females as consequence of their low intake (Ferreira & Veiga, 2008). Bulimia has similar diagnostic criteria; however, it is often marked by episodes of binge eating followed by purging behaviours for weight control, with an average frequency of twice a week (Fortes et al., 2012; Scherer, Martins, Pelegrini, Matheus, & Petroski, 2010).

The prevalence of these psychopathological disorders ranges from 1 to 4% in the general population (Martins, Pelegrini, Matheus, & Petroski, 2010; Scherer et al., 2010). Evidence suggests that females who are not athletes are more affected by anorexia and bulimia compared with male non-athletes (Ferreira & Veiga, 2008; Schaal et al., 2011). ED rates are higher among athletes than the general population (Filaire et al., 2007; Fortes, Miranda, Amaral, & Ferreira, 2011; Martinsen, Brantland-Sand, Eriksson, & Sundgot-Borgen, 2010; Torstveit et al., 2008). As such, studies have shown a higher frequency of unhealthy eating

behaviours in athletes compared with non-athletes (De Bruin, Oudejans, & Bakker, 2007; Ferreira & Veiga, 2008; Torstveit et al., 2008). However, some studies have found higher frequencies of risky eating behaviours in the general population compared with athletes (Martinsen et al., 2010; Michou & Costarelli 2011). These inconsistencies are likely due to the fact that both athletes and the general population are vulnerable to media messages about body appearance and social acceptance (e.g., slim bodies for girls and muscular bodies for boys; De Bruin et al., 2007).

With regard to specific segments of the population, evidence suggests that a high prevalence of unhealthy eating behaviours exists in adolescent non-athletes (De Bruin, Woertman, Bakker, & Oudejans, 2009; Martins et al., 2010; Scherer et al., 2010) and adolescent athletes (Filaire et al., 2007; Fortes et al., 2012). Holm-Denoma et al. (2009) and Torstveit et al. (2008) indicated that sporting facilities are usually full of opportunities to optimise athletic performance as well as body shape and size. Athletes may feel pressured to improve performance and body weight at any cost. Hence, some athletes most likely use unhealthy methods of changing their body weight or lean body mass with the belief that this change will enhance peak performance (Costarelli & Stamou, 2009; Fortes & Ferreira, 2011; Rosendahl, Bormann, Aschenbrenner, Aschenbrenner, & Strauss, 2009). Thus, competitive sports are a high-risk environment for the development of ED. Comparisons between athletes and non-athletes regarding unhealthy eating habits can clarify whether differences exist with regard to vulnerability to ED between these groups. Females are more negatively affected by ED than males with regard to their health, regardless of their athletic status (Alves et al., 2008; Fortes & Ferreira, 2011; Martinsen et al., 2010; Torstveit et al., 2008). Some authors have recommended analysing behavioural variables across groups with regard to gender (Fortes & Ferreira, 2011; Rouveix et al., 2007), age (De Bruin et al., 2007), body fat percentage (Fortes et al., 2012) and type of sport (Martinsen et al., 2010).

In fact, some findings have shown that older adolescents tend to have higher frequencies of unhealthy eating behaviours compared with younger children (Fortes et al. 2011; Martins et al., 2010). Thus, research that attempts to compare groups with age difference without controlling for this variable in the analyses might be unreliable. In addition, evidence suggests that a high percentage of body fat can cause youths to become more vulnerable to unhealthy eating behaviours (Fortes & Ferreira, 2011; Scherer et al., 2010). Due to the findings that demonstrate the different percentages of body fat for athletes and non-athletes, some authors have recommend using body fat percentage as a covariate in the analyses (De Bruin et al., 2007; Fortes et al., 2012). Furthermore, the type of sport practiced can influence athletes with regard to unhealthy eating behaviours. Evidence indicates that participation in sports that emphasise leanness or the reduction of body weight to optimise performance can cause athletes to engage in risky eating behaviours (Fortes et al., 2011; Schaal et al., 2011; Torstveit et al., 2008).

