

# DETECTION OF EATING DISORDERS IN MALE AND FEMALE ARTISTIC GYMNASTS

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## **Abstract**

*The purpose of this study was to investigate the trend of eating disorders in competitive male and female artistic gymnasts. The study involved 23 male and 42 female gymnasts, aged 7-27, from sports clubs throughout Greece. The EAT-26 Diet Attitudes scale was used to investigate participants' eating habits. The data collection process included communication with sports organizations throughout Greece on the content and purpose of the research. After consultation, the questionnaire was due to the COVID-19 pandemic provided in an electronic form and also included the consent form for participation in the research. The results of the study indicated that eleven of the sixty-five gymnasts had a total score of >20 on the EAT-26, a rate higher among female gymnasts (~ 24%) compared to male gymnasts (~ 4.4%) ( $p < .05$ ). Although female gymnasts develop more eating disorders and bulimia than male gymnasts, no significant differences were found in the subscales of the questionnaire ( $p > .05$ ). Therefore, this finding in combination with the fact that most of the gymnasts were teenagers ( $15.23 \pm 6.35$  years old) requires particular importance and attention from coaches and the family environment.*

**Keywords:** *Eating disorders, Artistic gymnastics, Aesthetic sports, Puberty, Neurogenic anorexia, Neurogenic bulimia, Covid-19.*

## **INTRODUCTION**

The term eating disorder defines the definitive disorder of eating habits and control of body weight that, as a result, may cause clinically significant damage to the health and psychosocial behavior of the individual (Sudi et al., 2004). Psychogenic anorexia and bulimia nervosa are the most extreme manifestations of eating disorders; however, some factors such as food or diet obsession, lack of satisfaction with body image, and constant weight gain are associated with divergent eating behavior (Michou & Costarelli, 2011). These symptoms are caused by psychological and emotional factors (Weinberg & Gould, 1995), more specifically, low self-esteem,

feelings of hopelessness, negative self-esteem, and anxiety in relation to weight and body shape (Heywood & McCabe, 2006). Since the beginning of the 21st century, the prevalence of eating disorders seems to play an important role both in the general population and in the field of high-performance sports (Clark, 2007). In more recent years, eating disorders have progressively become more frequent in female population, and specifically in sports (Hausenblas & Carron, 1999; Swoap & Murphy, 1995). The main eating disorders are classified into the following categories of pathological conditions: a) "psychogenic-neurogenic anorexia", b)

"psychogenic-neurogenic bulimia" and c) "atypical eating disorders" (Michou-Costarelli, 2011).

The competitive profile of aesthetic sports such as artistic (AG) and rhythmic gymnastics (RG) predisposes mainly female gymnasts to a constant preoccupation with their shape, size and/or body weight (Dallas, Dallas, Simatos, Simatos, 2016). Further, the vast majority of gymnasts engaged in such sports attempt to maintain the "perfect" physical appearance, which is characterized by low total body mass and low-fat mass throughout their sporting career (Beals, 2004), generating an increased association of eating disorder (Kerr, Berman, De Souza, 2006; Krentz & Warschburger, 2011; Nordin, Harris & Cumming, 2003). In aesthetic sports (AG & RG), environmental factors (coaches, parents, judges) put constant pressure on young gymnasts to maintain a slim body (Salbach, Klinowski, Pfeiffer, Lehmkuhl, & Korte, 2007), since low body weight is associated with high quality performance (Sample, 2000). Low body weight meets the "aesthetic" requirements of sports (Thompson & Sherman, 2010) mainly in RG where it appears that there are higher indicators in the tendency for a slim body and the incidence of eating disorders in comparison to AG and acrobatic gymnastics (AcG) (Nordin, Harris, & Cumming, 2003).

