

Are inappropriate eating behaviors and anxiety related with track and field in adolescent athletes?

Comportamentos alimentares inadequados e ansiedade estão relacionados com atletismo em atletas adolescentes?

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ABSTRACT

Objective

The study analyzed the relationship between anxiety and inappropriate eating behaviors in adolescent female athletes.

Methods

Eighty-eight track and field athletes aged 12 to 17 years participated in the study. We used the Eating Attitudes Test-26 subscales to assess inappropriate eating behaviors and the Brazilian State - Trait Anxiety Inventory subscales to assess State and Trait anxiety.

Results

State - Trait Anxiety Inventory - State ($p=0.18$) or State - Trait Anxiety Inventory - Trait ($p=0.14$) had no significant influence on the Dieting subscale score. The Bulimia and Food Preoccupation subscale score was also not influenced by State - Trait Anxiety Inventory - State ($p=0.25$) or State - Trait Anxiety Inventory - Trait ($p=0.21$). However, State - Trait Anxiety Inventory - Trait ($p=0.048$) had a significant impact on the Oral Control subscale score, but State - Trait Anxiety Inventory - State ($p=0.19$) did not explain its variance.

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Conclusion

Only State - Trait Anxiety Inventory - Trait was related to oral control and the environmental and social forces that encourage food intake in female athletes.

Indexing terms: Anxiety. Athletes. Eating disorders. Track and field.

RESUMO

Objetivo

O objetivo deste estudo foi analisar a relação da ansiedade com os comportamentos alimentares inadequados em atletas adolescentes do sexo feminino.

Métodos

Participaram 88 atletas de atletismo com idade entre 12 e 17 anos. Utilizaram-se as subescalas do Eating Attitudes Test para avaliar o comportamento alimentar. As subescalas de Avaliação do Inventário de Ansiedade Traço-Estado foram utilizadas para avaliar a ansiedade estado e traço.

Resultados

Os achados não apresentam influência estatisticamente significativa da Avaliação do Inventário de Ansiedade Traço - Estado ($p=0,18$), nem da Avaliação do Inventário de Ansiedade Traço - Traço ($p=0,14$) sobre os escores da subescala Dieta. A respeito da subescala Bulimia e Preocupação com Alimento, os resultados não apontaram influência estatisticamente significativa da Avaliação do Inventário de Ansiedade Traço - Estado ($p=0,25$) e da Avaliação do Inventário de Ansiedade Traço - Traço ($p=0,21$). Em relação à subescala Autocontrole Oral, a Avaliação do Inventário de Ansiedade Traço - Traço demonstrou impacto significativo ($p=0,048$), enquanto a Avaliação do Inventário de Ansiedade Traço - Estado ($p=0,19$) não explicou sua variância.

Conclusão

Concluiu-se que apenas a Avaliação do Inventário de Ansiedade Traço - Traço esteve relacionada ao autocontrole em relação à comida e às forças ambientais e sociais estimulantes à ingestão alimentar nessas atletas.

Termos de indexação: Ansiedade. Atletas. Transtornos alimentares. Atletismo.

INTRODUCTION

Inappropriate Eating Behaviors (IEB) are classified as health-damaging behaviors^{1,2}. Long-term food restriction, the use of laxatives and diuretics, self-induced vomiting, binge eating, and the use of anabolic-androgenic steroids are some examples of IEB^{3,4}. Schaal *et al.*⁵ consider IEB the main symptoms of eating disorders, such as anorexia nervosa and bulimia nervosa. The prevalence of IEB in Brazil varies from 10 to 20%^{6,7}. It is higher in adolescents^{8,9}, especially female adolescents¹⁰, and even higher in athletes^{5,11-13}, affecting approximately 50% of this population^{3,14}.

Competition sports have many requirements to optimize performance^{2,4}, which may somehow encourage athletes to adopt IEB. Fortes *et al.*¹⁵ point out that coaches are the main

promoters of vulnerability to IEB. These same authors claim that coaches' demands for better performance are excessive. However, food restriction and self-induced vomiting may reduce athletes' anaerobic power¹⁶. In this sense, some track and field athletes (100 meters, 200 meters, 100-meter hurdles, pole vault, long jump) whose performance is determined by anaerobic power can damage their careers by engaging in IEB daily.

