

# Eating Disorder Symptoms in Female Sports: Comparison of Rhythmic Gymnasts and Female Handball Players

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## **Abstract**

Previous research shows that female athletes are particularly at risk of eating disorders and control their weight more in aesthetic than non-aesthetic sports. The aim of this research was to determine eating disorders in rhythmic gymnastics using the EAT-26 test. A group of female handball players was also included in the research in order to compare results from aesthetic and non-aesthetic sports. Rhythmic gymnastics is a conventional sport in which the exercise is performed on the ground with a screw, hoop, ball, cones and tape accompanied by music. The sample of respondents consisted of rhythmic players (N=40) and handball players (N=40) aged 14-17. The EAT-26 contains 26 items divided into three levels ('dieting', 'bulimia and preoccupation with food', 'oral control') and was used to test the presence of eating disorder symptoms. The results of the Mann Whitney U test showed that there are significant differences between the two groups of subjects in the total score of EAT-26. A comparison of attitudes about nutrition, age and body mass index (BMI) revealed that rhythmic players control their body weight and diet significantly more than handball players.

## **Key words**

*body mass index; EAT-26; female athletes; leann sport; rhythmic gymnastics*

## **Introduction**

It proves to be that eating disorder symptoms are common among female athletes (Bratland-Sanda & Sundgot-Borgen, 2012) and more often observed in a wide range of elite sports (Martinsen & Sundgot-Borgen, 2012). In elite aesthetic sports like rhythmic gymnastics, girls are typically competing very young, at the age of 13-15 years, which is developmental stage of middle adolescence, where major changes are characterized, including physiological and psychological changes, which are well-established risk factors for developing eating disorders (Striegel-Moore & Bulik, 2007). Specific factors in the sport environment may encourage an unhealthy focus on body weight and shape (Bratland-Sanda and Sundgot-Borgen, 2012).

In rhythmic gymnastics, the gymnastic leotards is the only clothes that rhythmic athletes are wearing so every part of the body is visible, both in training and during the competition performance (Norton et al. 2000). Since this sportswear facilitates the comparison of athletes, it encourages dissatisfaction with body image and unhealthy eating behavior (Steinfeldt et al., 2013).

Aesthetic sport are specific because referees are giving scores which are subjective and depends on different aesthetic factors, including athlete's appearance. It is expected that skinnier athletes score higher in artistic impression, although physical appearance is not directly evaluated (Claessens Lefevre et al., 1999), which might contribute to eating disorder behaviors. Rhythmic gymnastics is a conventional sport in which is perform on the floor with the hand apparatuses as rope, hoop, ball, clubs, and ribbon in harmony with music (Eid, 2014). In elite rhythmic gymnastics, a somatotype with reduced subcutaneous adipose tissue is desirable and the ectomorph component of the body is emphasized (Radas et al., 2018). Knowledge of kinanthropological characteristics is directly relevant to all aspects of training that are valid in top sports. In addition to the above, it is known that rhythm gymnasts should be as thin as possible due to landing after performing very demanding elements It could also be expected that leanness sports athletes with greater Body Mass Index (BMI) value are especially at risk for developing eating disorder symptoms and this risk occurs because their actual body weight deviates more from what is considered to be the ideal (i.e. extremely skinny) body weight and shape in these sport disciplines (Parlov, 2020).

The aim of our study was to explore the eating disorder symptoms in rhythmic gymnasts using EAT26 instrument, so assuming similar physiological and psychological developmental changes, we compared a group of rhythmic gymnasts with female handball players of the same age.

Female handball is a sports game in a series of polystructural complex sports characterized by the alternation of cyclic and acyclic complex movements, the result depending on the cooperation of all team members (Malacko, 1991). The game consists of two half time in which the two teams attempt to score goals scoring by throwing the ball into the opponent's goal. Unlike rhythmic gymnastics, female handball is non-leanness sport where aesthetic component is not relevant for the performance and success. Considering the theoretical considerations and results of previous research, we assume that rhythmic gymnasts will show a higher degree of eating disorder symptoms than female handball players. The aim of our research was to explore the eating disorder symptoms in rhythmic gymnast's athletes by comparing them with female handball players using the EAT-26 test.

## **Methods**

### ***Participants***

40 rhythmic female athletes and 40 female handball players aged 13 to 15 participated in the research. Both participants were from clubs in Osijek, Croatia. The inclusion criteria were: a minimum of three years in competitive training, continually and without major breaks. Both groups participated in the 2019-2021 competitive seasons and already attended at least one major sport competition. The participants' personal data in the study were anonymized. The only personal data we collected were: year of birth, current weight and height and also, in which sport these participants compete.

