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Body dissatisfaction and eating disorders in acrobatic gymnasts as a function of competition level

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ABSTRACT

Introduction: In gymnastics sports, including Acrobatic Gymnastics (AG), there is a prevalence of Eating Disorders (ED). One of its main causes lies in body dissatisfaction. Therefore, the objectives of this study were: a) to know and compare the risk of ED and body dissatisfaction in a group of national level GA athletes at two levels of competition, b) to estimate if there are gymnasts who meet any of the criteria for referral to a health centre.

Methods: A descriptive cross-sectional study was conducted with the participation of 74 national female gymnasts in the Youth and Age Group categories. Height and weight measurements were used to find body mass index (BMI) and bodyfold for % body fat (%BF).

The Eating Disorders Inventory (EDI 3-RF) and the Body Shape Questionnaire (BSQ) were used for the variables Body Dissatisfaction and the EDI 3-RF was also used for the variable EDI 3-RF for the variable ED.

Results: The results showed that there are low percentages of gymnasts at risk of ED, finding body dissatisfaction as a possible antecedent for the presence of these disorders.

Conclusions: The higher category age group gymnasts stand out for a higher risk of developing ED and body dissatisfaction, as they present higher levels of Obsession for thinness, bulimic behaviours and body dissatisfaction, but without significant differences. Signals a possible onset of risk in higher categories.

KEYWORDS

Gymnastics, Mental Disorders, Body Image, adolescents, Acrobatic gymnastics.

INTRODUCTION

Eating disorders (EDs) are classified as psychological disorders, which are characterised by abnormalities in food intake[1]. The most common ED conditions are anorexia nervosa (AN), bulimia nervosa (BN) and eating disorder not otherwise specified (EDNOS) according to the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders, Fifth Revision (DSM-5) (APA, 2013). Among the range of possibilities, it seems that body image (BI) and in particular body distortion or dissatisfaction plays an important role in ED[2].

The BI is the mental and conscious representation that each individual constructs and perceives of his or her body. It is a construct that has different components: the perceptual (perception of the body as a whole or of some of its parts), the cognitive (evaluations regarding the body or a part of it), the affective (feelings or attitudes regarding the body or a part of it and feelings towards the body) and the behavioural (actions or behaviours that occur as a result of the perception[3]. Dissatisfaction refers to the cognitive-affective component and is the discomfort or dissatisfaction towards our body or some part of it[4]. This dissatisfaction can lead to a disturbance in food intake and undoubtedly has an impact on a causal relationship in ED[2].

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Generally, these EDs in women carry great weight due to the increasing desire to be thinner, becoming in many cases an obsession with thinness[2].

In sports or aesthetic physical activities, this concern for BI is often more present due to the artistic requirements that lead athletes to weight concerns because of the social pressures of their sporting environment, leading to greater body dissatisfaction in the first place, which subsequently affects intake restriction or bulimic behaviours[5,6,7].

Specifically in gymnastic sports, it is indicated that there is a prevalence of these disorders in the disciplines of rhythmic gymnastics and aerobic gymnastics[2,8]. The systematic review study by Salas-Morillas et al.[7] carried out along these lines confirms that gymnasts are at greater risk of suffering from ED, highlighting the appearance in higher categories, with one of the main causes being concern, distortion and dissatisfaction with BI. However, it all depends on the gymnastic discipline, as in a comparative study between rhythmic and acrobatic gymnasts, the latter presented higher body esteem[9]. On the other hand, a study that assessed the CI and nutritional characteristics through the Mediterranean diet in GA athletes from the Autonomous Community of Andalucía (Spain), observed that gymnasts had greater satisfaction than non-gymnasts[10].

With regard to EDs, most studies focus on the sedentary population[11,12]. It seems appropriate to emphasise the importance of conducting more studies on samples of athletes in order to estimate in depth the degree of impact of EDCs in this population. In addition, athletes aged between 12 and 17 years are the most vulnerable segment of the population, as they not only have to face all that comes with being an adolescent, but also the demands of being a high-level sports practitioner[13].