Moreover, competition sports generate psychological stress in athletes¹⁷ and psychological stress may increase anxiety¹⁸. Anxiety, an emotional state, is divided into state anxiety and trait anxiety⁴. State anxiety refers to a transitory emotional state characterized by subjective feelings or tension of varying intensity and duration. Trait anxiety regards the stable relation of responding to stress and a tendency to perceive stress- or tension-generating situations.

Anxiety has been related to IEB in athletes. Gomes *et al.*¹⁹ studied male and female Portuguese Karate, Taekwondo, swimming, basketball, handball, and volleyball athletes and found that IEB frequency increased with anxiety. Vargar *et al.*²⁰, who studied male and female Turk basketball, volleyball, swimming, track and field, wrestling, handball, rhythmic gymnastics, tennis, Taekwondo, and dance athletes, and Silva *et al.*¹², who studied male and female Portuguese handball, basketball, volleyball, swimming, track and field, Taekwondo, and karate athletes, found that athletes at risk of developing eating disorders experienced more anxiety than those not at risk. On the other hand, Rouveix *et al.*⁴ did not find a relationship between anxiety and IEB in male French judo athletes. However, all these studies regarded European athletes. The Medical Literature Analysis and Retrieval System Online (Medline), Web of Science, Scientific Eletronic Library Online (SciELO), and Scopus databases were searched using the keywords eating disorders, eating behaviors, anxiety, and sport. Except for the study by Fortes *et al.*²¹ with artistic gymnastics athletes, no other study Brazilian study analyzed the relationship between IEB and anxiety in Brazilian athletes.

This type of study is critical for track and field coaches. If anxiety is related to IEB in female Brazilian athletes, coaches will be able to identify those susceptible to eating disorders by investigating their competition anxiety. Thence, the objective of this study was to analyze the relationship between anxiety and IEB in adolescent female track and field athletes.

METHODS

This study was approved by the Human Research Ethics Committee of the School of Philosophy, Sciences, and Letters of *Universidade de São Paulo* (USP) under protocol number 119/2012 (CAE - 05166712.8.0000.5407). The athletes and their guardians signed an informed consent form that explained the study objectives and procedures. Anonymity and complete data confidentiality were guaranteed to the participants.

Participants

According to the State of *Rio de Janeiro's* Track and Field Federation, the adolescent female track and field population in 2013 numbered roughly 445 athletes. The participants were recruited by simple random sampling a convenience sample. A total of 99 adolescent female track and field (sprints, jumps, and throws) athletes aged 12 to 17 years from sports clubs in the city of *Rio de Janeiro* (RJ) participated in the study. Although adolescence encompasses ages 10 to 19 years^{8,15}, the literature emphasizes that adolescents below 12 years of age normally have difficulty filling out psychometric questionnaires^{5,19}. Hence, athletes aged less than 12 years were not included in the study. Additionally, athletes aged more than 17 years were not recruited because the participating sports clubs included only athletes aged less than 18 years.

The inclusion criteria were: having signed the Informed Consent Form; training at least two hours a day, five days a week; having participated in a regional competition in 2013; having answered the questionnaires; and having undergone anthropometric assessment. The exclusion criteria were: having physical and/or intellectual disabilities; and taking psychoactive medication periodically. Eleven athletes were excluded from the study because they did not answer the questionnaires fully. Thus, the final sample consisted of 88 athletes [100 meters (n=24), 200 meters (n=15), 100-meter hurdles (n=11), 400-meter hurdles (n=9), pole vault (n=7), long jump (n=10), high jump (n=6), and javelin throw (n=6)] with a mean age of 15.03 (± 1.74) years and mean percentage of body fat of 17.44 (± 2.37), training 3.22 (± 0.84) hours a day. According to sexual maturation classification, 20% were prepubertal, 35% were pubertal, and 45% were postpubertal.

Instruments

The female version of the Eating Attitudes Test-26 (EAT-26) validated by Bighetti *et al.*¹, with

an internal consistency of 0.82, investigated IEB. This questionnaire consists of 26 questions distributed into three factors: 1) Dieting: Investigates the pathological refusal of high-calorie foods and preoccupation with physical appearance; 2) Bulimia and Food Preoccupation: Investigates binge eating followed by self-induced vomiting to lose/control body weight; and 3) Oral Control: Investigates self-control with food and assess environmental and social promoters of food intake. The final EAT-26 score is given by adding the item scores, and the cut-off score that indicates risk of eating disorders is 21. The study sample has an internal consistency (Cronbach's alpha) of 0.83.