### ***Measurements***

To test the presence of eating disorder symptoms the Eating Attitudes Test: Eat26 (EAT: Garner et al., 1982) was picked. The Eat26 test examines the presence and frequency of extreme behaviors

related to eating habits. The questionnaire consists of a total of 26 questions. Identification of those who are at risk of eating disorders are based on information of the individual's Body Mass Index (BMI) and behavioral symptoms based on individual answers. The Body Mass Index (BMI) is computed and used to determine whether the person is "significantly underweight" compared to age matched norms. The score of BMI for teens at age 13-15 years old is critical under the 18 (Rolland-Cachera et al., 1991; Corbin and Lindsey, 1997). The Eat26 item self-report scale assesses eating disorder symptoms on three subscales: dieting (13 item), oral control (7 item), bulimia and food preoccupation (6 item). Subscale total scores are a sum of responses to all items in the scale, where the higher score corresponds to higher severity of eating disorder. Participants give responses on a 6-point scale: never (0), rarely (0), sometimes (0), often (1), usually (2), always (3). The first three responses are scored zero, with the other three responses being scored 1, 2 and 3, accordingly. A score greater than 20 is considered to be an indicator of a possible eating disorder problem and individuals who score 20 or more should seek clinical support (Lane H., Lane A. & Matheson, 2004). The severity criteria are adjusted according to the age of the participants. Anonymous self-report questionnaires proved to be the most effective diagnostic tool for eating disorders among athletes, as seeking for help and admitting the problems are not very common in this population (Bardone-Cone, 2011). Following the methodology described for the Eating Disorder Inventory Referral Form (EDI-RF; Garner, 2004), four behavioral questions are included in this version of the EAT-26, in order to determine the presence and frequency of extreme weight-control behaviors. These questions assess self-reported binge eating, self-induced vomiting, use of laxatives, and treatment for an eating disorder over the preceding 6 months.

### ***Procedure***

Participants were questioned anonymously and voluntarily with parental permission, exclusively for research purposes. The questionnaire was paper-based after training, without the possibility to communicate with other participants and under the supervision of coaches and researchers. Participation in the research lasted about ten minutes. Results of the questionnaire were subsequently entered into free online Google Forms and exported to a .csv file for further processing. In the research the questionnaire "Eat 26" with verified metric characteristics was used (Lane H. et al., 2004).

### ***Statistical analysis***

The Mann-Whitney U Test (MWU) was used to test for the differences in EAT26 total score, individual variables (answers to questions) and the calculated subscales (bulimia and food preoccupation subscale and oral control subscale) between the two sports'. The p-values were Bonferroni corrected, used to counteract with error when doing multiple comparisons. The statistical analysis was conducted in the SPSS 13.4 statistical software.

## **Results**

The results of the research are first presented within the descriptive indicators of the variables used, followed by the results of statistical analyzes. Table 1. shows the results of descriptive statistics of rhythmic gymnasts where is shown BMI, weight, height, ideal weight and response to the questionnaire. In Table 2. are shown the results of descriptive statistics of female handball

players of the same variables.

Table 1. Descriptive statistics of rhythmic gymnasts

	Valid N	Mean	Minimum	Maximum	Std.Dev.
BMI	40	19.5550	16.3000	24.0000	2.101886
Weight	40	163.6750	149.0000	178.0000	6.995924
Height	40	52.4500	40.0000	68.0000	7.598752
Ideal weight	40	50.0500	35.0000	65.0000	7.709302
fear_gain_weight_1	40	3.7250	1.0000	6.0000	1.999840
avoid_eat_if_hungry_2	40	5.3250	3.0000	6.0000	0.944281
often_think_food_3	40	4.1250	1.0000	6.0000	1.324087
cant_stop_eating_4	40	5.3000	2.0000	6.0000	1.017790
slicing_to_pieces_5	40	3.2250	1.0000	6.0000	1.686865
calc_kcal_6	40	4.1750	1.0000	6.0000	1.599479
avoid_hi_carb_7	40	4.3250	2.0000	6.0000	1.439150
people_push_eat_8	40	4.7500	2.0000	6.0000	1.031553
post_vomit_9	40	5.9500	4.0000	6.0000	0.316228

post_guilt_10	40	5.0500	2.0000	6.0000	1.299901
skinny_wish_11	40	4.0750	1.0000	6.0000	1.831176
burn_kcal_12	40	4.9750	1.0000	6.0000	1.367901
people_think_skinny_13	40	4.5000	1.0000	6.0000	1.198289
think_bodyfat_14	40	4.9750	1.0000	6.0000	1.290746
long_meals_15	40	4.1500	1.0000	6.0000	1.442043
avoid_sugar_16	40	4.7000	2.0000	6.0000	1.159133
dietary_food_17	40	4.8250	2.0000	6.0000	1.393897
nutri_ctrl_life_18	40	4.8000	1.0000	6.0000	1.539231
resist_food_19	40	3.8000	1.0000	6.0000	1.572194
people_convince_eat_20	40	5.1500	3.0000	6.0000	0.975337
think_food_alot_21	40	4.7750	1.0000	6.0000	1.458617
no_sweets_22	40	4.6000	1.0000	6.0000	1.277016
ften_diet_23	40	5.0500	2.0000	6.0000	1.357789
like_feel_empty_stomach_24	40	4.9750	1.0000	6.0000	1.671595
have_post_vomit_25	40	5.8250	4.0000	6.0000	0.500641