On the other hand, we are not aware of scientific studies that quantitatively assess whether acrobatic gymnasts, depending on their competitive category at pre-adolescent and adolescent ages, are at greater or lesser risk of developing Eds.[14] Hence, the aim of this study is precisely a) to know and compare the risk of Eds and body dissatisfaction in a group of national level gymnasts at two levels of competition, b) to estimate whether there are gymnasts who meet any of the referral criteria for referral to a health centre.

METHODS

Participants

The participants were selected through a descriptive cross-sectional study, accessing the collection of information in those groups of gymnasts to which there was easy access and informed consent from the guardians. The final sample consisted of 74 national gymnasts divided into two groups according to competitive category: youths (48.7%) and age group (51.3%), all of whom were female competitors. The age range was between 8 and 16 years, with a mean age of 12.9 (SD = 1.93), being 12.55 (SD = 1.71) the mean age for the youth gymnasts and 13.2 (SD = 2.08) for the age group gymnasts. The gymnasts had an average of 5 years of practice and trained 12.19 hours on average per week. The study followed the guidelines established by the 2013 Declaration of Helsinki and respected the ethical considerations of the Sport and Exercise Science Research and was approved by the Research Ethics Committee of the University of Granada (reference number: 1484/CEIH/2020).

Variables and instruments

The Body Shape Questionnaire (BSQ) by Cooper et al.[15], adapted by Raich, et al.[16], which measures the cognitive-behavioural component, was used to measure the CI variable. It consists of 34 items, with six response options on a Likert-type scale (1 = never; 2 = rarely; 3 = sometimes; 4 = often; 5 = very often; and 6 = always). The maximum score to be obtained is 204 points and the minimum 34 points, which are divided into the following cut-off points: a) less than 81, no dissatisfaction with the CI; b) 81-110, mild dissatisfaction; c) 111-140, moderate dissatisfaction; and d) greater than 140, extreme dissatisfaction. It allows obtaining an overall score (sum of the direct scores of the items) and 4 subscales can be derived: body dissatisfaction, fear of gaining weight, low esteem for appearance and desire to lose weight. The Cronbach's alpha internal consistency coefficient in the original version is 0.93 by Cooper et al.[15] to 0.97 by Raich et al.[16], being 0.96 in this study for the whole sample.

The Eating Disorders Inventory (EDI-3-RF), Garner[17], in its Spanish adaptation[18] was used for the EDI variable. It allows a rapid assessment with standardised criteria to rule out or confirm the presence of ED. An individualised score can be obtained for each of the three scales: Obsession with thinness (7 items), bulimic behaviours (8 items) and body dissatisfaction (10 items).

* Drive for Thinness scale (DT) measures a strong drive for getting thinner or a strong fear of fatness, consequently becoming a good predictor of binge eating or ED devel-opment. The direct score ranges from 0 to 20, 12 being the critical value.

* Bulimia scale (B) evaluates the tendency towards thoughts related to excessive eating or towards uncontrolled binge eating. The direct score ranges from 0 to 32, the critical value lying between 5 and 8, depending on the gymnast's BMI.

* Body Dissatisfaction scale (BD) assesses the individual's dissatisfaction with their general body shape or those body parts that people with ED are usually most concerned about: belly, hips, thighs, buttocks, etc. The direct score ranges from 0 to 40, divided into three levels depending on the body dissatisfaction intensity: 0-6 low, 7-27 average and 28-40 high.

Lastly, this questionnaire allows for referral to a specialised service, depending on three standard criteria:

- Criterion 1 is exclusively based on the individual's BMI. Depending on sex and age, it is decided whether the body weight is excessively low.

- Criterion 2 relates BMI to the presence of excessive concern about weight or food, or complicated eating patterns (assessed through DT and B scales).

- Criterion 3 focuses on the presence of behavioural symptoms that could suggest an ED (assessed through the B scale of the questionnaire).

