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Research article

THE BODY SHAPE OF PUBERTAL RHYTHMIC GYMNASTS: THE ASSOCIATION WITH BMI, EATING DISORDER RISKS, AND PERFECTIONISM

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Abstract. *The aim of this study was to determine the relationship between body shape, the body mass index (BMI), eating disorders risks, and perfectionism in pubertal rhythmic gymnasts, and to assess the impact of investigated variables on the body shape satisfaction of those athletes. The study group included 40 female rhythmic gymnasts at the national level of competition aged 12.761±0.930 years. They reported an average training experience of 5.925±2.306 years, a total of 9.114±4.428 hours of practice a week, and the start of their sports career at 5.766±1.968 years. To assess their degree of dissatisfaction with their body image, the Body Shape Questionnaire (BSQ) was used. Additionally, the Eating Attitudes Test-26 (EAT-26) was used to assess disturbances in eating attitudes and behaviors, and the Sport Perfectionism Questionnaire was used to measure perfectionism in sports. The correlation between BSQ and EAT-26 is positive (.511), as well as Dieting .932. Interestingly, the correlation between the BSQ score and the result on the EAT-26 is higher than the correlation between BSQ and Perfectionism (.393). The stepwise multiple regression analysis showed that Perfectionism, BMI, Training hours per week, the Training experience, EAT-26, Age and Experience accounted for 64.2% of the variance of BSQ (adjusted R2=.642, p=.000). The results indicate that rhythmic gymnasts with higher BSQ scores are concerned about their appearance in sport, tend to use dieting or compensatory behavior, and score higher values on the subscale non-adaptive perfectionism. This puts them into at greater risk of developing eating disorders, and it is necessary to implement some form of prevention for these disorders as early as possible.*

Key words: *Body Shape Questionnaire, Eating Attitudes Test-26, Sport Perfectionism Questionnaire, Rhythmic gymnastics.*

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INTRODUCTION

The problem of inappropriate nutrition among female athletes appeared with the introduction of female athletes in sports competitions (Smolak, Murnen, & Ruble, 2000). In addition to poor nutrition, supplements and body-shaping medicines have contributed to the development of eating disorders among many women and girls (de Oliveira Coelho, da Silva Gomes, Ribeiro, & de Abreu Soares, 2014). According to a review article (Smolak et al., 2000), most of the previous studies agreed that female athletes seem to be potentially exposed to problems with eating disorder onset. It is known that prevalence of clinical eating disorders is quite low in the sport environment, and there is a higher prevalence of disordered eating practices among athletes (Di Cagno et al., 2018). It was also noted that disordered eating behaviors and eating disorder risks are more frequent in female than male athletes, with a prevalence from 0 to 19% in male athletes, versus a prevalence from 6 to 45% in female athletes (Bratland-Sanda & Sundgot-Borgen, 2013).

The core features of eating disorders include disturbance in body image (e.g., overvaluation of thinness, weight or shape concerns), over or under control of eating (e.g., severe dietary restriction, binge eating), and extreme behaviors to control weight or shape (e.g., compulsive exercise, purging) (Ahrberg, Trojca, Nasrawi, & Vocks, 2011). Studies have shown that aesthetic sports overemphasize the very low percentage of body fat for better aesthetics of performance (Melin, Torstveit, Burke, Marks, & Sundgot-Borgen, 2014; Menezes, Novaes, & Fernandes-Filho, 2014; de Oliveira et al., 2017;). Therefore, to meet the aesthetic standards of the sport, female athletes tend to lose body mass, reduce the intake of high-calorie foods, and train compulsively (Fortes, Almeida, & Ferreira, 2014). Ballet students tend to develop eating disorders and this risk is attributed mainly to younger ballet dancers who strive for perfectionism and thinness (Neumärker, Bettle, Neumärker, & Bettle, 2000; Thomas, Keel, & Heatherton, 2005; Toro, Guerrero, Sentis, Castro, & Puértolas, 2009). Additionally, this kind behavior is often seen in rhythmic gymnastics (de Oliveira et al., 2017). The explanation for the behavior of ballet students and rhythmic gymnastics behavior is most often that eating disorders occur when food intake is significantly lower than the required daily intake (Wollenberg, Shriver, & Gates, 2015).

