

Body dissatisfaction among artistic gymnastics adolescent athletes and non-athletes

Insatisfação corporal de adolescentes atletas e não atletas de ginástica artística

Clara Mockdece Neves¹
Juliana Fernandes Filgueiras Meireles¹
Pedro Henrique Berbert de Carvalho²
Sebastião Sousa Almeida³
Maria Elisa Caputo Ferreira¹

Abstract – The evaluation of psychological factors can help preventing eating disorders in athletes. This study aimed to verify possible links between body dissatisfaction and media influence, perfectionism, mood and risk behavior for eating disorders and to compare the study variables among artistic gymnastics elite and non-elite athletes and non-athletes. Participants were 413 adolescents of both sexes (elite and non-elite athletes and non-athletes), aged 10–18 years (mean age 12.86 ± 1.80). BSQ, EAT-26, SATAQ-3, MPS and BRUMS were applied to evaluate body dissatisfaction, risk behavior for eating disorders, media influence, perfectionism and mood, respectively. Anthropometric data were collected to estimate body mass index (BMI) and body fat percentage (%BF). Descriptive statistical, comparative and correlational analyses were held. Only EAT-26 influenced BSQ in the three groups. In non-athletes, BMI, BRUMS and SATAQ-3 added explanation to the model. For non-elite athletes, %BF, media influence and mood were also predictors of body dissatisfaction. Elite athletes had lower BMI and %BF than the others. Non-athletes had lower perfectionism scores while non-elite athletes had lower mood scores. It could be concluded that the risk behavior for eating disorders is the factor most strongly related to body dissatisfaction among elite and non-elite athletes and non-athletes.

Key words: Adolescents; Body image; Eating disorders; Mood disorders.

Resumo – A avaliação de fatores psicológicos pode auxiliar na prevenção de transtornos alimentares em atletas. Objetivou-se verificar possíveis relações entre a insatisfação corporal e influência da mídia, perfeccionismo, estado de humor e comportamento de risco para transtorno alimentar, bem como comparar as variáveis de estudo entre praticantes de ginástica artística de base e de alto rendimento e não atletas. Participaram da pesquisa 413 adolescentes de ambos os sexos (atletas de alto rendimento e de base e não atletas), com idade entre 10 e 18 (média de $12,86 \pm 1,80$) anos. Foram aplicados: BSQ, EAT-26, SATAQ-3, MPS e BRUMS para avaliar insatisfação corporal, comportamento de risco para transtorno alimentar, influência midiática, perfeccionismo e estado de humor, respectivamente. Foram coletados dados antropométricos para estimar o Índice de Massa Corporal (IMC) e o Percentual de Gordura (%G). Foram realizadas análises estatísticas descritivas, comparativas e correlacionais. Somente o EAT-26 influenciou o BSQ nos três grupos avaliados. Em não atletas, IMC, BRUMS e SATAQ-3 acrescentaram explicação ao modelo. Para os atletas de base, %G, influência da mídia e estado de humor também foram preditores para a insatisfação corporal. Os atletas de alto rendimento tiveram menores valores de IMC e %G do que os demais. Os não atletas apresentaram menores escores para o perfeccionismo, enquanto os atletas de base menores pontuações para o estado de humor. Conclui-se que o comportamento de risco para transtorno alimentar é o fator que se relaciona mais fortemente com a insatisfação corporal em atletas de base, de alto rendimento e em não atletas.

Palavras-chave: Adolescente; Imagem corporal; Transtornos da alimentação; Transtornos do humor.

1 Federal University of Juiz de Fora. Graduate Program in Psychology. Juiz de Fora, MG, Brazil.

2 Federal University of Juiz de Fora. Faculty of Physical Education and Sports. Campus of Governador Valadares. Governador Valadares, MG, Brazil.

3 University of São Paulo. Faculty of Philosophy, Sciences and Letters of Ribeirão Preto. Ribeirão Preto, SP, Brazil.

Received: June 16, 2015
Accepted: October 20, 2015



Licença
Creative Commons

INTRODUCTION

Artistic gymnastics is a sport of early specialization, in which high-performance training begins in adolescence^{1,2}. In this aesthetic sport^{2,3}, there is demonstration and exhibition of the best performance. Mistakes are allowed, but every failure is deducted from the final score². So, it is an environment filled with charges, depending on the category in which the practitioner is inserted.