The short version of the Brazilian State-Trait Anxiety Inventory (STAI) validated for the Brazilian population by Fioravanti-Bastos *et al.*¹⁸ assessed anxiety. STAI has twelve 4-point Likert-scale items (absolutely not = 1; a little = 2; some = 3; and very much = 4) divided into two subscales: a) State anxiety (STAI-S), which regards how the interviewee feels at that moment; and b) Trait anxiety (STAI-T), which regards how the interviewee generally feels. The STAI validation study¹⁸ found internal consistencies of 0.90 and 0.89 for STAI-S and STAI-T, respectively. Cronbach's alphas for the present sample were 0.85 for STAI-S and 0.87 for STAI-T, indicating good internal consistency.

The Body Shape Questionnaire (BSQ) validated for Brazilian adolescents assessed body dissatisfaction²². The instrument has good internal consistency, with a Cronbach's alpha (α) of 0.96 and a significant correlation coefficient between the test and retest scores (0.89 for girls). The study sample had $\alpha=0.91$, demonstrating good instrument consistency. The self-assessment questionnaire consists of 34 Likert-scale questions on the adolescent's preoccupation with her body weight and physical appearance. The BSQ results are classified into four levels of body dissatisfaction as follows: no dissatisfaction when the score is below 80; mild dissatisfaction when

the score is between 80 and 110; moderate dissatisfaction when the score is between 110 and 140; and severe dissatisfaction when the score is 140 or more. Since body dissatisfaction promotes eating behaviors associated with risk of eating disorders^{11,23}, the BSQ scores were controlled in some statistical analyses.

Percentage of body fat was calculated as recommended by Slaughter *et al.*²⁴ for adolescents. The triceps and subscapular skinfold thicknesses were measured as recommended by the International Society for Advancement for Kineanthropometry²⁵, using the skinfold caliper (adipometer) LANGE® (Cambridge Scientific Industries Inc.) with accuracy of 1 mm. The measurements were taken rotationally three times, using the mean in the analyses. The authors created a sociodemographic questionnaire for the athletes to report their race (white, black, yellow, brown) as required by the protocol proposed by Slaughter *et al.*²⁴. Sexual maturation was determined by Tanner's criteria²⁶, validated for Brazilians by Matsudo & Matsudo²⁷. Since body fat influences IEB^{11,15}, the percentage of body fat was used as covariate in some statistical analyses.

Procedures

First, the researchers contacted the track and field coaches of sports clubs in the city of *Rio de Janeiro* (RJ). After the study procedures and objectives were properly explained, the researchers asked the coaches' permission for the athletes to participate in the study.

After the coaches authorized the study, the researchers held a meeting with each team to inform the athletes about all the study procedures and hand them the informed consent form for their guardians to sign, thereby giving their authorization in writing for the athletes to participate in the study.

Data were collected in two different occasions in appropriate rooms at the sports clubs.

In the first meeting, the athletes answered the EAT-26, STAI, and BSQ questionnaires, and in the second meeting, the skinfold thicknesses were measured. The athletes were instructed verbally on how to fill out the questionnaires, and their doubts were clarified. The questionnaires also contained filling instructions. The questionnaires were administered in a group setting but answered individually, which took roughly 30 minutes.

Preoccupation subscale score; and 3) STAI-S and STAI-T on EAT-26's Oral Control subscale score. Multivariate Analysis of Variance (Manova) compared the EAT-26 subscale scores by anxiety (STAI score) group. Then Bonferroni *post hoc* correction identified the statistical differences. BSQ and percentage of body fat were controlled in all analyses. The software Statistical Package for the Social Sciences (SPSS) 17.0 treated the data with a significance level of 5%.