Pubertal delay, growth retardation, and delayed skeletal maturation are often observed in rhythmic gymnasts (Georgopoulos et al., 2001). Furthermore, these parameters are typically associated with disordered eating behaviors, dietary restraint, and high training load (Tan, Calitri, Bloodworth, & McNamee, 2016). It is important to note that the body composition of rhythmic gymnasts describes low body weight, low percentage of body fat, long limbs, narrow and thin body and hips (Boros, 2009). Precisely, a lean body is necessary for success in this sport because it enables the performance of specific sporting and aesthetic requirements, as well as the easy execution of all rhythmic performances (Van Durme, Goossens, & Braet, 2012). Performance-related and body appearance demands in combination with predisposing personality characteristics can be implicated in the aetiology of eating disorders (Sundgot-Borgen & Torstveit, 2010), with perfectionism as the central variable (Schmidt & Treasure, 2006). Perfectionism is a personality trait characterized by striving for excessively high standards of performance along with a heightened sensitivity to negative evaluations from the self and others (Flett & Hewitt, 2002). Perfectionistic concerns are highly prevalent among females and were shown to be the greatest risk factor for eating disorders among female athletes (Hopkinson & Lock, 2004). A group of authors (Veljković, Đurović, Biro, Stojanović, & Ilić, 2020) created a universal model that represents and explains

the structure of eating attitudes. Factors like body image dissatisfaction, weight concerns, and actual dieting behavior are nearly always part of these models, and a negative body image is found to be a very potent, well-supported risk factor (Perini et al., 2009; Ravaldi et al., 2003).

One study (Sundgot-Borgen, 1993) showed that, on a sample size of 500 elite female athletes from 35 different sports, 18% had eating problems, including bulimia nervosa, anorexia nervosa and subclinical eating disorder. Another group of authors (Sharps, Wilson, Graham, & Curtis, 2021) reported that 53% of female athletes have low energy intake and 16% of them are at risk for developing eating disorders. Athletes competing in the adult category in rhythmic gymnastics presented a clinically significant result, 16.7% were classified as "at risk" for the development of anorexia and/or bulimia (de Oliveira et al., 2017). Previous research (Kong & Harris, 2015; Theodorakou & Donti, 2013) on perfectionism in female sport showed that elite athletes in aesthetics sports experience experienced heightened pressures for competitive performance and a slim physique compared to lower-level athletes. It is possible that different achievement environments (e.g. elite sport) may increase the possibility of developing heightened perfectionism (Stoeber, 2011). A study of the association between eating disorder symptoms and perfectionism in adolescent female rhythmic gymnasts of the international and recreational level (Donti, Donti, Gaspari, Pleksida, & Psychountaki, 2021) confirmed that international level gymnasts show more eating pathology than recreational level gymnasts. Authors reported that the body mass index (BMI) seems relevant for athletes' dieting behavior, and the association between perfectionism and eating disorder symptoms in recreational level gymnasts and lower performance and appearance expectations are linked to reduced occurrence of eating pathology. Although the factors underpinning results remain unclear, there was a positive relationship between the level of sport and the development of perfectionistic strivings (Donti et al., 2021). Even in spite of such importance, there is an insufficient number of scientific papers that studied eating disorders in pubertal female athletes. According to our knowledge, no study investigated factors associated with body shape, BMI, eating disorder risks and perfectionism in pubertal rhythmic gymnasts. Therefore, the aim of this study was to determine the association between body shape, BMI, eating disorder risks and perfectionism in pubertal rhythmic gymnasts, and to determine the impact of the studied variables on body shape satisfaction among those athletes.