Since it is a sport in which body is in focus, aesthetic standards of thinness and low body fat are required from athletes - as the standard propagated by the media⁴⁻⁶, which can affect the body image of these athletes³. This construct is defined as the mental representation of the own body and is related to social, emotional, physiological factors and also to the environment in which the individual is inserted⁷. One of the aspects of body image, body dissatisfaction, is the negative subjective evaluation of the own body⁷.

Charges performed by extrinsic and intrinsic agents seem to influence the relationship of the artistic gymnastics practitioner with his own body^{2,3}. Furthermore, personality traits may be associated with negative body image^{2,8,9}. Perfectionism, for example - high requirement levels¹⁰ - may lead to concern about imperfections of body shape and weight⁹. In addition, the psychological state - set of positive and negative feelings¹¹ - can generate dissatisfaction with physical appearance². However, studies on the relationship of these variables with body image are recent in literature.

Investigations have associated risk behaviors for eating disorders and body dissatisfaction in athletes^{12,13}. This behavior is characterized by deleterious eating behaviors^{13,14}, which can trigger anorexia and bulimia nervosa. Thus, evaluating these factors can help preventing future eating disorders. Previous national studies evaluating artistic gymnastics athletes did not take into account the category in which the athlete was inserted^{11,15}. It is possible that the competitive environment and the performance requirement of elite athletes more strongly influence negative feelings in relation to their body when compared to those who do not compete at high level. In addition, the evaluation of a control group composed of non-athletes can help understanding the process of body dissatisfaction in athletes. Thus, studies assessing psychological factors and verifying possible differences between elite and non-elite athletes and non-athletes are still lacking in literature.

Thus, the aim of this study was to investigate possible relationships between body dissatisfaction and media influence, perfectionism, mood state and risk behavior for eating disorders and to compare these variables between artistic gymnastics elite and non-elite athletes and a control group.

METHODOLOGICAL PROCEDURES

The study was approved by the Ethics Committee for Research on Human Beings of the Federal University of Juiz de Fora, protocol number 337.127 (registration 14406513.9.0000.5147).

A cross-sectional study was conducted in the Artistic Gymnastics Training Center of Três Rios -RJ, which received during the year 2014, elite athletes who represented Brazil in national and international competitions, characterized as reference for this sport. According to Malina et al.¹, artistic gymnastics elite athletes trained on average 30 hours per week. Thus, this value was used to classify the category of athletes into two groups (elite and non-elite athletes). As this cut-off point can be considered strict, only 40 athletes met these criteria, and they all voluntarily agreed to participate in this research.

All other adolescents who participated in the project were classified as non-elite athletes. Sample calculation considered all students enrolled in the Artistic Gymnastics project of Três Rios RJ aged 10-18 years in 2014 (n = 470). The prevalence of body dissatisfaction adopted for sample calculation was 31.9% - average values found in Brazilian studies with similar populations^{2,3,16}. Adopting 95% as confidence interval, and 5% as sampling error, we came to an ideal minimum sample of 100 athletes. The possibility of losses or refusals around 30% was considered raising the minimum sample to 130 adolescents. In addition, it was attempted to extrapolate this value, collecting the highest number as possible of non-elite athletes (n = 281), with 60% adherence percentage.

A control group was established in order to compare the study variables among adolescents who did not exercise and elite and non-elite athletes. Thus, adolescents from a public school in the same city and the same age group athletes (10-18 years) were included in this group. The participating school had, in 2014, 8 classes of adolescents at this age group, with approximately 40 students per class (n = 320). All students who were present in classroom at the time of data collection were invited to participate. Those whose parents agreed to participate and agreed to be volunteers in the survey answered the questionnaires. As the intention of researchers was to obtain information regarding non-athlete adolescents, those who were involved in any regular physical activity program were excluded. Thus, the adhesion percentage for this group was 67%, so that data from 217 adolescents were collected.