Most of the studies that have compared unhealthy eating attitudes among athletes and the general population do not discuss or isolate the factors that might influence ED such as age, body fat percentage and type of sport. When behavioural variables are compared within groups that have dissimilar characteristics, the result might be due to differences among non-isolated independent variables.

Brazilian studies have yet to compare the different eating behaviour constructs (e.g., food restriction, bulimia, preoccupation with food and oral self-control) with regard to sex and participant athleticism (i.e., athletes vs. non-athletes).

Most studies concerning eating behaviours have exclusively examined data from all-female samples (Alves et al., 2008; De Bruin et al. 2007; De Bruin et al., 2009; Ferreira & Veiga, 2008; Martins et al., 2010; Scherer et al., 2010). Finally, an evident need exists to develop research on these behavioural variables as they concern males. Therefore, this study

compared the different factors associated with eating behaviours among young female and male athletes and non-athletes.

Materials and Methods

Participants

This cross-sectional analysis was conducted in 2011 with young athletes (464 males and 116 females) and non-athletes (163 males and 199 females) between 10 and 19 years old. The sample was divided into four groups based on gender (male or female) and sports participation (athletes or non-athletes). Participants under 18 years old had their parents sign a consent form that explained the objectives and procedures of the study, and they signed an assent form regarding their voluntary participation. Confidentiality was guaranteed for all participants. Furthermore, this study was approved by the Universidade Federal de Juiz de Fora's Human Subjects Protection Committee (i.e., the ethics committee for research involving humans; 232/2010) in accordance with Resolution 196/96 of the Brazilian Council for Health.

Athlete Recruitment

The criteria for the athlete participants were to be a

a) formal affiliate of a team or club; b) regular participant at practice time with the team or club; and c) regular participant in local, regional or national championships.

Before contacting these athletes, the objectives and procedures of this recruitment were explained to the administrative boards of eight clubs in Juiz de Fora, MG, Brazil. Representatives of six clubs agreed to participate, thereby allowing data collection with regard to their athletes. A list of 620 female and male athletes between 10 and 19 years old was created. These athletes represented their clubs at competitions of track and field, basketball, fencing, football, gymnastics, handball, judo, swimming, synchronised swimming, water polo, diving,

tae-kwon-do, volleyball and preparing to compete in triathlon events. All participant regularly attended practices at a minimum of three times per week; each practice lasted at least an hour a day. Furthermore, they took part in local, regional or national tournaments.

This study included only youths who submitted the Statement of Informed Consent (SIC) signed by their parents (if < 18 years old) or themselves (if > 18 years old).

Non-athlete recruitment

The inclusion criteria for non-athlete participants were adolescents who a) did not participate in competitive sports over the last two years; b) were engaged in any kind of physical activity more than twice a week, one hour per session; and c) were regularly enrolled in private or public elementary or high schools within Juiz de Fora, MG, Brazil, in 2011.

Most adolescents were in school. According to the Department of Education of Juiz de Fora, MG, Brazil, approximately 80,000 students between 10 and 19 years old were enrolled in the city's schools in 2010. The procedure for selecting non-athlete participants was first to perform a sample size calculation based on the recommendations of Alves et al. (2008): given a 10% prevalence of unhealthy eating behaviours with 99% confidence and 5% a sampling error, 239 students must be evaluated to obtain a sample that represents the population.

The proportional sample was then stratified by the inclusion of schools in the socio-geographical regions of Juiz de Fora (north, south and centre) as well as the type of binding administration (public and private) and then distributed across elementary or high schools. For random selection, we used the lottery method in two steps. At first, this procedure drew schools in each region. Each selected school appeared on an official weblink provided by the industry statistics of the Department of Education of the State of Minas Gerais, Brazil. Each school received a unique number. These numbers were then thoroughly mixed in a bowl and shook.

Then, without looking, the researcher randomly picked the numbers. The same procedure was adopted to select the participants within each school. The population that were assigned the number picked were included in the sample.

The directors of ten schools (five public and five private) were invited to participate in the study. All administrative boards were informed about the study's objectives and procedures. Six schools (three private and three public) agreed to allow students to participate in this study.