METHODS

Participants

Forty female rhythmic gymnasts (aged 12.761±.930 years) were included in this study, affiliated with different rhythmic gymnastics clubs in the Balkans. The participants were rhythmic gymnasts who participated in national level competitions, tournaments and international cups. They reported an average training experience of 5.925±2.306 years, a total of 9.114±4.428 hours of practice a week, and the start of their sport career at 5.75±1.89 years. The participants' BMI was calculated as the ratio of body weight to the squared standing height (kg/m2). The characteristics of the participants are shown in Table 1. Parental consent and child assent were also obtained. All the participants filled in an Informed Consent form and the study was conducted according to the Declaration of Helsinki and approved by the Ethics Committee of the Faculty of Sport and Physical Education, University of Niš (Number 05-2115).

Procedure

The study was carried out at international rhythmic gymnastics summer camp. All the questionnaires were in printed format and were handed to the gymnasts after the morning training session. The gymnasts filled in the data anonymously and placed their questionnaires in a special box in the sports hall after completing the questions. Instructions to the participants included a reminder to respond to all the items and a statement that there were no right or wrong answers.

Instruments

The instrument contains three questionnaires and a series of questions that were used to collect demographic data and data on the characteristics of sports activities. The participants had to state their gender, age, sports experience, the age at which they started playing sports and their achievements, and what level they compete/do sports.

The Body Shape Questionnaire (BSQ)

To assess the degree of dissatisfaction with body image, the Body Shape Questionnaire – BSQ was used, which measures the concern one has with his/her own body shape, self-depreciation due to physical aspects and to the feeling of being obese. The questionnaire differentiates between two aspects of body image: the accuracy of body size estimates, and the feelings towards the body (dissatisfaction or depreciation of one's fitness level). The questionnaire includes 34 items, and uses a 6-point, Likert-type scale (1= never, 2= seldom, 3= sometimes, 4= often, 5= very often, and 6= always). The items' scores are summed up, and a total score is calculated for each individual. A total score lower than or equal to 80 is considered normal; i.e., there is no distortion of body image. A score between 81 and 110 means a mild body image distortion; scores between 111 and 140 indicate a moderate distortion; and over 140 a severe body image distortion (Cordás & Castilho, 1994).

The Eating Attitudes Test-26 (EAT-26)

EAT-26 is a self-report questionnaire used internationally to identify and assess disturbances in eating attitudes and behaviors and is also useful for following the progression of clinical cases. The questionnaire consists of 26 items with three sub-scales: Dieting, Bulimia and Food preoccupation, and Oral Control. If the total scores are higher than 20, EAT-26 is considered to be positive, thus confirming the presence of abnormal dietary attitudes, and the risk of developing an eating disorder (Garner & Garfinkel, 1997). The inventory uses a 6-point, Likert-type scale (1= always, 2 = very often, 3 = often, 4 = sometimes, 5 = seldom, and 6= never).

Sport Perfectionism Questionnaire

The Sport Perfectionism Questionnaire is an instrument used to measure perfectionism in sports (Stoeber, Otto, & Stoll, 2006). The scale consists of 10 items, where the first 5 items refer to the subscale Striving for perfection (example: "During the competition I strive to be as perfect as possible", and the other 5 items refers to the subscale Negative reaction to imperfection (example particle: "During competitions I feel extremely upset if everything does not go perfectly") (Stoeber et al., 2006). The emotional and cognitive reactions of

athletes during competitions or performances are captured by both scales. Participants assess their feelings throughout the competition, using a rating system that ranges from 1 ("Never") to 6 ("Always"). The subscale scores are calculated by averaging the responses to the relevant items, with higher scores indicating a stronger expression of perfectionist aspirations. Adaptive perfectionism was operationalized as a score on the first subscale (striving for perfection), and maladaptive perfectionism as a result on the second subscale (negative reaction to imperfection). The following values were determined by internal consistency type reliability analysis of Cronbach's alpha coefficients: $\alpha = .87$ (strive for perfection) and $\alpha = .85$ (negative reaction to imperfection). The obtained values are slightly lower than those determined for the English version of the questionnaire, $\alpha = .92$ (striving for perfection) and $\alpha = .87$ (negative reaction to imperfection), but are still satisfactory levels (Stoeber et al., 2006).

