

Exploring eating disorders and body satisfaction in elite and non-elite gymnasts

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Published online: May 31, 2024

Accepted for publication : May 15, 2024

DOI:10.7752/jpes.2024.05146

Abstract:

Gymnastics, characterized by its pursuit of perfection in performance and appearance, often fosters high levels of anxiety and mental health issues among athletes. Body dissatisfaction, prevalent in the sport, is a potential risk factor for eating disorders, particularly among gymnasts who are predisposed to such conditions. This study aims to examine the prevalence of eating disorders and levels of body satisfaction among elite and non-elite gymnasts in Indonesia. This research uses a quantitative descriptive method with a cross-sectional design. Thirty-one elite and non-elite gymnast athletes consisted of artistic, rhythmic, and aerobic gymnasts (age = 16.58±3.84 years, body weight = 46.65±9.76 kg, height = 155.8± 10.96 cm, BMI = 19.03± 2.20 kg/m²) completed their answer on eating disorder examination (EDE-Q 6.0) and provided their self-report concerning their body shape and satisfaction (BSQ-16), and (FRS). This study found a tendency towards developing eating disorders (ED) in both elite and non-elite gymnasts, with a greater susceptibility reported in female athletes. Furthermore, there was a notable issue regarding body form among elite gymnasts, with a clear distinction between elite and non-elite athletes ($p = 0.00$) in terms of their perceived body shape. In order to optimize both mental and physical well-being, it is imperative to provide gymnasts with a comprehensive education on mental health and a full awareness of a well-balanced diet. Moreover, it is crucial to implement regular monitoring of athletes, the availability of psychiatric, and a personalized approach to formulating treatment planning. Furthermore, it is imperative to engage sports nutritionists, psychologists, coaches, and doctors to offer comprehensive support that allows gymnasts to achieve their utmost capabilities healthily and sustainably.

Keywords: eating control, disordered eating, body shape, body dissatisfaction, mental health

Introduction

Athletes' participation in sports where weight requirements or body shape are considered ideal may pose a risk of relative energy deficiency in the context of sport. This danger is defined by signs of relative energy deficit, such as amenorrhea (lack of menstruation), bradycardia (abnormally slow heartbeat), or stress fracture (Hornberger et al., 2021; Karrer et al., 2020; Mountjoy et al., 2018). Types of sports that consider slenderness or body weight important are endurance, aesthetics, and heavyweight (Kristjánsdóttir et al., 2019). In aesthetic sports such as gymnastics, perfectionism has a significant influence because of the expectations set for the execution of movements and the existence of a subjective assessment system used to evaluate gymnasts' performance (Neves et al., 2013). Boone et al., (2013) stated that perfectionism has a significant influence on body image issues among those diagnosed with eating disorders. The measures used to control body weight or body shape are intended to attain peak athletic performance or meet the ideal physical criteria in sports. Individuals in this endeavor may resort to harmful weight management methods, such as food avoidance, restricting food consumption, excessive exercise, applying dehydration tactics, producing vomiting, and using diuretics, laxatives, or diet medications (Carl et al., 2017; Kontele & Vassilakou, 2021; Reardon et al., 2019, 2019; K. R. Wells et al., 2020).

The sport of gymnastics is greatly influenced by the factors above because specific body standards are considered ideal for this sport, such as having a short height and a low body fat percentage (Fortes et al., 2014). Gymnasts were found to be prone to experiencing body dissatisfaction due to trying to achieve their ideal body (Barker-Ruchti & Schubring, 2016). Athletes with non-ideal bodies in sports with weight or body shape requirements may experience more pressure to achieve an ideal body shape (Treasure et al., 2020). Weight pressure in the sporting environment encompasses feedback from coaches, judges, or teammates regarding body weight and shape, explicit weight or body shape criteria for competition, the revealing nature of training or competition attire, and the belief that low body weight confers a performance advantage (Håman et al., 2015; J. J. Reel et al., 2013). This causes anxiety for gymnasts; it is also known that anxiety disorders are mental health problems that can affect eating habits (Anggraeni et al., 2024). As a result, athletes resort to extreme measures that result in improper dietary practices, distorted attitudes or behaviors toward food, and the onset of eating disorders (Kristjánsdóttir et al., 2019). In addition to the observed eating disorder risk factors, there are also