The study included adolescents who were enrolled and regularly attending classes in the Artistic Gymnastics Project (elite and non-elite athletes) and in the participating school (control group of non-athletes) during the data collection phase; who presented the Informed Consent Form (ICF) signed by parents / guardians; who agreed to participate by signing the Consent Form (CF); and had availability to answer the questionnaires and perform anthropometric assessments. Subjects who for some reason did not participate in any stage of data collection, as well as pregnant students or people with disabilities were excluded.

Initially, adolescents answered a sociodemographic questionnaire, used to access information about age and physical activity level (practice or not, hours of weekly training and competitive level) in order to characterize the volunteers as elite and non-elite athletes or non-athlete.

The Body Shape Questionnaire (BSQ) was used to evaluate body dissatisfaction¹⁷. It is a questionnaire consisting of 34 items on a 6-point Likert scale (“never” to “always”). The final score is the sum of items and can range from 34 to 204, and from 81 points, the higher the total score, the greater the body dissatisfaction. Cronbach’s alpha showed high value for the study sample ($\alpha = 0.91$).

The Sociocultural Attitudes Towards Appearance Questionnaire-3 (SATAQ-3) was used to assess the influence of media, sport and exercise on body image⁵. This questionnaire has been validated for the Brazilian university population⁴. The instrument has already been assessed for the Brazilian adolescent population, showing good indicators of validity and reliability⁵ and has not undergone changes for this population. The questionnaire consists of 30 items on a 6-point Likert scale (“totally disagree” to “completely agree”). The total score is calculated by adding the responses, ranging from 30 to 150 points. The higher the score, the greater the influence of socio-cultural aspects on body image. For the present sample, Cronbach’s alpha was considered adequate ($\alpha = 0.80$).

The Eating Attitudes Test-26 (EAT-26) was used to verify the existence of risk behavior for eating disorders¹⁸. The questionnaire consists of 26 questions, with six response options in the Likert form of points, from 0 (rarely, almost never and never) to 3 (always). The total score is calculated by the sum of items, ranging from 0 to 78. From 21 points, the higher the score, the higher the risk of eating disorders. For the sample in question, the instrument obtained good internal consistency ($\alpha = 0.83$).

The Multidimensional Perfectionism Scale (MPS) was used to access the perfectionism levels¹⁰. It consists of 45 items on a 7-point Likert scale (“Strongly disagree” to “completely agree”). The final score is obtained by the sum of items, ranging from 45 to 315 points. The higher the score, the higher the perfectionism traits. Its internal consistency analysis revealed alpha of 0.66.

The Brunel Mood Scale (BRUMS) was applied to measure mood¹¹. The scale consists of 24 simple mood indicators in a Likert scale from 0 (none) to 4 (extremely). The total mood disorder is calculated by the sum of negative factors, subtracting the scores of positive factors. The total score ranges from -16 to 64, and the higher the value obtained, the higher the total mood disorder. The internal consistency for the study sample was $\alpha = 0.77$.

Anthropometric data of body weight, height and skinfolds (triceps and subscapular) were also collected through portable digital scale, portable stadiometer and properly calibrated compass. Body Mass Index (BMI) was obtained by dividing body mass by the squared height (kg / m^2). To estimate body fat percentage (%BF), the Slaughter et al.¹⁹ protocol for adolescents was used.

Regarding procedures, contact was made with the coordination of the Artistic Gymnastics Project and with the school Principal to explain the study objectives and methods and request authorization to carry out the study. After consent, the best days and schedules for data collection were established.

During data collection, the study objectives and methods were explained to students and parents, who received the CF and ICF, respec-

tively. After CF and ICF being signed and returned, data collection was performed by the same researcher without the presence of parents and in reserved and appropriate location for completing the questionnaires. In addition, the collection was divided into two stages: 1) application of sociodemographic questionnaire, BSQ, EAT-26 and anthropometric assessments; and 2) application of SATAQ-3, MPS and BRUMS. It is noteworthy that all three groups answered the same instruments in order to compare the psychological factors among them.

All students who met the inclusion criteria were invited to participate as volunteers. However, those who missed one day of collection were excluded. Sampling took place between February and April 2014.