Statistical Analyses

The data were reported as means and standard deviations (SD). Normality of the distribution was estimated using the Kolmogorov-Smirnov test. In addition to descriptive statistics, Pearson's correlation coefficient was used to analyze the obtained results, and the significance level was set at $p = .050$. A stepwise multiple regression analysis was used to determine the impact of BMI, EAT-26 and perfectionism on the BSQ as the criterion variable. The effect size for regression analyses was measured using Cohen's f2 (Cohen's $f2 = R2 / (1 - R2)$ and was interpreted as: .020 = small, .150 = medium, and .350 = large, (Cohen, 1988). The data were processed using the statistical package IBM SPSS Statistics 20.

RESULTS

Table 1 shows the descriptive parameters and normality of distribution for each variable. Additionally, Table 1 show the results of Persons' correlation analysis.

Table 1 Descriptive Statistics for tested variables

Variables	Mean	SD
Age	12.761	.930
Height	1.590	.081
Bodyweight	45.572	6.174
BMI	17.821	2.255
Experience	5.925	2.306
Start of the training	5.766	1.968
Training hours per week	9.114	4.428
BSQ	78.51	19.721
Dieting	4.700	6.386
Bulimia	2.221	2.830
Oral control	3.163	3.040
EAT	10.084	9.322
Perfectionism	42.702	10.654
Striving	24.514	5.613
Negative reaction to imperfection	18.190	6.814

In Table 2, the results of the correlation analysis showed that a BSQ correlates with the start of the training and the number of training hours per week. The correlation between BSQ and the result of the EAT-26 is positive (.511), and higher than the correlation between body shape concerns and perfectionism (.393).

Table 2 Correlation analysis

Variables	BMI	Experience	Start of the training	Training hours per week	BSQ	Dieting	Bulimia	Oral control	EAT	Striving for perfection	Negative reaction to imperfection
Experience	.125	-									
Start of the training	.176	-.564**	-								
Training hours per week	.094	.309	.144	-							
BSQ	.121	.076	.340*	.569**	-						
Dieting	.210	-.187	.271	.200	.527**	-					
Bulimia	.264	.109	.090	.198	.385*	.736**	-				
Oral control	-.045	-.002	-.142	-.084	.102	.076	-.033	-			
EAT	.209	-.095	.167	.170	.511**	.932**	.796**	.368*	-		
Striving for perfection	-.023	.023	.047	.151	.262	.049	-.067	-.143	-.033	-	
Negative reaction to imperfection	.133	-.254	.168	.165	.391*	.453**	.277	.061	.414*	.465**	-
Perfectionism	.073	-.151	.132	.185	.388*	.316	.142	-.036	.248	.824**	.885**

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

A stepwise multiple regression analysis showed that Perfectionism, BMI, Training hours per week, start of the training, EAT-26, Age and Experience accounted for 64.2% of the variance of BSQ (adjusted R2 =.642, p=.000). The effect size for the regression analysis was large (1.34).

Table 3 Stepwise multiple regression analysis

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate	F	p
1	.757[a]	.573	.479	13.975	6.123	.000

a. Predictors: (Constant), Perfectionism, BMI, Training hours per week, start of the training, EAT, Age, Experience

Table 4 Results of the stepwise multiple regression analysis predicting the score of the BSQ