Data analysis

The Kolmogorov Smirnov test checked data normality. Since the data had a normal distribution, the variables were expressed as central tendency (mean) and dispersion (minimum, maximum, and standard deviation). The mean STAI (26.53) was used as the cut-off point to classify athletes by level of anxiety: high anxiety ≥ 26.53 and low anxiety < 26.53 . Three simple linear regression models were constructed to verify the influence of: 1) STAI-S and STAI-T on EAT-26's Dieting subscale score; 2) STAI-S and STAI-T on EAT-26's Bulimia and Food

RESULTS

The Eating Attitudes test-26 results showed that 16% of the athletes were at risk of eating disorders. Furthermore, 46.7% of the sample experienced high anxiety (STAI > 26.53). Table 1 shows the descriptive data of all study variables.

The regression model in Table 2 shows that neither STAI-S ($F(1, 87)=2.99; p=0.18$) nor STAI-T ($F(1, 87)=3.24; p=0.14$) influenced EAT-26 Dieting subscale scores significantly.

Table 3 shows the regression model that used Bulimia and Food Preoccupation subscale

Table 1. Descriptive values (minimum, maximum, mean, and standard deviation) of the EAT-26, STAI, BSQ, age, and percentage of body fat of female track and field athletes. *Rio de Janeiro* (RJ), Brazil. 2013.

Variables	Minimum	Maximum	Mean	SD
EAT-26	0	29	10.60	8.29
STAI	19	37	26.53	4.98
BSQ	38	125	69.94	19.87
Age (years)	12	17	15.03	1.74
%BF	12	23	17.44	2.37

Note: SD: Standard Deviation; EAT-26: Eating Attitudes Test-26; STAI: Brazilian State-Trait Anxiety Inventory; BSQ: Body Shape Questionnaire; %BF: Percentage of Body Fat.

Table 2. Multiple linear regression using STAI-S and STAI-T as explanatory variables of the variance in EAT-26's Dieting subscale scores of adolescent female track and field athletes. *Rio de Janeiro* (RJ), Brazil. 2013.

Variables	Block	B	R	R ²	R ² *	p-value
STAI-S	1	0.08	0.25	0.06	0.04	≤ 0.18
STAI-T	2	0.09	0.18	0.04	0.03	≤ 0.14

Note: EAT-26: Eating Attitudes Test; R²*: Ratio² adjusted; STAI-S: State-Trait Anxiety Inventory-State; STAI-T: State-Trait Anxiety Inventory-Trait.

Table 3. Multiple linear regression using STAI-S and STAI-T as explanatory variables of the variance in EAT-26's Bulimia and Food Preoccupation subscale scores of adolescent female track and field athletes. *Rio de Janeiro* (RJ), Brazil. 2013.

Variables	Block	B	R	R ²	R ^{2*}	p-value
STAI-S	1	0.05	0.10	0.01	0.01	≤0.25
STAI-T	2	0.07	0.12	0.03	0.02	≤0.21

Note: EAT-26: Eating Attitudes Test; R^{2*}: Ratio² adjusted; STAI-S: State-Trait Anxiety Inventory-State; STAI-T: State-Trait Anxiety Inventory-Trait.

Table 4. Multiple linear regression using STAI-S and STAI-T as explanatory variables of the variance in EAT-26's Oral Control subscale scores of adolescent female track and field athletes. *Rio de Janeiro* (RJ), Brazil. 2013.

Variables	Block	B	R	R ²	R ^{2*}	p-value
STAI-S	1	0.08	0.04	0.02	0.01	≤0.19
STAI-T	2	0.12	0.23	0.05	0.03	≤0.05

Note: EAT-26: Eating Attitudes Test; R^{2*}: Ratio² adjusted; STAI-S: State-Trait Anxiety Inventory-State; STAI-T: State-Trait Anxiety Inventory-Trait.

Table 5. Comparison between the EAT-26 subscale scores of the high- and low-anxiety groups of adolescent female track and field athletes. *Rio de Janeiro* (RJ), Brazil. 2013.

Variables	Group						p-value
	Low anxiety (STAI <15.26)			High anxiety (STAI ≥15.26)			
	Mean	±	Standard Error	Mean	±	Standard Error	
Dieting	6.09	±	1.04	5.46	±	1.14	≤0.27
B and FP	3.63	±	0.56 ^a	0.98	±	0.62	≤0.02
OC	3.91	±	1.39	2.66	±	1.51	≤0.15

Note: ^ap<0.05 in relation to the high-anxiety group.