The incidence of eating disorders (EDs) in athletes of different sports (21%) and level of performance is higher than in non-athletes (6%) (Byrne & McLean, 2001; Hausenblas & Carron, 1999). In addition, the diagnostic criteria for subclinical and clinical EDs were met by more athletes (13.5%) than controls (4.6%,  $p < .001$ ) and by more female (20%) than male athletes (8%,  $p < .001$ ) (Sundgot-Borgen & Torstveit, 2004), while in sports that have strict criteria for controlling body weight - either as a condition of performance or ranking or as a subjective assessment by judges, such as AG and RG,

indicate much higher rates of EDs (Cook & Hausenblas, 2011; Smolak, Murnen, & Ruble, 2000). Factors such as training volume, unusual eating practices and reduced food intake, contribute to the occurrence of eating disorders (Monthuy-Blanc, Maiano, & Therme, 2010). Moreover, low self-esteem and body dissatisfaction appear to be determinants of the occurrence of eating disorders in the general population (Jacobi et al, 2004). Self-esteem is an imperative predictor of various disorders in adolescence and adulthood and its lacking contributes to poor body image (Gleason, Alexander, & Somers, 2000) and is associated with both the occurrence of eating disorders (Milligan & Pritchard, 2006) as well as constant preoccupation with dieting and lack of satisfaction with the physical image. Body image refers to the perceptions, feelings and thoughts that a person experiences regarding their shape, body size and appearance, while lack of satisfaction with body image is considered an important factor in the occurrence of eating disorders (Kato et al. 2011).

Defamatory comments about the body or instructions for weight loss create a tendency for disturbed eating habits (Kerr et al, 2006) and higher rates of negative emotions, for instance, shame and anxiety (Muscat & Long, 2008). It is estimated that up to 40-45% of elite athletes in "aesthetic" sports show symptoms of eating disorders (De Souza et al., 2014; Francisco, Alarcao, & Narciso, 2012). The importance of this research lies in the fact that the developmental age of adolescence is a critical and sensitive period for the occurrence of eating disorders, especially in gymnastic sports (Sundgot-Borgen & Torstveit, 2004), as well as for their subsequent maintenance in the future. Hence, the purpose of this study was to investigate the occurrence of eating disorders in competitive male and female artistic gymnasts, and look at gender differences in eating attitudes as well.

## METHODS

Forty-two competitive female gymnasts, aged 7-27, with a mean age  $15.04 \pm 5.8$  years and a mean training experience  $8.61 \pm 5.31$  years; and twenty-three male gymnasts, aged 7-27 ( $13.78 \pm 5.1$ ), with a mean training experience  $8.14 \pm 4.32$  years, volunteered to participate in the study. The present research was carried out in sports clubs of Greece during the months of January to August 2021. The 65 questionnaires were collected from sports clubs throughout Greece. The response rate of athletes amounted to 78% of the total number of gymnasts in the aforementioned clubs. (Initially, the questionnaire was sent to a much larger sample of gymnasts. However, a number of questionnaires was poorly answered and therefore not considered for statistical analysis). The body height and body weight of the participants were self-reported (information was collected in the survey) and the demographics of the gymnasts (age, gender, sport, education, competitive experience, training frequency) were collected in the survey and completed by gymnasts and/or their parents. The body mass index (BMI) ( $\text{kg}/\text{m}^2$ ) of the athletes was calculated according to the known mathematical formula  $\text{weight} / \text{height}^2$ ; on this basis, the average and the standard deviation for the anthropometric characteristics were calculated. The procedures were approved by the Institutional Ethics Review Committee of the National and Kapodistrian University of Athens.