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-2.731	36.239		-.075	.940
	Age	1.976	2.942	.093	.672	.507
	BMI	-.704	1.113	-.081	-.632	.532
	Experience	2.211	1.488	.255	1.486	.147
	Start of the training	3.822	1.635	.373	2.338	.026*
	Training hours per week	1.331	.633	.295	2.102	.043*
	EAT	.784	.267	.371	2.938	.006*
	Perfectionism	.332	.242	.173	1.375	.179

a. Dependent Variable: BSQ

DISSCUSSION

The aim of this study was to determine the association between body shape, BMI, eating disorder risks, and perfectionism among pubertal rhythmic gymnasts, and also to determine the impact of the studied variables on body shape satisfaction of those athletes. The study confirmed an association between body shape concerns and pathological eating attitudes and perfectionism among pubertal rhythmic gymnasts. The findings indicate that gymnasts who obtain a higher score on the Body Shape Questionnaire (BSQ) exhibit concerns regarding their appearance in the realm of sports. Moreover, they tend to engage in behaviors such as dieting or compensatory actions. Additionally, these individuals demonstrate elevated scores on the subscale measuring non-adaptive perfectionism. Furthermore, the second aim was to examine whether BMI, eating disorders risk, and perfectionism would be significant predictors of body shape satisfaction in pubertal rhythmic gymnasts.

In a previous study by Veljkovic et al. (2020), it was found that underweight girls participating in aesthetic sports were content with their body shape and employed strict dietary control to maintain thinness. However, in our study, no significant correlation was observed between BMI and BSQ. Additionally, the scores obtained on the EAT-26 scale were low. These results can be attributed to the younger age of our participants, as earlier studies predominantly focused on adolescent athletes (Donti et al., 2021). In adolescence, body changes due to growth and maturation are often interpreted by gymnasts as undesirable and deleterious to performance (Sundgot-Borgen & Torstveit, 2010).

It is crucial to assess athletes' relationships with their bodies, eating habits, and psychological characteristics at an early stage, to mitigate risks. Several authors have highlighted the potential risk associated with initiating sport-specific training too early, as it may lead to the selection of a sport that is incompatible with the athlete's body type (Sundgot-Borgen, 1993). Furthermore, pubertal changes can impact performance, which is why earlier studies (Coelho, Gomes, Ribeiro, & Soares, et al., 2014; Veljkovic et al., 2020) underscored the importance of commencing primary prevention efforts as early as 9-11 years of age. Such interventions aim to safeguard athletes from various factors that can predispose them to develop eating disorders and unhealthy eating habits.

Previously, a study by Sharps et al. (2021) demonstrated that pressure to have a slim body contributes to dissatisfaction with one′s own body weight and paradoxically translates into further weight gain caused by emotional eating. In our study, body shape was positively connected with all the studied variables, but not with BMI, which we can also attribute to the age of the participants. Contrary to our research, a group of authors (Petrie, Greenleaf, & Martin, 2010) found that girls with higher BMI express greater dissatisfaction with their own body shape and feel a greater sense of pressure to have a slim body.

The authors Donti et al. (2021) reported that the subscale Negative Reactions to Imperfection, BMI and training experience accounted for 33.2% of the variance on the EAT-26 in international level gymnasts, while no association was found between any of the subscales of perfectionism and EAT-26 in recreational level gymnasts. Compared to our results (10.084±9.322) and higher risks for developing some eating disorders, a negative association was observed between training experience and the EAT-26 score among international level athletes (Donti et al., 2021). They reported higher mean values of the participants for eating disorder risks (EAT), both at the international (18.02 ± 10.08) and national level (11.77 ± 8.11).

Negative Reactions to Imperfection and BMI seem relevant for athletes' dieting behavior although training experience may be associated with fewer eating disorder symptoms. Our study results showed both BSQ and EAT were associated with Negative reaction to imperfection. Negative Reactions to Imperfection are considered negative dimensions of perfectionism and have been found to positively correlate with competitive anxiety and negatively with self-confidence in competitive athletes (Stoeber, Otto, Pesheck, Becker, & Stoll, 2007). The lack of association between perfectionism and eating disorder symptoms in non-competitive level gymnasts indicates that moderate exercise, and lower performance and appearance expectations, are linked to reduced occurrence of eating pathology.