sociocultural influences such as an idealized body, pressure to achieve body ideals, internalization of ideals, and personality traits of perfectionism in athletes with weight or body shape requirements (Hazzard et al., 2020). Gymnasts have a higher propensity for dissatisfaction and preoccupation with their body mass and form since the importance of visual aesthetics outweighs that of other athletes (Rommel et al., 2021). Presenting the bodies in form-fitting and exposing athletic attire facilitates the comparison of physical appearances, leading to increased unhappiness with one's body image and a greater engagement in dietary practices (Parlov et al., 2020). Gymnasts' mental health may be further compromised by elevated levels of perfectionism since there is a correlation between perfectionism and an increased susceptibility to eating disorders (Mancine et al., 2020).

Eating disorders (ED) are pathological eating behaviors that need to be addressed due to the significant consequences they bring (Valentin, 2020). ED is a prevalent and potentially serious disorder that may have adverse effects on physical and emotional well-being, athletic performance, and overall quality of life. It is associated with a higher risk of illness and death (Amato et al., 2021; Donato et al., 2022). Clinical eating disorders, such as anorexia nervosa (AN) and bulimia nervosa (BN), as well as eating disorders characterized by extremely limited food intake, are frequently linked to insufficient energy intake. This can lead to the suppression of the hypothalamic-pituitary-ovarian axis and subsequent disruption of the menstrual cycle (Logue et al., 2020; Pieter, 2020; Ravi et al., 2021). Following a limited diet may lead to malnourished athletes experiencing relative energy deficits in sports or inadequate energy availability. This phenomenon arises when individuals ingest an insufficient quantity of calories relative to their physical exertion level (Thompson et al., 2021). The primary focus in the realm of eating disorders is on body contentment about physical appearance, particularly body regions associated with weight (Rekkers et al., 2021).

Body satisfaction refers to how a person rates their overall body shape, from head to toe, and how satisfied they are with their current body shape. Two variables can influence a person's satisfaction with their body. The first is personal factors, such as self-confidence and ideal self-image. Second are social factors, such as friends, media, and family (Rieke et al., 2016). Self-perception of health, including factors such as height, weight, growth, and general health, is a very reliable indicator of body satisfaction (J. Reel et al., 2015). Individuals who see themselves as abnormally underweight about their subjective perception of an optimal body weight tend to have diminished levels of body satisfaction. On the other hand, seeing oneself as too overweight is linked to reduced levels of contentment with one's physique (Blum & Choiriyah, 2021). Research has consistently shown that promoting an idealized perception of body satisfaction tends to result in higher levels of body dissatisfaction. This, in turn, may contribute to adopting harmful exercise patterns and developing disordered eating habits (Håman et al., 2015; Mathisen & Sundgot-Borgen, 2019). The ideal body for achieving the best performance in a particular sport does not always correspond to society's body aesthetic standards; this can lead to greater athlete dissatisfaction (Rousselet et al., 2017). Body dissatisfaction tends to occur due to identifying a discrepancy between the self-perceived body (i.e., body image) and that which is perceived to be ideal (Payge Coyne et al., 2020), with body size standards often derived from body mass index (BMI) (Houkamau et al., 2021). Within this domain, a gymnast are prone to experiencing dissatisfaction and preoccupation with their body mass and form since the importance placed on visual aesthetics surpasses that of other sports (Rommel et al., 2021).