SPSS 19.0 software was used and significance level of $p < 0.05$ was adopted. Central tendency (mean) and dispersion (standard deviation) were also used. For all instruments, Cronbach's alpha was calculated. The Komolgorov-Smirnov test indicated data normality. The one-way ANOVA analysis of variance compared the research variables depending on the competitive level, according to *post hoc* Bonferroni. The Pearson correlation found relationship among evaluated parameters. Finally, the multiple forward linear regression analysis found how much study variables influence body dissatisfaction.

RESULTS

The study included 540 adolescents of both sexes. However, in the control group, 80 adolescents were physically active and therefore were excluded. In addition, nine non-athletes and 38 non-elite athletes were excluded due to incomplete data. Thus, the final sample consisted of 413 adolescents: 40 elite athletes (37 girls - 92.5%); 245 non-elite athletes (207 girls - 84.49%) and 128 non-athlete adolescents (60 girls - 46.88%). Table 1 shows descriptive data and comparison of the three groups. BSQ and EAT-26 were similar among groups.

Table 1. Descriptive analysis of the study variables

	Control group		Non-elite athletes		Elite athletes		F	p-value
	Mean	SD	Mean	SD	Mean	SD		
Age	13.29	1.61	12.57	1.84	13.33	1.86	-	-
BMI	21.07	4.59	19.34	3.28	18.15	2.11	13.665	0.0001*
%BF	25.44	12.03	25.06	9.08	11.69	4.37	34.375	0.0001*
BSQ	68.63	27.00	66.16	25.81	65.18	24.34	0.466	0.628
EAT-26	17.54	13.51	16.24	11.58	18.90	11.17	1.079	0.341
SATAQ-3	75.12	15.78	78.63	17.61	72.78	15.32	3.198	0.042*
MPS	176.60	19.40	185.71	25.33	185.50	22.21	6.675	0.001*
BRUMS	7.23	12.86	4.12	10.83	10.18	11.04	6.463	0.002*

SD - standard deviation; BMI - body mass index; %BF - body fat percentage; BSQ - Body Shape Questionnaire; EAT-26 - Eating Attitudes Test - 26; SATAQ-3 - Sociocultural Attitudes Towards Appearance Questionnaire-3; MPS - Multidimensional Perfectionism Scale; BRUMS - Brunel Mood Scale. * Significant at $p < 0.05$.

After comparing groups, *post hoc* Bonferroni was used for variables with statistically significant differences. Non-athletes had higher BMI than non-elite athletes ($p = 0.0001$) and elite athletes ($p = 0.0001$). For %BF, elite athletes had significantly less body fat than non-athletes ($p = 0.0001$) and non-elite athletes ($p = 0.0001$). Non-athletes had lower perfectionism score than non-elite athletes ($p = 0.001$), and the latter had lower total mood disorder score than elite athletes ($p = 0.007$) and non-athletes ($p = 0.041$). For the media influence on body standards, no differences were identified.

For the Pearson correlation analysis, the three groups were considered separately (Table 2).

Table 2. Association among study variables through the Pearson test (r).

Variables	BMI	%F	BSQ	SATAQ-3	EAT-26	MPS	BRUMS
Control Group							
BMI	-						
%BF	0.814*	-					
BSQ	0.370*	0.360*	-				
EAT-26	0.176*	0.059	0.375*	-			
SATAQ-3	0.008	0.058	0.238*	0.180*	-		
MPS	0.018	0.022	0.158	0.070	0.232*	-	
BRUMS	0.109	0.191*	0.370*	0.118	0.063	0.008	-
Non-elite athletes							
BMI	-						
%BF	0.827*	-					
BSQ	0.261*	0.308*	-				
EAT-26	0.097	0.173*	0.515*	-			
SATAQ-3	0.057	0.036	0.289*	0.326*	-		
MPS	0.019	-0.026	0.081	0.203*	0.340*	-	
BRUMS	-0.003	0.011	0.189*	0.086	0.124	0.003	-
Elite athletes							
BMI	-						
%BF	0.697*	-					
BSQ	0.262	0.159	-				
EAT-26	0.128	0.259	0.737*	-			
SATAQ-3	0.174	-0.24	0.403*	0.308	-		
MPS	0.231	0.117	0.294	0.239	0.182	-	
BRUMS	0.260	0.174	0.032	0.008	0.067	-0.261	-