Finally, this questionnaire allows the referral of subjects to a specialised care service for a more rigorous study according to three established criteria: criteria 1, based on the subject's BMI; criteria 2 relates BMI to the measures of two scales DT and B; criteria 3 is based on the presence of behavioural symptoms warning of a possible ED (assessed with part B of the questionnaire).

For the anthropometric variables weight and height, the instruments used were: a TEFAL digital scale with a precision of 0.05 kg for weight and a SECA 220 measuring rod with a precision of 1 mm for height. With the weight and height measurements, the BMI was calculated, based on weight (kg) divided by height squared (metres).

Procedure

The most important clubs at national level were visited, requesting permission to access the gymnasts. Prior to the administration of the tests, we explained to them what the study consisted of and informed them of the voluntary, anonymous and confidential nature of the data. Furthermore, as the gymnasts were minors, the signed authorization of their parents was requested by means of informed consent. Data collection was carried out in small groups always in the presence of one of the authors, with ISAK level 1 certification. Firstly, a self-registration form was filled in with questions regarding age, years of practice in gymnastics, club, competitive level and weekly training days/hours and then the BSQ and the EDI-3RF. The completion of all the questionnaires took between 15 and 20 minutes. Finally, the anthropometric tests were carried out in accordance with the recommendations and protocol established by the International Society for the Advancement of Kinanthropometry (ISAK)[19]. In all measurements the gymnasts were barefoot and in training clothes.

Statistical analysis

For descriptive statistics, means, percentages and standard deviations were calculated. For inferential analysis the normality of the data distributions was tested using the Shapiro-Wilk test for normality. The Mann-Whitney U-test was performed to compare differences by categories in body dissatisfaction and ED due to the non-normal distribution of the data. Correlational analysis between variables was by Spearman correlation coefficients. Statistical significance was set at $p < .05$. All statistical analyses were performed using Statistical Package for the Social Sciences (SPSS) v. 25.0 software (SPSS Inc., Chicago, IL).

RESULTS

Firstly, table 1 shows the descriptive analysis of the gymnasts' overall mean scores in all the variables analysed, taking into account the different scales of the instruments used.

It can be seen that Youth gymnasts have the highest BMI, with a normal BMI of 19.5. Regarding the body dissatisfaction

Table 1. Descriptions of the different variables according to category

	Youth (n=36)	Age Group (n=38)	Total (n=74)	*p*
Age	12.55±1.71	13.2±2.08	12.9±1.93	0.000
Wheight (kg)	45.2±10.5	45.9±12.5	45.6±11.5	0.000
Height (m)	1.5±0.11	1.5±0.12	1.5±0.11	0.010
BMI	19.7±2.4	19.3±3.1	19.5±2.8	0.200*
BSQ	69.6±29.5	62.7±36.7	66.1±33.3	0.000
DT	10.3±7.7	10.1±8.4	10.2±8.1	0.000
B	4.7±4.7	6.3±7.7	5.6±6.4	0.000
BD	17.1±4.7	18.1±5.1	17.5±4.9	0.000

BMI= Body Mass Index; BSQ= Body Dissatisfaction by BSQ DT= Thinness Dissatisfaction; B= Bulimia; BD= Body Dissatisfaction by EDI-3RF.

values, the Age Group level gymnasts have the highest values of dissatisfaction. And according to the indexes of Obsession for Thinness, Youth gymnasts have higher values, but the same does not occur with the risk of Bulimia B, as it is the Age Group gymnasts who have higher values.

Tables 2 describe the frequency and percentage of body dissatisfaction levels according to category in the different questionnaires, showing a high percentage of gymnasts in both categories with no dissatisfaction according to the BSQ questionnaire up and none with high levels of dissatisfaction regarding the EDI3 RF questionnaire low.