B: Bulimia; FP: Food Preoccupation; OC: Oral Control; STAI: Brazilian State-Trait Anxiety Inventory; SE: Standard Error; EAT-26: Eating Attitudes Test-26.

score as the criterion variable. Again, STAI-S ($F(1, 87)=1.95$; $p=0.25$) and STAI-T ($F(1, 87)=2.36$; $p=0.21$) had no significant influence on this score.

The last regression model used the Oral Control subscale score as the dependent variable (Table 4). Only STAI-T ($F(1, 87)=6.61$; $p=0.048$) had a significant impact on this score at the 5% level. STAI-S ($F(1, 87)=3.07$; $p=0.19$) did not explain the oral control variance in young track and field athletes.

Some findings regarding the comparison of EAT-26 subscales by anxiety group deserve emphasis (Table 5): 1) The Dieting subscale scores of high- and low-anxiety athletes did not differ significantly ($F(1, 86)=2.16$; $p=0.27$); 2) Low-anxiety athletes had higher Bulimia and Food Preoccupation subscale scores than high-anxiety

athletes ($F(1, 86)=17.02$; $p=0.018$); and 3) The Oral Control subscale scores of high- and low-anxiety athletes did not differ significantly ($F(1, 86)=4.64$; $p=0.15$).

DISCUSSION

The objective of the present study was to analyze the relationship between anxiety and IEB in adolescent female track and field athletes. Some authors have recommended studies to determine whether anxiety can predispose athletes to IEB. So far, such studies have found a relationship between anxiety and IEB^{12,19,20}. However, these studies regarded European athletes. The only study that investigated the relationship between anxiety and IEB in Brazilian

athletes confirmed the positive relationship between these variables, but this study was performed on gymnasts²¹. Thus, there are no studies analyzing the relationship between anxiety and IEB in female Brazilian track and field athletes.

The study results show a prevalence of IEB of 16% (EAT+). This finding is corroborated by other studies on female Brazilian athletes^{11,28}. IEB prevalence in athletes of competitive team sports or those that require anaerobic power (track and field, basketball, and soccer) is usually lower than that in athletes of aesthetic sports (synchronized swimming, diving, and artistic gymnastics)²⁸. Scoffier *et al.*¹⁷ argued that the main trigger of abnormal eating behaviors is the coaches' insistence for the athletes to lose weight to optimize performance. Indeed, according to the scientific literature, track and field athletes are not considered a group at risk of eating disorders³.

The mean percentage of body fat was 17.44 (± 2.37), which may be considered low for females^{11,16}. However, athletes require a percentage of body fat close to this number for good performance in most sports^{14,23}. Athletes with a percentage of body fat below 15% may have menstrual disorders³ and malnutrition¹¹, which may hinder both their performance and health¹⁶. Moreover, researchers have suggested that a low percentage of body fat may be closely associated with higher anxiety²⁰, which may explain the 46.7% prevalence of high anxiety in athletes.

The results of the first regression model (Dieting subscale) show that state and trait anxiety were not associated with long fasting periods in female athletes, which is corroborated by Vargar *et al.*²⁰. These authors have also not evidenced a relationship between food restriction and anxiety in Turk athletes of various sports. Hence, an anxious athlete does not seem to restrict food intake. Rouveix *et al.*⁴ claims that anxious athletes are probably more prone to binge eating than to food restriction.

The regression model using the Bulimia subscale score as the criterion variable showed

that anxiety was not related to self-induced vomiting and binge eating in female athletes, contrary to what some studies have indicated^{19,20}. The present results may be explained by the fact that physical training reduces anxiety²⁰, and training is a daily habit for athletes. Therefore, young athletes probably have low anxiety levels, which would indicate low susceptibility to binge eating. Physically active individuals experience less anxiety than inactive individuals¹². This relationship may stem from the fact that physical activity increases the release of the neurotransmitters serotonin and dopamine, associated with happiness and psychological wellbeing, attenuating negative emotional states such as anxiety²⁰. Given that track and field athletes train systematically, they may have low anxiety levels. Corroborating this idea, Rouveix *et al.*⁴ found lower anxiety levels in athletes than in non-athletes. On the other hand, some authors emphasize that athletes with anxiety disorder may binge eat high-carbohydrate foods because these foods promote the release of neurotransmitters, such as serotonin^{12,29}.