BMI - body mass index; %BF – Body Fat Percentage; BSQ - Body Shape Questionnaire; EAT-26 - Eating Attitudes Test-26; SATAQ-3 - Sociocultural Attitudes Towards Appearance Questionnaire-3; MPS - Multidimensional Perfectionism Scale; BRUMS - Brunel Mood Scale. * Significant at $p < 0.05$

From associations demonstrated above, three multiple forward linear regression analyses were performed, having BSQ scores as a criterion variable, one for each evaluated group. The scales with higher association levels with BSQ were the first to be introduced in the regression model.

It is noteworthy that %BF, BMI and SATAQ-3 did not add explanation to the models of non-athletes, non-elite and elite athletes, respectively.

Table 3. Forward linear regression analysis using the BSQ scores as a criterion variable.

	Block	R ²	R ² adjusted	F	p
Non-athletes					
EAT-26	1	0.141	0.134	20.62	0.0001*
BMI	2	0.236	0.224	19.29	0.0001*
BRUMS	3	0.327	0.310	20.06	0.0001*
SATAQ-3	5	0.355	0.334	16.92	0.0001*
Non-elite athletes					
EAT-26	1	0.265	0.262	87.64	0.0001*
%BF	2	0.314	0.309	55.48	0.0001*
SATAQ-3	3	0.332	0.324	39.93	0.0001*
BRUMS	5	0.350	0.339	32.267	0.0001*
Elite athletes					
EAT-26	1	0.543	0.531	45.08	0.0001*

BMI - body mass index; %BF – Body Fat Percentage; BSQ - Body Shape Questionnaire; EAT-26 - Eating Attitudes Test-26; SATAQ-3 - Sociocultural Attitudes Towards Appearance Questionnaire-3; MPS - Multidimensional Perfectionism Scale; BRUMS - Brunel Mood Scale. * Significant at $p < 0.05$

DISCUSSION

Sports training programs often prioritize the technical aspect at the expense of the psychological aspect. However, it is important to consider the mental aspect of athletes in order to prevent the development of psychopathologies²⁰. Therefore, the main aim of this study was to investigate the relationship between body dissatisfaction and media influence, perfectionism, mood state and risk behavior for eating disorders.

From the linear regression for the group of non-athletes, EAT-26, BMI, BRUMS and SATAQ-3 together explained 33.4% of body dissatisfaction variance. The relationship of these variables with body dissatisfaction has been individually verified in samples of adolescents^{2,5,21,22}. Although this group does not suffer pressure in search of an ideal body, the results of this study indicate that body dissatisfaction is related to risk behaviors for eating disorders, nutritional and mood status and media influence, similar to relations established in the group of non-elite athletes.

In the second regression model (non-elite athletes), risk behavior for eating disorders, %BF, media influence and mood state explained together 33.9% of body dissatisfaction variance. It is noteworthy that, compared to the regression model for non-athletes, body fat replaced BMI as an explanatory variable for non-elite athletes. The authors point out that %BF is more reliable for the evaluation of anthropometric factors in athletes^{23,24}. However, the use of %BF is recommended for assessing body composition in athletes.

In the last regression analysis (elite athletes), 54.3% of the body dissatisfaction variance was explained only by risk behavior for eating disorders. It is possible that body dissatisfaction in elite athletes is more strongly influenced by the adoption of deleterious eating behaviors due to the specific characteristics of the sport environment^{9,13,23}, for example, pressures to maintain body weight and clothing highlighting body^{2,9}. Thus, coaches

should guide their athletes to reduce body dissatisfaction warning them for the possibility of developing eating disorders.