The majority of gymnasts (79.7%) are in No body dissatisfaction according to the BSQ questionnaire, with Age Group gymnasts having the highest body dissatisfaction scores. 7.9% are at Moderate dissatisfaction and 5.3 at an extreme level.

Regarding the results of the EDI 3RF questionnaire, the majority (36.4%) are at a medium level of body dissatisfaction, with 39.4% of Age Group gymnasts at a medium level, and none of the gymnasts at the High level of the total sample.

Table 3 describes the frequency and percentage of gymnasts who are in the critical value of the different scales Thinness Obsession (DT) and Bulimia (B).

On the other hand, Age Group gymnasts have a higher risk of TD (34.2%) compared to 25% of gymnasts in the Youth category. In the case of the risk of suffering from bulimia, 26.3% of Age Group gymnasts compared to 19.4% of Youth gymnasts. And the Figure 1 describes the differences of the values DT and B according to the categories.

Table 4 describes the frequency and percentage of subject referral to treatment according to the three criteria established by the EDI-3RF. For these percentages, the DT scale related to Obsession with Thinness was considered as an assessment measure to refer gymnasts with a score of 9 or more on this component and 4 for the B scale. Following these criteria, only 1 gymnast, 2.7% of the youths and 3 gymnasts, 7.8% of the age-groups were included in this warning group for risk of ED (criteria 3). In both groups the percentage was similar with no significant differences.

Table 2. Frequency (percentage) of different levels of Body Dissatisfaction (BSQ/EDI 3 RF) according to category

Category	No dissatisfaction	Mild dissatisfaction	Moderate dissatisfaction	Extreme disatisfaction	*p*
Youth (n=36) %	29 (80.45)	8 (22.2)	2 (5.6)	1 (2.8)	0.070
AgeGroup (n=38) %	30 (78.9)	3 (7.9)	3 (7.9)	2 (5.3)	0.000
Total (n=74) %	59 (79.7)	11 (14.1)	5 (6.8)	3 (4.1)	0.000

Category	Under	Medium	High	*p*
Youth (n=36) %	5 (12.8)	12 (33.3)	-	0.096
AgeGroup (n=38) %	4 (10.5)	15 (39.4)	-	0.000
Total (n=74) %	9 (12.8)	27 (36.4)	-	0.000

Table 3. Frequency (percentage) of gymnasts who are in critical values of the variables Thinness Obsession (DT) and Bulimia (B) according to category

Category	DT	B
Youth (n=36) %	9 (25)	7 (19.4)
AgeGroup(n=38) %	13 (34.2)	10 (26.3)
Total (n=74) %	22 (29.7)	17 (22.9)
p	0.000	0.000

Table 4. Frequency (percentage) of gymnasts meeting the referral criteria according to category

Category	Criteria 1	Criteria 2	Criteria 3
Youth (n=36) %	-	10 (27.7)	1 (2.7)
AgeGroup(n=38) %	5 (13.1)	13 (34.2)	3 (7.8)
Total (n=74) %	5 (6.7)	23 (31)	4 (5.4)
p	0.000	0.000	0.000