There are a few limitations to this study. First, there was the small sample size (this study included only rhythmic gymnasts from the Balkans). Second, the participants self-reported their body height and body weight, they were not measured. Third, the participants competed on different levels. Also, the cross-sectional design of this study limits interpretation of the results, as does the lack of a control group. Future research should monitor older rhythmic gymnasts during puberty.

CONCLUSION

The findings from our study substantiated the correlation between body shape concerns, pathological eating attitudes, and perfectionism among pubertal rhythmic gymnasts. It was concluded that gymnasts with higher BSQ scores exhibit worries regarding their appearance in the sport, which can lead to the adoption of dieting or compensatory behaviors. Moreover, they demonstrated higher values on the non-adaptive perfectionism subscale. These factors collectively increase their vulnerability to developing eating disorders, highlighting the imperative of early implementation of preventive measures for these disorders.

REFERENCES

Ahrberg, M., Trojca, D., Nasrawi, N., & Vocks, S. (2011). Body image disturbance in binge eating disorder: A review. *European Eating Disorders Review*, *19*(5), 375-381.

Bratland-Sanda, S., & Sundgot-Borgen, J. (2013). Eating disorders in athletes: overview of prevalence, risk factors and recommendations for prevention and treatment. *European Journal of Sport Science*, *13*(5), 499-508.

Boros, S. (2009). Dietary habits and physical self-concept of elite rhythmic gymnasts. *Biomedical Human Kinetics*, *1*(1), 1-2.

Cordás, T. A., & Castilho, S. (1994). Imagem corporal nos transtornos alimentares: instrumento de avaliação: Body Shape Questionnaire. *Psiquiatr Biol*, *2*(1), 17-20.

Cohen, J. (1988). Statistical power analysis for the behavioral sciences. Hillsdale, NJ: Lawrence Erlbaum.

Coelho, G. M. D. O., Gomes, A. I. D. S., Ribeiro, B. G., & Soares, E. D. A. (2014). Prevention of eating disorders in female athletes. *Open access journal of sports medicine*, 105-113.

de Oliveira Coelho, G. M., da Silva Gomes, A. I., Ribeiro, B. G., & de Abreu Soares, E. (2014). Prevention of eating disorders in female athletes. *Open access journal of sports medicine*, 5, 105.

de Oliveira, G. L., de Pinho Gonçalves, P. S., de Oliveira, T. A. P., Valentim Silva, J. R., Roquetti Fernandes, P., & Fernandes Filho, J. (2017). Assessment of Body Composition, Somatotype and Eating Disorders in Rhythmic Gymnasts. *Journal of Exercise Physiology Online*, 20(1).

Di Cagno, A., Fiorilli, G., Iuliano, E., Tsopani, D., Buonsenso, A., Piazza, M., & Calcagno, G. (2018). Disordered eating behaviors in rhythmic gymnasts: a survey to investigate the coaches' point of view on the management. *Journal of Physical Education and Sport*, *18*(3), 1748-1755.

Donti, O., Donti, A., Gaspari, V., Pleksida, P., & Psychountaki, M. (2021). Are they too perfect to eat healthy? Association between eating disorder symptoms and perfectionism in adolescent rhythmic gymnasts. *Eating behaviors*, 41, 101514.

Fortes, L. d. S., Almeida, S. d. S., & Ferreira, M. E. C. (2014). A internalização do ideal de magreza afeta os comportamentos alimentares inadequados em atletas do sexo feminino da ginástica artística? *Revista da Educação Física*/UEM, 25, 181-191.

Flett, G. L., & Hewitt, P. L. (2002). *Perfectionism: Theory, research, and treatment*. American Psychological Association.

Garner, D. M., & Garfinkel, P. E. (Eds.). (1997). *Handbook of treatment for eating disorders*. Guilford Press.

Georgopoulos, N. A., Markou, K. B., Theodoropoulou, A., Vagenakis, G. A., Benardot, D., Leglise, M., Dimopoulos, J.A & agenakis, A. G. (2001). Height velocity and skeletal maturation in elite female rhythmic gymnasts. *The Journal of Clinical Endocrinology & Metabolism*, *86*(11), 5159-5164.