To identify potential eating disorders and evaluate gymnasts' eating behaviours, the following questionnaire was used: The Eating Attitude Test EAT-26 (Garner, Olmsted, Bohr and Garfinkel, 1982) is an eating attitudes test that has been validated for use in the Greek population (Douka, Grammatopoulou, Skordilis, Koutsouki, 2009). It is a leading diagnostic evaluation marker for the early identification of subclinical cases of disordered eating

behaviour. This scale was constructed to record the symptoms, behaviours, and thoughts associated with eating disorders. In addition to the single factor "eating attitudes" (26 questions in a 4-point Likert-type scale), the questionnaire includes 3 separate sub-scales dealing with: slimming diets (dieting), bulimia and pre-occupation with food, and oral control. The total score of EAT-26 is obtained by summing up the total number of sentences that make it up with a special scoring key, while the score of each factor is obtained by summing up the score of individual questions that make it up. Overall performance of  $\geq 20$  at EAT-26 indicates abnormal eating behaviour and appearance of symptoms of disordered food intake. However, this questionnaire is not utilised to diagnose eating disorders; rather, it is designed to detect a possible onset or pre-existing eating disorder. Subsequent confirmatory factor analysis of the questionnaire (Douka, Grammatopoulou, Skordilis, & Koutsouki, 2009) resulted in a questionnaire consisting of 13 questions with three factors (diet, bulimia and food).

After consultation of the researcher with the sports clubs, the coaches were informed over the phone and in written form about the content and purpose of the research. Due to the pandemic, they were given the questionnaire in electronic form. It included the consent form for participation in the research which had to be completed and signed by the gymnasts themselves (if they were adults). Prior to the study, the gymnasts, their parents and coaches were fully informed about the purpose and procedures of the study and gave their written informed consent. For underage children, a prerequisite for participation was to send digitally parental consent. In addition, a cover letter was sent digitally to participants, parents-guardians, and coaches, stating that their participation was voluntary, they were not at any type of risk; it informed them of the importance and purpose of the study, and the confidentiality and anonymity of the

data collected. Participants were given a written reminder that all questions had to be answered by choosing the option that represented them, including a hint that there were no right or wrong answers. The questionnaire was completed by the parents / guardians of underage participants.

Statistical analysis was performed with SPSS v. 22 (SPCC Inc., Chicago, IL) and the level of statistical significance was set at .05. After the preliminary check, it was found that the basic statistical assumptions were met and that the variables had an approximately normal distribution. Initially, descriptive statistics indices (means and standard deviations) were used for all variables under consideration. In order to examine the differences between the two groups in anthropometric characteristics and in all examined variables, a t-test was performed between independent samples. The Pearson r correlation coefficient was used to investigate the correlations between the variables in question. The Cronbach alpha was used to examine the internal consistency across three age groups (children, adolescent, adults). The results revealed coefficients ranging from .297 to .567, and may be found in Table 1.

Cohen (1988) limits were used to determine the intensity of the statistically significant correlations. Specifically, if  $r < .29$ , the correlation is considered weak, if  $.30 < r < .39$  is considered moderate, if  $.40 < r < .69$  is considered strong, and finally, if  $r > .70$ , the correlation is considered very powerful.

## RESULTS

Descriptive statistics of anthropometric characteristics as well as body mass index (BMI) and training experience are presented in Table 2.

Of the 42 gymnasts who participated in the study, 10 scored  $> 20$ , of which four were aged 12-17, three 8.5-11 and three 24-25. Of the 23 athletes, only one scored

$> 20$  (aged 19 years). Means and standard deviations of gymnasts' scores for both genders in EAT-26 scale as a whole as well as in the individual factors (diet, bulimia and food, swallowing control) are listed in Table 3.

Table 1  
*Internal consistency across age groups.*

Group	Cronbach's Alpha
<b>Diet</b>	
Total	.567
Children	.438
Adolescent	.422
Adults	.438
<b>Bulimia</b>	
Total	.297
Children	.287
Adolescent	.463
Adults	-.181
<b>Oral control</b>	
Total	.432
Children	.034
Adolescent	.381
Adults	.730

Furthermore, the total sample was categorized according to their total score in EAT -26 as well as depending on gender (Table 4).

In addition, correlations between the subscales of the EAT 26 are presented in Table 5.