This study included youths who submitted the Statement of Informed Consent (SIC) signed by their parents (if < 18 years old) or themselves (if > 18 years old).

Instruments

- *Eating Attitudes Test* (EAT-26)

This study used the EAT-26 questionnaire (Garner, Olmsted, Bohr, & Garfinkel, 1982), which is composed of 26 questions. The EAT-26 has six response options ranging from 0 to 3 (3 = always, 2 = almost always, 1 = often, and 0 = seldom, hardly ever or never). The only question that is reversed scored is the 25th (i.e., 0 = always, nearly always or often, 1 = seldom, 2 = almost never, 3 = never). These items were divided into three subscales, each corresponding to a facet of eating behaviour: a) diet, which concerns the pathological refusal to consume high-calorie foods and preoccupations with physical appearance; b) bulimia and attention to food, which refers to binge eating episodes followed by purging behaviours for the purpose of weight loss/weight control, and c) oral self-control, which reflects self-control with regard to food and assesses the environmental and social forces that stimulate food intake. Bighetti, Santos, Santos and Ribeiro (2004); this validated the EAT-26 for female adolescents in Brazil measure has an internal consistency of .82 as measured by Cronbach's alpha. For male youths, we used the EAT-26 validated for Brazilian adolescents by Fortes, Ferreira, Amaral, Conti and Cordás (in

press); the value of internal consistency for this measure is .87. Moreover, no test-retest differences were found; thus, this measure presents acceptable reliability and reproducibility. Cronbach's alpha in the present study was .89 and .92 for female and male athletes, respectively. In the non-athlete group, Cronbach's alpha was .88 for girls and .85 for boys. Although the EAT-26 has separate validations for each gender, this tool does not differ for boys and girls. The EAT-26 score is the sum of particular scale for each scored question. Scores greater than 20 points indicate a risk for an ED (EAT+).

- Anthropometry

Body fat was assessed using the doubly indirect method by measuring the triceps and the subscapular skinfolds using manual callipers. We used Slaughter, Lohman, Boileau, Hoswill, Stillman, and Yanloan's (1988) protocol to perform this estimation. These measurements were performed using a rotational method and were collected three times to average the values. A single evaluator performed these measurements to increase assessment reliability. The technical error of measurement (TEM) was calculated according to Perini, Oliveira, Ornellas and Oliveira (2005); thus, we excluded data with a variance greater than 10%.

- Demographics

A questionnaire that assessed age, gender, type of sport and training hours/day was developed and delivered to participants prior to the EAT-26 and anthropometric measurements.

Procedures

The same procedures were performed at all locations where data were collected. After authorisation was received from the administrative board, parents meetings were announced among the target population to explain the objectives and procedures of the study and to address

student or athlete inclusion. These meetings were held during times and days that the targeted population was able to participate without interfering with their practice or school time. At the end of each meeting, participants were invited to ask questions and decided whether to participate in the study. Next, the SICs were delivered to the athletes and non-athletes. Minors were asked to return the forms signed by their guardians the following week.

The research was divided into two parts. First, the qualitative data were collected; second, the anthropometric measures were completed.

The participants received and completed the EAT 26, answered the questionnaire designed by the researcher and provided their demographic data (i.e., age, gender, type of sport and number of practice hours per week [for athletes] or physical activity frequency per week [for non-athletes]). These surveys were completed in a group and administered by researchers who used standardised verbal explanations to avoid inter-evaluator interference.

After the questionnaires were completed, the youths were led into another room, wearing comfortable clothes. In this second stage, the anthropometric data were measured individually to assure confidentiality.

Data Analyses

Measures of central tendency (mean) and dispersion (standard deviation and frequency) were used to describe the study variables. A two-way analysis of variance (ANOVA) was applied to compare age and body fat percentages by gender and group. This analysis also used the Bonferroni post hoc test to identify significant differences. A multivariate analysis of covariance (MANCOVA) was conducted for the three EAT-26 subscales with regard to age, body fat and sports type. A 2 X 2 design was adopted to test the relationship between gender and group. In addition, we conducted a logistic regression to determine the odds ratios for the

unhealthy eating behaviours of athletes versus non-athletes. The data were analysed with SPSS 17.0, adopting a significance level of 5%.