Hopkinson, R., & Lock, J. (2004). Athletics, perfectionism, and disordered eating. *Eating and Weight Disorders-Studies on Anorexia, Bulimia and Obesity*, *9*(2), 99-106.

Kong, P., & Harris, L. M. (2015). The sporting body: body image and eating disorder symptomatology among female athletes from leanness focused and nonleanness focused sports. *The Journal of psychology*, *149*(2), 141-160.

Melin, A., Torstveit, M. K., Burke, L., Marks, S., & Sundgot-Borgen, J. (2014). Disordered eating and eating disorders in aquatic sports. *International journal of Sport Nutrition and Exercise Metabolism*, *24*(4), 450-459.

Menezes, L. d. S., Novaes, J., & Fernandes-Filho, J. (2014). Somatotipo de atletas y practicantes de gimnasia rítmica prepubescentes y postpubescentes. *International Journal of Morphology*, *32*(3), 968-972.

Neumärker, K.-J., Bettle, N., Neumärker, U., & Bettle, O. (2000). Age-and gender-related psychological characteristics of adolescent ballet dancers. *Psychopathology*, *33*(3), 137-142.

Perini, T. A., Vieira, R. S., Vigário, P. d. S., Oliveira, G. L. d., Ornellas, J. d. S., & Oliveira, F. P. d. (2009). Eating disorders in elite synchronized swimmers. *Revista Brasileira de Medicina do Esporte*, 15, 54-57.

Petrie, T. A., Greenleaf, C., & Martin, S. (2010). Biopsychosocial and physical correlates of middle school boys' and girls' body satisfaction. *Sex Roles*, *63*(9–10), 631–644.

Ravaldi, C., Vannacci, A., Zucchi, T., Mannucci, E., Cabras, P. L., Boldrini, M., Murciano, C.M., &Ricca, V. (2003). Eating disorders and body image disturbances among ballet dancers, gymnasium users and body builders. *Psychopathology*, *36*(5), 247-254.

Schmidt, U., & Treasure, J. (2006). Anorexia nervosa: Valued and visible. A cognitive-interpersonal maintenance model and its implications for research and practice. *British Journal of Clinical Psychology*, *45*(3), 343-366.Sharps, F. R. J., Wilson, L. J., Graham, C. A. M., & Curtis, C. (2021). Prevalence of disordered eating, eating disorders and risk of low energy availability in professional, competitive and recreational female athletes based in the United Kingdom. *European Journal of Sport Science*, 1-7.

Smolak, L., Murnen, S. K., & Ruble, A. E. (2000). Female athletes and eating problems: A meta-analysis. *International Journal of Eating Disorders*, *27*(4), 371-380.

Stoeber, J. (2011). The dual nature of perfectionism in sports: Relationships with emotion, motivation, and performance. *International Review of Sport and Exercise Psychology*, *4*(2), 128-145.

Stoeber, J., Otto, K., & Stoll, O. (2006). Multidimensional inventory of perfectionism in sport (MIPS): English version.

Stoeber, J., Otto, K., Pescheck, E., Becker, C., & Stoll, O. (2007). Perfectionism and competitive anxiety in athletes: Differentiating striving for perfection and negative reactions to imperfection. *Personality and individual differences*, *42*(6), 959-969.

Sundgot-Borgen, J. (1993). Prevalence of eating disorders in elite female athletes. *International Journal of Sport Nutrition and Exercise Metabolism*, *3*(1), 29-40.

Sundgot-Borgen, J., & Torstveit, M. (2010). Aspects of disordered eating continuum in elite high-intensity sports. *Scandinavian Journal of Medicine & Science in Sports*, *20*, 112-121.

Tan, J. O. A., Calitri, R., Bloodworth, A., & McNamee, M. J. (2016). Understanding eating disorders in elite gymnastics: ethical and conceptual challenges. *Clinics in Sports Medicine*, *35*(2), 275-292.