new_tasty_food_2 6	40	2.9250	1.0000	6.0000	1.558887
cant_stop_eat_1p	40	1.4500	1.0000	4.0000	0.749359
vomit_induce_2p	40	1.0500	1.0000	3.0000	0.316228
laxative_3p	40	1.0000	1.0000	1.0000	0.000000
practice_60min_4 p	40	3.1500	1.0000	6.0000	1.981323

Table 2. Descriptive statistics of female handball players

	Valid N	Mean	Minimum	Maximum	Std.Dev.
BMI	40	21.8100	17.1000	28.3000	2.50567
Weight	40	166.5000	151.0000	181.0000	7.79875
Height	40	60.3750	44.0000	80.0000	9.29485
Ideal weight	40	56.0000	4.0000	75.0000	11.53590
fear_gain_weight_1	40	4.5250	1.0000	6.0000	1.41399
avoid_eat_if_hungry_2	40	5.3000	2.0000	6.0000	1.01779
often_think_food_3	40	3.1250	1.0000	6.0000	1.75685
cant_stop_eating_4	40	5.1250	1.0000	6.0000	1.24422
slicing_to_pieces_5	40	4.3750	1.0000	6.0000	1.42662

calc_kcal_6	40	4.2500	1.0000	6.0000	1.75046
avoid_hi_carb_7	40	5.1000	3.0000	6.0000	0.98189
people_push_eat_8	40	4.9250	1.0000	6.0000	1.36603
post_vomit_9	40	5.8750	3.0000	6.0000	0.56330
post_guilt_10	40	5.5000	2.0000	6.0000	0.96077
skinny_wish_11	40	4.0500	1.0000	6.0000	1.58438
burn_kcal_12	40	4.7500	1.0000	6.0000	1.40967
people_think_skinny_13	40	4.9500	2.0000	6.0000	1.29990
think_bodyfat_14	40	4.6500	1.0000	6.0000	1.40603
long_meals_15	40	4.3750	1.0000	6.0000	1.62808
avoid_sugar_16	40	5.0250	2.0000	6.0000	1.16548
dietary_food_17	40	4.7250	1.0000	6.0000	1.08575
nutri_ctrl_life_18	40	4.8500	1.0000	6.0000	1.40603
resist_food_19	40	4.3000	1.0000	6.0000	1.62038
people_convince_eat_20	40	5.1000	1.0000	6.0000	1.10477
think_food_alot_21	40	4.3750	1.0000	6.0000	1.68990

no_sweets_22	40	5.1250	2.0000	6.0000	1.13652
ften_diet_23	40	5.6000	3.0000	6.0000	0.74421
like_feel_empty_s tom_24	40	5.4750	2.0000	6.0000	0.93336
have_post_vomit_ 25	40	5.9000	5.0000	6.0000	0.30382
new_tasty_food_2 6	40	3.0000	1.0000	6.0000	1.41421
cant_stop_eat_1p	40	1.9750	1.0000	6.0000	1.34903
vomit_induce_2p	40	1.0250	1.0000	2.0000	0.15811
laxative_3p	40	1.0000	1.0000	1.0000	0.00000
practice_60min_4 p	40	2.4250	1.0000	6.0000	1.63123

The EAT26 total score and the Dieting subscale show significant differences between the two groups. The median value for EAT26 total score is higher in the rhythmic gymnasts group (C=16) than within the female handball players (C=9). Regarding the other two subscales (bulimia and food preoccupation subscale and oral control subscale) did not show significant differences between the two groups ( $p > 0.05$ ). In order to evaluate the athlete's perception of their own weight, an eating disorder relevant variable the weight dissatisfaction is proposed calculated from the obtained data, defined according to equation (1) (Parlov, 2020).

$$WD = ((\text{weight} - \text{ideal weight}) / \text{weight}) \quad (1)$$

WD is a measure of how a participant think about her own weight and whether or not he or she should change by means of gaining or losing relative to current weight. The WD was included in all statistical analysis. The results of the MWU test are shown in Table 3. At the BMI and ideal weight, there were also significant differences. Responses to questions 2, 5, 6, 7, 10, 11, 18 and 25 (see supplement for test description) show significant differences among the two groups.