Table 2

*Anthropometric characteristics, body mass index and training experience of the sample (n = 65).*

	Male gymnasts (n=23)	Female gymnasts (n=42)	Total sample (n=65)
Age (years)	13.78 ± 5.10	15.23 ± 6.35	14.72 ± 5.98
Weight (kg)	47.88 ± 18.73	42.7 ± 13.26	44.53 ± 15.61
Height (m)	1.53 ± 0.18	1.49 ± 0.14	1.515 ± 0.15
Body Mass Index (BMI) (kg/m <sup>2</sup> )	19.53 ± 3.51	18.69 ± 3.1	18.99 ± 3.28
Training experience (years) *	8.61 ± 5.31	8.14 ± 4.32	8.31 ± 4.70

Table 3

*Gymnasts score in EAT -26 scale.*

Parameter	Male gymnasts (n=23)	Female gymnasts (n=42)	Total sample (n=65)
<i>Engagement with diet Bulimia &amp; Engagement with food</i>	5.52 ± 4.57	7.07 ± 4.65	6.6 ± 4.62
<i>Oral Control</i>	2.43 ± 1.50	3.45 ± 2.65	3.14 ± 2.35
<i>EAT-26</i>	2.33 ± 2.21	2.57 ± 2.53	2.5 ± 2.4
<i>EAT-26</i>	9.8 ± 6.9	12.09 ± 7.46	11.9 ± 7.73

*p > .05*

Table 4

*Categorization of the sample (n = 65).*

Categorization of the sample according to the total score in EAT-26				
Total score	Frequency		%	
>20	11		16.92	
<20	54		83.07	
Categorization of male and female artistic gymnastics athletes according to the total score in EAT-26				
Total score	Male athletes (n = 23)		Female athletes (n = 42)	
	Frequency	%	Frequency	%
>20	1	4.35	10	23.91
<20	22	95.65	32	76.19

Table 5

*Pearson correlation between subscales of EAT 26 (n = 65).*

	diet	Bulimia	Swallowing control
Dieting	1	.440 **	.771 **
Bulimia	.440 **	1	.481 **
Oral control	.771 **	.481 **	1

*p < .01*

## DISCUSSION

The majority of scientific studies referring to eating disorders are mainly focused on female population as it is more prone to eating disorders compared to males. Therefore, the purpose of this study was to investigate the tendency of eating disorders in competitive male and female artistic gymnasts. Subsequently, the differences in dietary attitudes of the male gymnasts compared to female gymnasts was examined. Further, a Pearson correlation that was conducted to reveal the correlation between the subscales of EAT 26 verify data by Thomas, O'Hara, Tahboub-Schulte, Grey, Chowdhury (2018) who found positive correlation among these subscales.

Results showed that the overall score in EAT-26 was 12.1 (7.1 on the diet subscale, 3.5 on the bulimia subscale and 2.6 on the swallowing control subscale) and 9.8 (5.5 on the diet subscale, 2.4 on the bulimia subscale and 2.3 on the oral control subscale) for female and male gymnasts, respectively. Accordingly, female gymnasts scored higher overall on the EAT-26 Eating Attitudes Scale as well as on individual values in the Diet and Bulimia and Eating categories. Nevertheless, no significant differences were revealed between male and female athletes on the subscales of the questionnaire ( $p > .05$ ). Further, a few non-significant differences were found between

children and adolescents in our study ( $p > .05$ ), as opposed to Hadjigeorgiou et al. (2018) who found significant differences between different age groups, in both men and women, as young and middle adulthood scored higher when compared to adolescence.