Results

Forty athletes and 68 non-athletes were excluded from the study for refusing to answer the questionnaire in its entirety or because they did not participate in the anthropometric assessment.

The descriptive statistics (means and standard deviations) of age by group and gender are shown in Table 1. The two-way analysis of variance showed that female athletes were older than their non-athlete counterparts ($F(1, 942) = 4.09$, $p = .03$). Similarly, an age difference was found between male athletes and non-athletes ($F(1, 942) = 4.83$, $p = .02$). The two-way ANOVA did not reveal an age difference between genders for the non-athlete group ($F(1, 942) = 1.36$, $p = .41$).

The results showed significant differences of group (athletes vs. non-athletes) and gender (males vs. females) with regard to body fat percentage ($F(1, 942) = 9.64$, $p = .001$). A Bonferroni post hoc test revealed that male athletes had a lower percentage of fat compared with male non-athletes ($F(1, 942) = 7.20$, $p = .04$), female athletes ($F(1, 942) = 6.15$, $p = .04$) and non-athletes ($F(1, 942) = 11.77$; $p = .01$). Furthermore, female non-athletes showed a significantly higher percentage of fat than female athletes ($F(1, 942) = 7.52$, $p = .04$) and male non-athletes ($F(1, 942) = 10.16$, $p = .04$; see Table 1).

Table 1. Mean and standard deviation of the independent variables by gender and group

Variable	Female				Male			
	Athletes		Non-athletes		Athletes		Non-athletes	
	M	SD	M	SD	M	SD	M	SD
Age	14.54[b]	1.86	12.73	1.59	15.05[b]	2.02	12.65[a,c]	1.69
%BF	23.03[b,c]	6.22	25.66[c]	7.27	18.43[d]	7.26	21.74[b]	10.26

[a] $P < 0.05$ compared to group female athletes.
[b] $P < 0.05$ compared to the group female non-athletes.
[c] $P < 0.05$ compared to group male athletes.
[d] $P < 0.05$ compared to the group male non-athletes.
%BF, body fat percentage.

We found that 18.1% of female athletes, 14.4% of male athletes, 26.1% of female non-athletes and 15.3% of male non-athletes showed ED symptoms based on their EAT-26 scores.

We also identified significant differences (F(1, 942) = 5.23, p = .01) on the EAT-26 subscales by gender and group (Table 2). Age was controlled for to demonstrate the influence of gender and group on the unhealthy eating behaviours (Fortes & Ferreira, 2011). In this sense, these findings indicate a significant influence of age (F(1, 942) = 4.36, p = .01) on EAT-26 scores. Body fat percentage was also controlled for in the analyses given its influence on the eating behaviours of adolescents (De Bruin et al., 2007). Thus, the results of the MANCOVA revealed significant effects on the study sample (F(1, 942) = 3.22, p = .02). Following the recommendations of Fortes et al. (2012) and Schaal et al. (2011), type of sport was included as a covariate, but this variable did not significantly affect EAT-26 scores (F(1, 942) = .87, p = .29).

Females had higher scores on the Diet subscale than males, regardless of group (F(1, 942) = 15.05, p = .001). However, male non-athletes showed higher scores on this subscale compared with male athletes (F(1, 942) = 7.99, p = .03). These findings indicate that females more frequently restricted their intake of high-calorie foods and were more dissatisfied with their physical appearance than males. Likewise, male non-athletes showed higher frequencies of food restriction for long periods of time and more dissatisfaction with their bodies compared with male athletes.

Importantly, female athletes showed higher scores on the Bulimia and Food Preoccupation subscale compared with the other groups ($F(1, 942) = 5.63$, $p = .03$). Male non-athletes had higher frequencies of binge eating compared with male athletes ($F(1, 942) = 9.67$, $p = .03$). These findings show that female athletes tend to have higher frequencies of binge eating followed by the use of unhealthy weight control methods compared with non-athlete adolescents and male athletes.