The last regression model showed that trait anxiety influences the type and amount of foods consumed by the athletes. Silva *et al.*¹² asserted that anxious adolescents may learn about healthy and not-so-healthy foods from their coaches and family members more easily than adolescents with low anxiety levels.

Comparison of the EAT-26 subscales by anxiety group based on the mean STAI score showed that food restriction frequency and environmental pressure to control food intake were similar in both groups (high- versus low-anxiety levels), contrary to Gomes *et al.*¹⁹. On the other hand, athletes who experience high anxiety binge eat and self-induce vomiting more often than those who experience low anxiety, corroborating Vargar *et al.*²⁰.

Although the present results are original, the study has some limitations. One is the cross-sectional study design, preventing the inference of causality. This means that it is not possible to

assess the intensity and direction of the associations found between the outcome variable and the independent variables. Another limitation may be the non-assessment of the athletes' menstrual cycle phase since the menstrual cycle may affect anxiety.

CONCLUSION

The study results indicate that only trait anxiety is related to oral control and the environmental and social forces that encourage food intake in female athletes. Trait anxiety in track and field athletes may make them vulnerable to poor oral control and environmental food intake promoters. Finally, low-anxiety athletes are more vulnerable to bulimic symptoms (binge eating and compensatory behaviors).

More specifically, coaches should pay attention to anxiety symptoms in their young athletes. Additionally, athletes' anxiety level should be assessed by STAI. Coaches should watch high-anxiety athletes for binge eating and self-induced vomiting, and keep track of the types and amounts of foods they consume. Athletes with abnormal eating behaviors should be referred to a psychologist, psychiatrist, and/or dietician.

CONTRIBUTORS

LS FORTES developed the research project, collected data, and wrote the article. SS ALMEIDA analyzed the data and reviewed the article. MEC FERREIRA supervised the entire study and reviewed the article.

REFERENCES

- 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.
- 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(4):731-9. doi: 10.1111/j.1600-0838.2008.00821.x
- De Bruin AP, Oudejans RRD, Bakker FC. Dieting and body image in aesthetic sports: A comparison of dutch female gymnasts and non-aesthetic sport participants. *Psychol Sport Exerc.* 2007; 8(4):507-20. doi: 10.1016/j.psychsport.2006.10.002
- Rouveix M, Bouget M, Pannafieux C, Champely S, Filaire E. Eating attitudes, body esteem, perfectionism and anxiety of judo athletes and nonathletes. *Int J Sports Med.* 2007; 28(2):340-5. doi: 10.1055/s-2006-924334
- 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. doi: 10.1371/journal.pone.0019007
- Alvarenga MS, Scagliusi FB, Phillippi ST. Comportamento de risco para transtorno alimentar em universitárias brasileiras. *Rev Psiquiatr Clin.* 2011; 38(1):3-7. doi: 10.1590/S0101-6083201100010002
- Asçi FH, Tuzun M, Koca C. An examination of eating attitudes and physical activity levels of Turkish University students with regard to self-presentation concern. *Eat Behav.* 2007; 7(2):362-7. doi: 10.1016/j.eatbeh.2005.11.011
- Fortes LS, Morgado FFR, Ferreira MEC. Fatores associados ao comportamento alimentar inadequado em adolescentes escolares. *Rev Psiquiatr Clin.* 2013; 40(2):59-64. doi: 10.1590/S0101-60832013000200002
- Scherer FC, CB Martins, A Pelegrini, SC Matheus, EL Petroski. Imagem corporal em adolescentes: associação com a maturação sexual e sintomas de transtornos alimentares. *Rev Bras Psiquiatr.* 2010; 59(3):198-202. doi: 10.1590/S0047-20852010000300005
- Alves E, Vasconcelos FAG, Calvo MCM, Neves J. Prevalência de sintomas de anorexia nervosa e insatisfação com a imagem corporal em adolescentes do sexo feminino do Município de Florianópolis, Santa Catarina, Brasil. *Cad Saúde Pública.* 2008; 24(3):503-12. doi: 10.1590/S0102-311X2010000300008
- Fortes LS, Almeida SS, Ferreira MEC. Anthropometric indicators of body dissatisfaction and inappropriate eating behaviors in young athletes. *Rev Bras Med Esporte.* 2013; 19(1):35-9. doi: 10.1590/S1517-86922013000100007
- Silva C, Gomes AR, Martins L. Psychological factors related to eating disordered behaviors: A study with Portuguese athletes. *The Span J Psychol.* 2011; 14(1):323-35. doi: 10.5209/rev_SJOP.2011.v14.n1.29