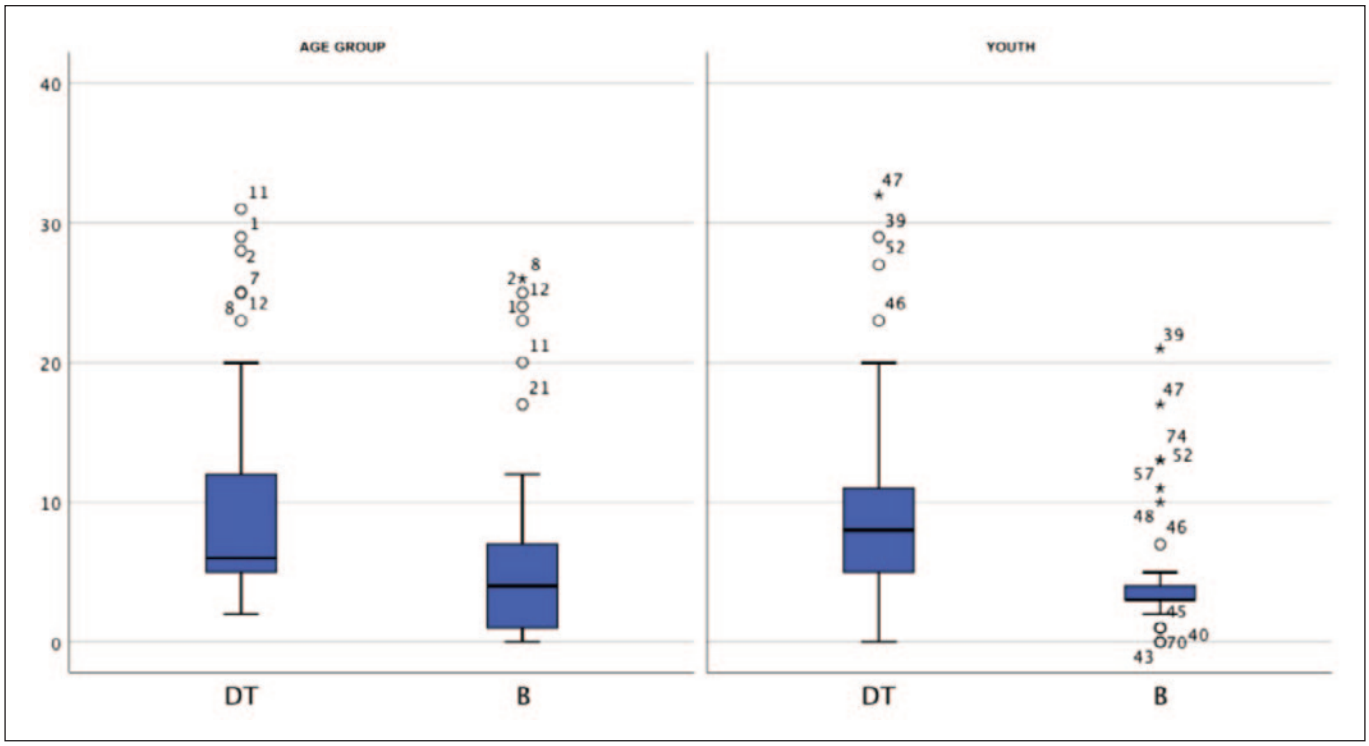

Figure 1. Differences observed between the values of the DT and B subscales according to the category

DISCUSSION

The results of this study indicate that, in relation to body dissatisfaction, there is scientific evidence that found similar responses, where a high percentage of female acrobatic gymnasts (79.7%) were not dissatisfied with their body[4,9,20]. However, other studies showed that dissatisfaction increases with age in women[9,14,21] results that do not agree with what was observed in our research where gymnasts of older age and category presented similar results.

With regard to the degree of dissatisfaction in the BSQ, 24.3% of the total sample fell into one of the degrees of dissatisfaction, with the majority being in the mild degree and only 4.1% in the extreme degree. These results coincide with studies where most gymnasts had no dissatisfaction[4,24]. Furthermore, these results corroborate scientific evidence from studies suggesting that age group gymnasts are less likely to develop CI disturbances[4,9,20].

In relation to the results provided by the EDI-3RF questionnaire in the BD scale referring to body dissatisfaction, it should be noted that no gymnast is in high dissatisfaction, with the majority being in moderate dissatisfaction. These percentages of moderate dissatisfaction and, as a consequence, lack of personal satisfaction, is one of the risk factors for ED in competitive gymnasts, together with the rise to high performance at an early age[23]. However, it is worth noting the sensitivity of this questionnaire to gymnasts, as it is a questionnaire prepared for a non-athlete population, so the data should be taken with caution.

In reference to the risk of ED, it is observed that a minimum percentage of gymnasts in this study are vulnerable to developing this type of disorder, an aspect that coincides with previous studies[22,24]. It should be noted that 73.7% of the gymnasts did not present a risk of developing ED, and several studies confirm these results in lower categories, in our case in national competition categories[25].