Finally, females had higher scores on the Oral Self-control and Diet subscales compared with males, regardless of group ($F(1, 942) = 3.55$, $p = .04$). The results also revealed that the external environment influenced females more with regard to food intake compared with males. In sum, the findings revealed that athletes, regardless of gender, were less influenced with regard to food intake than non-athletes. However, the results also indicated similarities between female athletes and non-athletes as well as between male athletes and non-athletes with regard to the environmental pressures perceived concerning food intake.

Table 2. Mean and standard deviation of the Eating Attitudes Test-26 subscales by gender and group

Variable	Female				Male			
	Athletes		Non-athletes		Athletes		Non-athletes	
	M	SD	M	SD	M	SD	M	SD
Diet	7.42[c]	0.39	7.96[d]	0.49	4.52[b,d]	0.38	6.75[a]	0.54
Bulimia	2.95[b]	0.24	2.21[c]	0.20	1.30[a,d]	0.22	1.93[a]	0.22
Oral self-control	4.61[c]	0.25	4.76[d]	0.27	3.47[b]	0.23	3.59[a]	0.30

[a] $P < 0.05$ compared to group female athletes.
[b] $P < 0.05$ compared to the group female non-athletes.
[c] $P < 0.05$ compared to group male athletes.
[d] $P < 0.05$ compared to the group non-athlete males.

Table 3 presents the results of the logistic regression model. We found that female non-athletes were 25% more likely to develop unhealthy eating habits compared with female athletes ($Wald = 27.63$, $X^2(1, 942) = 25.99$, $p = .03$). Similarly, these results were reproduced among males. In this sense, non-athletes were 36% more likely to have unhealthy eating behaviours compared with athletes ($Wald = 32.57$, $X^2(1, 942) = 31.13$, $p = .001$).

Table 3. Odds ratios for unhealthy eating behavior (reference category = negative) in adolescents divided by sex according to group (athletes vs non-athletes)

Group	Female			Male		
	OR	CI (95%)	*P*	OR	CI (95%)	*P*
Athletes	0.75	0.44–0.96	0.03	0.64	0.35–0.93	0.001
Non-athletes	1.00	—		1.00	—	

OR, odds ratio; CI, Confidence Interval.

Discussion

The present investigation compared the factors associated with unhealthy eating behaviours among young athletes and non-athletes of both genders. The findings presented in the literature are inconsistent. On one hand, research has shown that athletes have higher frequencies of unhealthy eating habits compared with non-athletes (Filaire et al., 2011; Holm-Denoma et al., 2009; Rosendahl et al., 2009; Rouveix et al., 2007; Torstveit et al., 2008). On the other hand, studies have shown more disordered eating in non-athletes (Martinsen et al., 2010; Michou & Costarelli, 2011). Furthermore, some investigations have not found differences between athletes and non-athletes with regard to unhealthy eating habits (Costarelli & Stamou, 2009).

An analysis of variance (ANOVA) revealed between-group differences with regard to the independent variables (age and body fat percentage). These findings corroborate other studies with regard to body fat percentage (Fortes et al., 2011; Martinsen et al., 2010; Rosendahl et al., 2009). Researchers have suggested that age and body fat percentage influence unhealthy eating habits among adolescents (Fortes et al.; 2012, Scherer et al., 2010). Thus, we used these variables as covariates to isolate between-group differences.

The results of the current study revealed a low prevalence (i.e., less than 20%) of unhealthy eating behaviour, with the exception of female non-athletes who showed a 26% risk for developing ED. These results corroborate the findings concerning the eating behaviours of

athletes (Fortes et al., 2012; Martinsen et al., 2010; Michou & Costarelli, 2011) and non-athletes (Alves et al., 2008; Martins et al., 2010 Scherer et al., 2010). Filaire et al. (2011) and Rouveix et al. (2007) evaluated female judo athletes and found that approximately 30% of these athletes showed unhealthy eating behaviours. Torstveit et al. (2008) found that 25% of Norwegian female athletes demonstrated unhealthy eating habits. The prevalence of the risk for ED in athletes remains mixed.