From the three regressions performed, the influence of risk behavior for eating disorder on body dissatisfaction increased gradually as the competitive level also increased. Thus, EAT-26 predicted in 13.4%, 26.2% and 54.3% of BSQ in non-athletes, non-elite and elite athletes, respectively. It was observed that in the first two groups, other variables added explanation to the model, while in the third, risk behavior for eating disorders was the only explanatory variable. The relationship between BSQ and EAT-26 was expected given that body dissatisfaction is diagnostic criteria for eating disorders¹⁴. In addition, literature has already shown these relationships in athletes^{22,25,26}. It seems that the competitive level somehow interferes with the magnitude of the relationship among these variables and therefore it should be controlled in future studies.

As second premise, this study aimed to compare the study variables between non-athletes and artistic gymnastics elite and non-elite athletes. Although the three groups showed body composition compatible with healthy standards, statistical differences were identified among them. elite and non-elite athletes had lower BMI than non-athletes. Regarding %BF, the analysis pointed to lower body fat in elite athletes. National and international studies^{13,16,27,28} that compared aesthetic sports athletes with non-athletes also showed lower body weight in the group of athletes. This is an expected pattern, since the maintenance of low body weight is a limiting factor for participation in the context of aesthetic competitive sports. Furthermore, exercise intensity also contributes to low body fat¹.

The results also showed differences among groups for MPS and BRUMS. Non-athlete adolescents had lower perfectionism value than non-elite athletes. Herbrich et al.²⁵ found no difference between a group of female dancers and control adolescents for this variable. Despite the fact that artistic gymnastics requires perfection in the execution of movements, elite athletes did not seem to have higher perfectionism scores when compared to the other groups. In addition, non-elite athletes had lower total mood disorder score than non-athletes and elite athletes. In this sense, Rosendahl et al.²² pointed out that participation in non-competitive sports may be considered a protective factor against the development of psychological disorders. The practice of artistic gymnastics should be encouraged among adolescents, especially in the early categories due to physical and psychological benefits.

Although no statistical differences for SATAQ-3 were found (by *post hoc* Bonferroni), elite athletes had lower mean value in this instrument. This may mean that they are less influenced by social body standards. Due to their training routine, elite athletes usually have their daily lives controlled by and directed to training, reducing their free time¹. Thus, these individuals are less exposed to television, which emphasizes the ideal body recommended by society and, in addition, other pressures may be more relevant to them, such as result and performance. These relationships deserve to be better studied in future studies.

Finally, there was no difference between BSQ and EAT-26 scores in the study groups. It has been initially hypothesized that elite athletes, for being exposed to external social pressure of the thin body ideal and also pressure from the competitive environment, could have more negative feelings related to body. However, this hypothesis was not confirmed, that is, all three groups showed similar BSQ and the EAT-26 scores. Studies comparing athletes of aesthetic sports and non-athletes corroborate these findings^{16,20,22,29}. It seems that although exposed to different risk factors, adolescents care about their body and maintain similar eating habits. However, other studies have indicated that participation in aesthetic sports can be a risk factor for the development of body dissatisfaction and eating disorders^{21,25}. These controversies deserve attention from researchers in future studies.

Some limitations should be pointed out. The authors question the reliability of the use of self-reported instruments in athletes^{13,28,29} and the cross-sectional design, due to the inability to infer causality. However, recent studies in athletes have used these methods^{22,24,28}. In addition, MPS was originally validated for students aged 17-51 years¹⁰ and, in this research, this instrument was applied to adolescents from 10 years. However, its internal consistency was evaluated and deemed appropriate³⁰.

Finally, the imbalance between the number of girls and boys evaluated among athletes should be emphasized. However, in addition to being an inherent characteristic of this sport, the training center where the research was conducted had focus on women's gymnastics. Moreover, the authors are aware that in the control group, female predominance was not maintained: the percentage of non-athlete boys and girls was similar. However, data collection in the school context sought to evaluate all individuals who were present at that time in the classroom, impairing the exclusion of some boys. In addition, due to the lack of studies with this population, the authors deemed it important to keep the male sample, which is known to be poorly studied^{2,3,7}.

Further studies should assess genders separately, and longitudinal studies should be conducted with athletes, as psychological factors may change depending on the competitive period.

CONCLUSION

It follows that only the risk behavior for eating disorders influenced body dissatisfaction in the three groups analyzed. However, other variables predicted body dissatisfaction in non-athletes and non-elite athletes. In addition, elite athletes had lower BMI and %BF than the other groups. The control group had lower perfectionism scores while non-elite athletes had lower total mood disorder scores.