Table 3. The results of the Mann-Whitney U Test showing significant differences in eating behavior on the Eat26 test



variable/answer to questions	p-value
2. Ever made yourself sick (vomiting) to control your weight or shape?	<0.05
6. Aware of the calorie content of foods that I eat.	<0.01
7. Particularly avoid food with a high carbohydrate content	<0.05
10. Feel extremely guilty after eating.	<0.01
11. Am preoccupied with a desire to be thinner.	<0.05
18. Feel that food controls my life.	<0.05
25. Have the impulse to vomit after meals	<0.01
Weight dissatisfaction (WD)	<0.01
Weight	<0.05
Ideal weight	<0.01
Dieting subscale	<0.05
EAT26 score	<0.05

Question no.9 had an equal response over both groups, which was 0 for all participants, out of the 25 questions in EAT26. Out of 40 female handball players, 29 have a BMI above 21.234, while for rhythmic swimmers there are only 9 above the same criteria.

## Discussion

When it comes to the EAT26, it is important to focus at young athletes because it seems that eating disorders and similar behavior appear at young ages. There is lacking of evidence on these aspects in young group sports. To our knowledge, this is the first research that is comparing two team sports in eating disorders. The score of EAT26 at or above 20 on the EAT-26 suggest the individual to get in contact with a physician or an eating disorders treatment specialist for a follow-up evaluation (Garner, 2004). Rhythmic gymnasts had a higher median value than the female handball players. Six of the forty rhythmic gymnasts have value above 20 and eight more of them are above 18. Since the questionnaire was anonymous, we believe that most participants give honest answers, which means that EAT-26 usually provides very useful information about the symptoms and eating problems that are common in eating disorders. BMI was discriminating variable because it turned out to be that female handball players have a higher weight, which also requires the nature of sport, but there should be no difference in these ages. By comparing the results, we can see the significant difference between rhythmic gymnasts, who are “forced to” look thin and female handball players in whose sport aesthetic component of the body is not needed for success. In their research, Sundgot-Borgen and Torstveit (2004), described a sport-specific variant of anorexia nervosa, where female athletes who have problems with eating disorders show an intense fear of gaining weight or becoming fat, although the athletes are not overweight at all, so there are using variety of pathogenic weight-control techniques to achieve their individually ideal weight. There is a similar research comparing two water sports, where Parlov et.al. (2020) in which it turned out that artistic swimmers might be affected by eating disorders due to the specifics of

the sport (leanness sport).

## Conclusion

This research has been used to examine the factors that cause eating disorders in rhythmic gymnastics, examine the dimension of Body Mass Index and their relations with possible symptoms of eating disorders and compare them with the group of the same age. Rhythmic gymnasts may be affected by eating disorders because this thinness is positively evaluated by judges, so the aim is that judges became aware of this mental illness and try to influence the change of rating. Coaches and team experts should be educated about eating disorders so they can help athletes and also point to negative physical and psychological consequences. It is important that rhythmic gymnasts know that they can look thin and be strong and healthy, but only with good nutrition which should be achieved by expert team (coach, nutritionist, physiotherapist and psychologist). In future research, it would be good to conduct qualitative research over a longer period of time by comparing the nutrition and sports achievements.

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# Simptomi poremećaja hranjenja u ženskim sportovima: usporedba ritmičkih gimnastičarki s rukometašicama

## Sažetak

Prethodna istraživanja pokazuju da su sportašice posebno izložene riziku od poremećaja prehrane i kontroliraju svoju težinu više u estetskim, nego neestetskim sportovima. Cilj ovog istraživanja bio je utvrditi poremećaje prehrane u ritmičkoj gimnastici pomoću EAT-26 testa. U istraživanje je uključena i grupa rukometašica kako bi se usporedili rezultati iz estetskog i neestetskog sporta. Ritmička gimnastika je konvencionalni sport u kojem se vježba izvodi na tlu s vijačom, obručem, loptom, čunjevima i trakom uz pratnju glazbe. Uzorak ispitanika činile su ritmičarke (N=40) i rukometašice (N=40) u dobi od 14-17 godina. EAT-26 sadrži 26 stavki koje su podijeljene u tri razine ('dijeta', 'bulimija' i preokupiranost hranom', 'oralna kontrola') korišten je za testiranje prisutnosti simptoma poremećaja prehrane. Rezultati Mann Whitney U testa pokazali su da postoje značajne razlike između dvije skupine ispitanika u ukupnom rezultatu EAT-26. Usporedbom stavova o prehrani, starosti i indeksa tjelesne mase (BMI) otkriveno je da ritmičarke značajno više kontroliraju tjelesnu težinu i način prehrane nego rukometašice.

## Ključne riječi

EAT-26; indeks tjelesne mase; konvencionalni sportovi; ritmička gimnastika; sportašice

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