Our findings differed from those of Gonidakis et al. (2008) who examined 33 athletes from various sports (wrestling, track & field, gymnastics, and martial arts) and discovered that the total score on the EAT-26 questionnaire was 8.6, revealing lower scores on the diet and bulimia subscale (3.3 and 1.7, respectively) in contrast to the higher score (3.6) on swallowing control. Furthermore, our results demonstrated that female gymnasts are more susceptible to developing eating disorders compared to male gymnasts. The high percentage (15.4%) of female athletes with a score greater than 20 showed that there is a worrying tendency in the occurrence of eating disorders in the sport of artistic gymnastics. This is consistent with previous data (Theodorakou & Donti, 2013) which showed that 9 out of 30 female athletes had a score higher than 20 in EAT-26, and those of Sundgot-Borgen & Torstveit (2004) who found high incidence of eating disorders in athletes of aesthetic sports. Respectively, the research of Martinsen and Sundgot-Borgen (2013) found that 19.7% of female athletes were more likely to develop an eating disorder

during adolescence compared to non-training individuals.

Participation in gymnastics/aesthetic sports is often associated with strict control of body weight, as a slim and lean body is a prerequisite for performance, ranking and positive evaluation by judges. Meeting the requirements of aesthetics sports (Thomson & Sherman, 2010) is associated with high incidence of eating disorders in these sports (Cook & Hausenblas, 2011; Smolak, Murnen & Ruble, 2000). Therefore, the results of the present study emphasize the importance of athletes' performance level as 11 of the 65 athletes scored more than 20.

However, certain limitations do not allow for generalization of the present findings without considerable caution. A primary limitation is that the data were collected by using questionnaires. Although this method is widely accepted in psychological research, researchers do not have the ability to monitor responses. Regardless, this data collection technique does not appear to affect the validity of the results (Pate, 1993). Another limitation is the wide range in the age groups of the sample, as well as the number of participants ( $n = 65$ ), and that measurements of anthropometric characteristics were conducted by the participants. Likewise, apart from the calculation of the body mass index, no other measurements were performed (eg., fat measurement). This restriction is particularly important as it does not provide information on participants' lean body mass. The main reason for the small number of participants was that the present study was performed under pandemic conditions. Consequently, all clubs were closed and it was difficult to communicate properly with the managers and coaches. In addition, the present study is original not only because it was conducted during the pandemic but also because it was an attempt to detect eating disorders not only in female but also in male gymnasts from different clubs. In addition, a limitation of

the study was that it involved only artistic gymnasts; the main reason was to detect EDs in this aesthetic sport in which both sexes participate and is characterized by dynamic exercises performed on different apparatus with different structure. Finally, a limitation which should be mentioned is that this particular study was performed during the pandemic confinement of COVID-19. This means that the information of the gymnastics clubs and coaches was made over the phone and the questionnaires were distributed electronically. Therefore, there was no direct contact and interaction with the participants, which means that any questions and clarifications about the process were not possible. The results of the study will lead to new findings, adding to the issue that has not been studied enough and directly concerns not only gymnasts' performance but also their health. Thus, the importance of research lies in the fact that the developmental age of adolescence is a critical and sensitive period for the occurrence of eating disorders, especially in gymnastics/aesthetics sports. However, further research should aim to examine differences in more detail, between gymnasts from different branches of gymnastics, such as trampoline, rhythmic gymnastics, acrobatic gymnastics, etc. In addition, eating disorders in non-aesthetic sports, such as martial arts, contact sports, and team sports, can be investigated. Given the limitations of the present study, future research is needed to investigate larger and more homogeneous samples of gymnasts, to investigate the existence and frequency of eating disorders. Finally, it is deemed necessary to repeat the present research once the pandemic is behind us.

## CONCLUSIONS

Results of the present research led us to the following conclusions. Initially, the results of the study indicated that eleven of the 65 participants (16.9%) had an overall

score > 20 at EAT- 26 and no gender effect was found in EAT-26. More specifically, ten of the 42 female gymnasts (23.91%) scored > 20, while only one of 23 male gymnasts (4.35%) had a total score > 20. Similarly, in the individual dimensions of EAT-26, Diet and Bulimia and food, female gymnasts showed higher values. Consequently, female artistic gymnasts seem to be a high-risk group for eating disorders.

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