13. Vieira JLL, Amorim HZ, Vieira LF, Amorim AC, Rocha PGM. Distúrbios de atitudes alimentares e distorção da imagem corporal no contexto competitivo da ginástica rítmica. *Rev Bras Med Esporte*. 2009; 15(6):410-4. doi: 10.1590/S1517-86922009000700001
14. Krentz EM, Warschburger P. Sports-related correlates of disordered eating in aesthetic sports. *Psychol Sport Exerc*. 2011; 44(3):315-21. doi: 10.1016/j.psychsport.2011.03.004
15. Fortes LS, Almeida SS, Ferreira MEC. Maturation process, body dissatisfaction and inappropriate eating behavior in young athletes. *Rev Nutr*. 2012; 25(5):575-86. doi: 10.1590/S1415-52732012000500003
16. Garthe I, Raastad T, Refsnes PE, Koivisto A, Sundgot-Borgen J. Effect of two different weight-loss rates on body composition and strength and power-related performance in elite athletes. *Int J Sport Nutr Exercise Metab*. 2011; 1(1):97-104.
17. Scoffier S, Woodman T, D'Arripe-Longueville F. Psychosocial consequences of disordered eating attitudes in elite female figure skaters. *Eur Eat Disord Rev*. 2011; 19(3):280-7. doi: 10.1002/erv.1107
18. Fioravanti-Bastos ACM, Cheniaux E, Landeira-Fernandez J. Development and validation of a short-form version of the Brazilian State-Trait Anxiety Inventory. *Psicol Reflex Crít*. 2011; 24(3):485-94. doi: 10.1590/S0102-79722011000300009
19. Gomes AR, Martins C, Silva L. Eating Disordered Behaviors in Portuguese athletes: The influence of personal, sport, and psychological variables. *Eur Eat Disord Rev*. 2011; 19(1):190-200. doi: 10.1002/erv.1113
20. Vargar E, Vardar SA, Kurt C. Anxiety of young female athletes with disordered eating behaviors. *Eat Behav*. 2007; 8(2):143-7.
21. 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. doi: 10.12820/rbafs.v.18n5p546
22. Conti MA, Cordás TA, Latorre MRDO. Estudo de validade e confiabilidade da versão brasileira do Body Shape Questionnaire (BSQ) para adolescentes. *Rev Bras Saúde Mater Infant*. 2009; 9(3):331-8. doi: 10.1590/S1519-38292009000300012
23. Fortes LS, Oliveira, FG, Ferreira MEC. Influência de fatores afetivos, antropométricos e sociodemográficos sobre o comportamento alimentar em jovens atletas. *J Bras Psiquiatr*. 2012; 61(3):148-53. doi: 10.1590/S0047-20852012000300005
24. Slaughter MH, Lohman TG, Boileau R, Hoswill CA, Stillman RJ, Yanloan MD, *et al*. Skinfold equations for estimation of body fatness in children and youth. *Hum Biol*. 1988; 60(5):709-23.
25. The Internacional Society for Advancement for Kineanthropometry. First printed. Australia: National Library of Australia; 2001.
26. Tanner JM. Growth at adolescence. 2nd ed. Oxford: Blackwell; 1962.
27. Matsudo SMM, Matsudo VKR. Validade da auto avaliação na determinação da maturação sexual. *Rev Bras Ciênc Mov*. 1991; 5(2):18-35.
28. Fortes LS, Ferreira MEC. Comparação da insatisfação corporal e do comportamento alimentar inadequado em atletas adolescentes de diferentes modalidades esportivas. *Rev Bras Educ Fis Esporte*. 2011; 25(4):707-16. doi: 10.1590/S1807-55092011000400014
29. Silva L, Gomes AR. Desordens alimentares no desporto: situação atual e perspectivas futuras no estudo dos fatores psicológicos. *Psicol Clin*. 2012; 24(2):83-100.

Received on: 5/21/2013
Final version on: 5/5/2014
Approved on: 5/19/2014