The differences among study findings might result from the use of a variety of tools and analysis methods. For example, some studies have used instruments to identify ED that focus on the symptoms of bulimia, whereas other tools assess the symptoms of anorexia. Findings generated by tailored questionnaires might be controversial. Importantly, standard questionnaires are usually intended to screen for the risk of developing ED in the general population and might not necessarily be sensitive enough to detect the symptoms of these psychopathologies in athletes. Therefore, standardising the use of tools to assess the eating behaviours of athletes would be interesting to enable future, reliable comparisons within the scientific literature.

Another interesting covariate in this literature is type of sport. Some authors have suggested that the type of sport practiced (e.g., sports with aesthetic features and sports with divisions by weight class) predisposes athletes to unhealthy eating behaviours. Thus, study results might vary based on the type of athlete recruited for the sample; furthermore, this variable might explain the controversial findings described above to some extent. In contrast, investigations of non-athletes have shown consistent results (Alves et al., 2008; Martins et al., 2010; Scherer et al., 2010). Thus, higher rates of abnormal eating attitudes are customarily found among females compared with males (Ferreira & Veiga, 2008).

This study showed that athletes had a lower score on the Diet subscale compared with female non-athletes: Dietary restrictions seem to be more common among adolescent female

non-athletes. Other studies have found this trend (Martinsen et al., 2010; Torstveit et al., 2008). Perhaps the low frequency of participation in regular physical activities predisposes females to using compensatory weight loss methods such as food restriction for long periods. In contrast, De Bruin et al. (2009) indicated that female athletes are supposedly more vulnerable to adhering to food intake restrictions as a daily behaviour because they tend to be pressured by coaches to obtain better results, especially the athletes of sports that require aesthetic projects. Therefore, this topic remains inconclusive and requires additional investigation.

A multivariate analysis of covariance revealed differences between male athletes and male non-athletes on the Diet subscale. The literature associated with these findings is inconsistent (Ferreira & Veiga, 2008; Filaire, Rouveix, Pannafieux, & Ferrand, 2007). Cultural differences can explain this variation. Brazil promotes the thin body ideal, regardless of gender; in others words, leanness is valued in men, but they must also have well-defined muscles (Miranda, Conti, Bastos, & Ferreira, 2011). However, studies have shown high numbers of overweight or obese male adolescents (Fortes et al., 2011; Fortes et al., in press). Furthermore, this study showed greater adiposity in non-athletes than athletes. Thus, young male non-athletes most likely have greater frequencies of long periods of food restriction to lose weight, believing that thinness is essential for social acceptance (Fortes & Ferreira, 2011; Martins et al., 2010).

We identified significant differences between athletes and non-athletes on the Bulimia and Food Preoccupation subscale among females. The literature has shown inconsistent findings with regard to these factors. Torstveit et al. (2008) and De Bruin et al. (2007) found that athletes were more likely to use self-induced vomiting, laxatives or diuretics for weight loss/management. However, Rosendhal et al. (2009) as well as Costarelli and Michou (2011) did not replicate these results. Thus, more research must be developed to clarify this topic. Some authors have argued that athletes who practice sports that emphasise thinness as essential

foundation for successful athletic performance are more susceptible to the symptoms of bulimia (De Bruin et al., 2009; Fortes & Ferreira, 2011). Thus, type of sport was included in the data analyses.

Our results revealed that adolescent male non-athletes presented higher scores on the Bulimia and Food Preoccupation subscale compared with young athletes. Male non-athletes are more likely to purge after binge eating. These findings corroborate those of other studies (Costarelli & Stamou, 2009; Holm-Denoma et al., 2009). However, Filaire et al. (2007) showed that male judokas and cyclists had higher frequencies of bulimic behaviours and stronger preoccupations with food than non-athletes. Other studies have shown that binge eating followed by purging behaviours for weight control are more frequent among athletes compared with non-athletes (Martinsen et al., 2010). This inconsistency reflects the variability among the sports evaluated in this research. Fortes and Ferreira (2011) indicated that sports with aesthetic features (e.g., diving and gymnastics) and those that divide athletes into weight classes (e.g., judo and taek-won-do) are risk factors for triggering unhealthy weight loss/control methods. Thus, future research should recruit and classify sample groups based on their sports' characteristics.