Theodorakou, K., & Donti, O. (2013). Prevalence of eating disorders and psychological parameters in elite female gymnasts: Their relation to body image and body mass index. *Athlitiki Psychologia*, *3*(24), 11-23.

Thomas, J. J., Keel, P. K., & Heatherton, T. F. (2005). Disordered eating attitudes and behaviors in ballet students: examination of environmental and individual risk factors. *International Journal of Eating Disorders*, *38*(3), 263-268.

Toro, J., Guerrero, M., Sentis, J., Castro, J., & Puértolas, C. (2009). Eating disorders in ballet dancing students: Problems and risk factors. *European Eating Disorders Review*: *The Professional Journal of the Eating Disorders Association*, *17*(1), 40-49.

Van Durme, K., Goossens, L., & Braet, C. (2012). Adolescent aesthetic athletes: a group at risk for eating pathology? *Eating behaviors, 13*(2), 119-122.

Veljković, A. A., Đurović, D., Biro, F., Stojanović, K., & Ilić, P. (2020). Eating attitudes and body image concerns among female athletes from aesthetic sports. *Annales Kinesiologiae, 11*(1), 3-16.

Wollenberg, G., Shriver, L. H., & Gates, G. E. (2015). Comparison of disordered eating symptoms and emotion regulation difficulties between female college athletes and non-athletes. *Eating behaviors*, 18, 1-6.

OBLIK TELA RITMIČKIH GIMNASTIČARKI U PUBERTETU: POVEZANOST SA BMI, RIZIKOM OD POREMEĆAJA ISHRANE I PERFEKCIONIZMOM

Cilj ovog istraživanja bio je da se utvrdi veza između oblika tela, indeksa telesne mase (BMI), rizika od poremećaja u ishrani i perfekcionizma ritmičkih gimnastičarki u pubertetu, kao i procena uticaja ispitivanih varijabli na zadovoljstvo oblikom tela ovih sportistkinja. U istraživanju je učestvovalo 40 ritmičkih gimnastičarki nacionarnog ranga takmičenja (uzrasta od 12.761±0.930 godina), sa trenažnim iskustvom od 5.925±2.306 godina, koje treniraju na nedeljnom nivou 9.114±4.428 sati, a sportsku karijeru su počele u uzrastu od 5.766±1.968 godina. Za procenu stepena nezadovoljstva slikom tela korišćen je Upitnik o obliku tela (Body Shape Questionnaire-BSQ). Dodatno, Test stavova o ishrani-26 (EAT-26) je korišćen za procenu poremećaja u stavovima i ponašanju u ishrani, a Upitnik o sportskom perfekcionizmu je korišćen za merenje perfekcionizma u sportu. Korelacija između rezultata BSQ i EAT-26 je pozitivna (.511), kao i kod Dijete (.932). Zanimljivo je da je korelacija između rezultata BSQ i rezultata u EAT-26 veća od korelacije između BSQ i perfekcionizma (.393). Analiza stepwise multiple regresije pokazala je da perfekcionizam, BMI, broj sati treninga nedeljno, iskustvo treninga, EAT-26, uzrast i iskustvo objašnjavaju 64.2% varijabilnosti rezultata BSQ (prilagođeni R2= .642, p= .000). Rezultati pokazuju da su ritmičke gimnastičarke sa višim BSK rezultatima zabrinute za svoj izgled u sportu, da imaju tendenciju da koriste dijetu ili kompenzatorno ponašanje i da imaju više vrednosti na subskali neprilagodljivog perfekcionizma. To ih dovodi u veći rizik od razvoja poremećaja u ishrani, te je neophodno što ranije sprovesti neki vid prevencije ovih poremećaja.

Ključne reči: *Upitnik o obliku tela, Test stavova u ishrani-26, Upitnik o sportskom perfekcionizmu, ritmička gimnastika.*