The risk of suffering from ED, has been reasoned in this work by the main presence of two risk scales: Obsession for thinness[8,22,24] and bulimic behaviours, higher in both cases in the age group category that are gymnasts who have higher technical requirements; they compete with two exercises in competition, and it is considered a preparatory category for international competition[22].

Regarding the referral criteria, the results show that gymnasts belonging to the age group category meet all three referral criteria. A low percentage (5.4%) met criteria 1, which is exclusively related to low BMI, with no youths meeting these criteria. With reference to remission criteria 2, the results are the highest in both categories, being slightly higher in juveniles (39.4% vs. 27.7%), which means that they should be preventively referred to a specialist for the presence of thinness obsession and problematic eating patterns. As for criteria 3, only 1 youth gymnast and 3 age group gymnasts,

5.4% of the gymnasts in the total sample, should be mandatorily referred for extreme weight control behaviour in the last three months (binge eating, vomiting, exercise). These referral rates are lower than the results published in Martínez-Rodríguez et al.[24] in rhythmic gymnastics. However, these comparisons must be made with caution, as none of these studies have applied the EDI-3-RF, so the chances of remission have not been analysed. However, it should be noted that our remission results are not at all alarming as wanting to have a slimmer body, lose weight and train longer cannot be taken into account in these performance athletes as symptoms of ED, since the high amount of training hours and the desire for a light, strong and slim aesthetic body to obtain sporting success in the artistic dimension is inherent to high competition in these gymnasts[23].

In general, all the studies analyse the risk of suffering or not from ED, without analysing in detail the symptoms prior to the ED itself. One of the notable variables related to the risk of suffering some type of ED is body dissatisfaction, analysed in our study by two BSQ instruments and one of the EDI 3RF scales. As can be seen, this is a precedent in this case, as associations are observed between the BSQ with the risk scales related to Obsession with thinness and bulimic behaviours measured by the EDI 3RF, as well as with the three referral criteria. This variable is related as a main cause in numerous studies[2,6,7].

In relation to BMI, more than half of the gymnasts have a BMI of normal weight or low weight with thinness grade III and II, with only 2.7% being overweight according to the indicators proposed by Cole et al.[28], results similar to those obtained in other studies on gymnasts in this speciality[9,14,27]. There are several authors who claim that these characteristics are due in many cases to a process of "natural selection", since a low weight benefits the practice of these highly technical sports, being a predominant factor in performance[28].

The limitations of this study include the low number of existing studies in GA and in other gymnastic disciplines covering athletes of different categories[29], as well as the low male participation, which makes it impossible to make a comparison based on gender. Likewise, the use of this instrument, although valid and reliable in the adolescent population, it is important to adapt it to the environment of these gymnasts since daily weight control and specific diets with restriction of certain foods during competitive periods, which in non-athlete patients would be warning signs of ED, are typical in these sports with an aesthetic component.

CONCLUSION

Overall, it can be concluded that gymnasts in both categories show good body satisfaction and low levels of risk of ED. The higher category age group gymnasts stand out for being more vulnerable to suffer from ED, presenting slightly higher levels of obsession with thinness, bulimic behaviours and body dissatisfaction than the youths, but without significant differences. Likewise, a positive relationship between body dissatisfaction and risk of ED was also found, with no differences between the two groups.

The main contribution of this work is to have studied the preparatory categories to the elite, as it allows us to observe the key point where these disorders begin to be triggered and their main causes. Furthermore, there are practically no studies on this subject carried out in Spain in this discipline, which is why it represents an important complement to knowledge on ED in the field of gymnastics sports. We can observe that in lower categories the level of risk decreases, being rewarding the action that the discipline performs.

With respect to studies already published, it would be interesting to keep the good action of the discipline in higher categories, taking into account the variables that develop it.

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