A MANCOVA did not reveal differences between athletes and non-athletes with regard to the Oral Self-control subscale for females. To date, no study has compared this variable between athletes and non-athletes. Therefore, our ability to compare our results with research in the scientific literature is limited. Some researchers have suggested that young people feel more pressure to change their eating habits due to the environment in which they operate. According to Fortes et al. (2012), friends and family members might predispose adolescents to unhealthy eating behaviours, depending on how their physical appearance is evaluated. Thus, the environment itself is an agent with regard to the appearance of abnormal eating attitudes, regardless of whether the adolescent is an athlete.

No differences were found between athletes and non-athletes with regard to the Oral Self-control subscale in males. The pressures perceived concerning food intake are likely similar between young male athletes and non-athletes (Costarelli & Stamou, 2009). However, Ferreira and Veiga (2008) argued that the competitive sporting environments place many demands on athletic performance, and these demands primarily stem from coaches and sponsors. Thus, these authors emphasised that athletes often feel more pressure to optimise their performances; thus, their behaviours become directed towards food to improve peak athletic performance. However, the origin of these behaviours might be associated with reduced athletic performance (e.g., overtraining syndrome, the reduction of benefits from anaerobic metabolism during competitive events in power sports, or the diminution of physiological parameters that negatively affect athletic performance) and lead to the possible consequence of ED (Torstveit et al., 2008).

The multivariate analysis of covariance also revealed gender differences with regard to the EAT-26 subscales for all athletes and the Diet and Oral Self-control subscales for non-athletes. Furthermore, we identified gender differences between athletes and non-athletes with regard to all subscales. These findings confirm those in the literature; in other words, females are more vulnerable to ED compared with males (Fortes & Ferreira, 2011; Martinsen et al., 2010; Rosendahl et al., 2009).

Finally, a logistic regression model revealed that female athletes were less likely to have unhealthy eating behaviours compared with female non-athletes. These findings were also found among males. Thus, young athletes had lower odds ratios with regard to developing unhealthy eating habits compared with non-athletes (Fortes et al., 2011). Thus, the results of this investigation contradict those of Fortes and Ferreira (2011).

The first limitation of the current study is related to the use of self-reports to guide research. Previous authors have argued that participants may not respond faithfully to questionnaires with subjective responses (Rouveix et al., 2007; Torstveit et al., 2008). On the other hand, several researchers recommend using these types of scales in studies with large samples because they are easy to apply and inexpensive (Fortes & Ferreira, 2011; Miranda et al., 2011). The second limitation was the assessment of adiposity via the doubly indirect method using skinfolds. Other researchers recommend using methods such as dual energy X-ray densitometry or bioelectrical impedance to assess body composition in athletes (Fortes et al., 2011). However, the use of such equipment has a high economic burden. Fortes et al. (2012) and De Bruin et al. (2007) recommend assessing the body fat profile of athletes using the bi-compartmental method via skinfolds. The current research is the first to recruit a sample of more than 500 Brazilian athletes and fill important gaps in knowledge with regard to their behavioural variables. This group had rarely been explored until now.

Conclusions

The results indicate that the variables associated with eating behaviour differed by gender and group (i.e., athletes vs. non-athletes): female non-athletes were at the greatest risk for developing ED. Unhealthy eating habits among females can be considered a public health problem because adolescent non-athletes are at risk to adopt unhealthy attitudes and behaviours (e.g., misguided diets).

Investments in assessment programs and nutritional education are recommended, both in athletics and in schools, to promote changes in food concepts and beliefs. Furthermore, new studies should be conducted to continue to understand the origins and consequences of unhealthy eating behaviours in adolescents. These studies should account for the possible variables that influence these habits such as friends and sociocultural issues.

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