From the practical point of view, it is important that teachers and coaches have in mind some factors that can influence the physical and mental well-being of adolescent athletes and non-athletes. These factors include the maintenance of weight and body fat in the physical context,

and body dissatisfaction at the psychological context. In this case, the present study demonstrated that risk behaviors for eating disorders were especially related to body dissatisfaction. Thus, small demonstrations of changes in the relationship of adolescents with food may be due to dissatisfaction with their own bodies. Thus, evaluations and nutritional and psychological guidance as well as multidisciplinary intervention measures are recommended to detect and prevent psychopathologies.

REFERENCES

1. Malina RM, Baxter-Jones AD, Armstrong N, Beunen GP, Caine D, Daly RM, et al. Role of intensive training in the growth and maturation of artistic gymnasts. *Sports Med* 2013;43(9):783-802.
2. Neves CM, Fortes LS, Filgueiras JF, Ferreira MEC. Comportamentos alimentares em ginastas de elite: associação com o perfeccionismo e o estado de humor. *Rev Edu Fís/UEM* 2013;24(3):359-69.
3. Fortes LS, Neves CM, Filgueiras JF, Almeida SS, Ferreira MEC. Insatisfação corporal, comprometimento psicológico ao exercício e comportamento alimentar em jovens atletas de esportes estéticos. *Rev Bras Cineantropom Desempenho Hum* 2013;15(6):695-704.
4. Amaral ACS, Ribeiro MS, Conti MA, Ferreira CS, Ferreira MEC. Psychometric evaluation of the Sociocultural Attitudes Towards Appearance Questionnaire-3 among Brazilian young adults. *Span J Psychol* 2013;16(e94):1-10.
5. Amaral ACS, Conti MA, Filgueiras JF, Ferreira MEC. Qualidades Psicométricas do Questionário de Atitudes Socioculturais em relação à aparência-3 (SATAQ-3) entre adolescentes. *Psic: Teor e Pesq* 2015;31(4):471-79.
6. Fortes LS, Ferreira MEC, Filgueiras JF, Neves CM, Paes ST, Almeida SS. Relationship between body image and overall and athletic internalization in young track and field female athletes. *Rev Bras Cineantropom Desempenho Hum* 2015;17(4):428-37.
7. Laus MF, Kakeshita IS, Costa TMB, Ferreira MEC, Fortes LS, Almeida SS. Body image in Brazil: recent advances in the state of knowledge and methodological issues. *Rev Saúde Pública* 2014;48(2):331-46.
8. Filaire E, Rouveix M, Pannafieux C, Ferrand C. Eating attitudes, perfectionism and body-esteem of elite male judoists and cyclists. *J Sports Sci Med* 2007;6(1):50-7.
9. Schaal K, Tafflet M, Nassif H, Thibault V, Pichard C, Toussaint J. Psychological balance in high level athletes: Gender-based differences and sport-specific patterns. *PLoS One* 2011;6(5):1-9.
10. Soares MJ, Gomes AA, Macedo AF, Azevedo MHP. Escala Multidimensional de Perfeccionismo: Adaptação à população portuguesa. *Rev Portuguesa Psicossom* 2003;5(1):46-55.
11. Rohlf's ICPM, Rotta TM, Luft CB, Andrade A, Krebs RJ, Carvalho T. A Escala de Humor de Brunel (BRUMS): Instrumento para detecção precoce da síndrome do excesso de treinamento. *Rev Bras Med Esporte* 2008;14(3):176-81.
12. Fortes LS, Almeida SS, Ferreira MEC. Influência da ansiedade nos comportamentos de risco para os transtornos alimentares em ginastas. *Rev Bras Ativ Fis Saúde* 2013;18(5):546-53.
13. Fortes LS, Kakeshita IS, Almeida SS, Gomes AR, Ferreira MEC. Eating behaviours in youths: A comparison between female and male athletes and non-athletes. *Scand J Med Sci Sports* 2013;24(1):e62-e68.
14. Leal GVS, Philippi ST, Polacow VO, Cordás TA, Alvarenga MS. O que é comportamento de risco para transtornos alimentares em adolescentes? *J Bras Psiquiatr* 2013;62(1):62-75.
15. Fortes LS, Almeida SS, Ferreira MEC. A internalização do ideal de magreza

- afeta os comportamentos alimentares inadequados em atletas do sexo feminino da ginástica artística? *Rev Edu Fis/UEM* 2014;25(2):181-91.
16. Vieira JLL, Vieira LF, Amorim HZ, Rocha PGM. Distúrbios de atitudes alimentares e sua relação com o crescimento físico de atletas paranaenses de ginástica rítmica. *Motriz* 2009;15(3):552-61.
 17. Conti MA, Cordás TA, Latorre MRDO. Estudo de validade e confiabilidade da versão brasileira do Body Shape Questionnaire (BSQ) para adolescentes. *Rev Bras Saude Mater Infant* 2009;9(3):331-8.
 18. Bighetti F, Santos CB, Santos JE, Ribeiro RPP. Tradução e avaliação do Eating Attitudes Test em adolescentes do sexo feminino de Ribeirão Preto, São Paulo. *J Bras Psiquiatr* 2004;53(6):339-46.
 19. Slaughter MH, Lohman TG, Boileau RA, Horswill CA, Stillman RJ, Van Loan MD, et al. Skinfold equations for estimation of body fatness in children and youth. *Hum Biol* 1988;60(3):709-23.
 20. Klinkowski N, Korte A, Pfeiffer E, Lehmkühl U, Salbach-Andrae H. Psychopathology in elite rhythmic gymnasts and anorexia nervosa patients. *Eur Child Adolesc Psychiatry* 2008;17(2):108-13.
 21. Ferrand C, Champely S, Filaire E. The role of body esteem in predicting disordered eating symptoms: A comparison of French aesthetic athletes and non-athletic females. *Psychol Sport Exerc* 2009;10(3):373-80.
 22. Rosendahl J, Bormann B, Aschenbrenner K, Aschenbrenner F, Strauss B. Dieting and disordered eating in German high school athletes and non-athletes. *Scand J Med Sci Sports* 2009;19(5):731-9.
 23. Fortes LS, Almeida SS, Ferreira MEC. Indicadores antropométricos de insatisfação corporal e de comportamentos alimentares inadequados em jovens atletas. *Rev Bras Med Esporte* 2013;19(1):35-9.
 24. Tortveit MK, Sundgot-Borgen J. Are under- and overweight female elite athletes thin and fat? A controlled study. *Med Sci Sports Exerc* 2012;44(5):949-57.
 25. Herbrich L, Pfeiffer E, Lehmkühl U, Schneider N. Anorexia athletica in pre-professional ballet dancers. *J Sports Sci* 2011;29(11):1115-23.
 26. Krentz EM, Warschburger P. Sports-related correlates of disordered eating in aesthetic sports. *Psychol Sport Exerc* 2011;12(4):375-82.
 27. Martinsen M, Sundgot-Borgen J. Higher prevalence of eating disorders among adolescent elite athletes than controls. *Med Sci Sports Exerc* 2013;45(6):1188-97.
 28. Torstveit MK, Rosenvinge JH, Sundgot-Borgen J. Prevalence of eating disorders and the predictive power of risk models in female elite athletes: A controlled study. *Scand J Med Sci Sports* 2008;18(1):108-18.
 29. Monthuy-Blanc J, Maiano C, Therme P. Prevalence of eating disorders symptoms in non-elite ballet dancers and basketball players: An exploratory and controlled study among French adolescent girls. *Rev Epidemiol Sante Publique* 2010;58(6):415-24.
 30. Streiner DL. Starting at the beginning: An introduction to coefficient alpha and internal consistency. *J Pers Assess* 2003; 80(1):99-103.

CORRESPONDING AUTHOR

Clara Mockdece Neves
Rua Belo Horizonte 85, apto 501
São Mateus, Juiz de Fora, MG,
Brasil.
CEP 36.016-430
E-mail: clarinhamockdece@hotmail.
com