Scientific study indicates that some demographics, such as women, youths, and athletes participating in gymnastics, aesthetics, endurance, and weight-based sports, have a higher prevalence of eating disorders (Castro-López et al., 2015; Mancine et al., 2020; Martínez-Rodríguez et al., 2021). The prevalence of eating disorders is higher among male and female athletes compared to the general population, with rates ranging from 6-45% among athletes and 3-15% in the general population (Carl et al., 2017; Haslam et al., 2021). In elite athletes, it is one of the most common psychiatric pathologies (Karrer et al., 2020). The term elite has been used in a variety of sporting contexts. This ranges from a sample of elite athletes under nine with a highly criticized approach to those competing at the senior international level (Baker et al., 2020). In this study, gymnasts who competed at national and international levels were included in the group of elite athletes, while gymnasts who competed at district/city and regional levels were included in the group of non-elite athletes. Multiple studies indicate variations in the psychological characteristics between elite and non-elite athletes, which directly influence the performance of both groups. It is well-acknowledged that elite athletes outperform non-elite athletes (Hastuti, 2013). Existing research indicates that elite athletes have an elevated incidence of eating disorder symptoms in comparison to non-elite athletes or physically active female athletes who do not compete (Kong & Harris, 2015). The prevalence of eating disorders is higher in lean sport athletes compared to non-lean sports athletes (Ravi et al., 2021). Additionally, eating disorder symptoms are higher in lean sport athletes compared to lean sport athletes (Mancine et al., 2020). Thin athletes demonstrated increased levels of ambition and external cultural expectations to keep a slim body and heightened dissatisfaction with their bodies compared to non-thin athletes (E. K. Wells et al., 2015). Athletes who engage in lean exercise may have a higher vulnerability to unhealthy eating habits and negative body image compared to athletes who do not engage in lean exercise. This is because they may experience more pressure to maintain low body weight and low body fat levels for aesthetic, performance, or societal reasons (Ravi et al., 2021). The possible impact of body satisfaction in avoiding excess weight has garnered the interest of academics and interventionists (McLean & Paxton, 2019). Attitudes toward eating and body satisfaction may be seen as a spectrum ranging from a state of balanced energy intake and

contentment with one's physique to the presence of eating disorders (Ravi et al., 2021). The growing interest in body satisfaction within the realm of eating disorders has created a need to distinguish and enhance the understanding of the idea of body contentment. Body satisfaction refers to being content with the physical look and functionality. Conversely, body dissatisfaction is a significant risk for the onset, continuation, and reappearance of eating disorders. (Wanderson, 2020). A relationship exists between low body satisfaction and a heightened risk of developing disordered eating practices (Leal et al., 2020). The purpose of eating disorder screening is to enable the early identification of abnormal eating habits that may result in eating disorders in gymnasts (Mancine et al., 2020). There is a lack of research on eating disorders and body satisfaction, particularly in aesthetic sports like gymnastics. Conducting such a study may raise awareness among gymnastics coaches and players in Indonesia about the need to assess for eating disorders and body contentment.

Material and Methods

Participants

The population in this study were gymnastics athletes who were members of Gymnastics Club training, City/Regency Indonesian Gymnastics Association, Regional Training Centers, and National Gymnastics Training throughout Indonesia. The sampling technique used purposive sampling with criteria for elite and non-elite Indonesian gymnastics athletes by category men artistic gymnastics (MAG), women artistic gymnastics (WAG), rhythmic gymnastics (RG), and aerobic gymnastics (AG) who have participated in City/Regency, Regional, National and International level championships. A total of 31 gymnasts, consisting of 20 elite gymnasts and 11 non-elite gymnasts, participated in this research.

Procedure

Data collection was carried out by distributing validated questionnaires via Google Forms. The data collected includes the socio-demographic characteristics of respondents, then data regarding the Eating Disorders Examination Questionnaire (EDE-Q 6.0), which is divided into four subscales consisting of 5 questions regarding restraint, five questions regarding eating concern, eight questions regarding concern, and five questions about weight concern. The second data about Body Shape Questionnaire (BSQ-16) consists of 16 questions which have four classifications based on scores including no concern with shape (< 38), mild concern with shape (38 - 51), moderate concern with shape (52 - 66), and marked concern with shape (> 66). The third data about the Figure Rating Scale (FRS) consists of 9 male silhouettes and 9 female silhouettes with three questions regarding the suitability of the solution to the respondent's body. This questionnaire consists of 1 - 28 questions regarding the Eating Disorders Examination Questionnaire (EDE-Q), 29 - 45 questions about the Body Shape Questionnaire (BSQ), and 46-48 questions about the Figure Rating Scale (FRS).

Statistical analysis

Data is collected, cleaned, and processed using IBM SPSS 26 application software. Data analysis was descriptive by displaying the distribution of frequencies and percentages of eating disorders and body shape satisfaction. For the Eating Disorders Examination Questionnaire (EDE-Q 6.0), the overall score or global score is obtained from the scores of the four subscales added together and the resulting total score divided by the number of subscales (i.e., four). For answer choices, a score will be given; answers 0 days are given a score of 0, answers 1-5 days are given a score of 1, answers 6-12 days are given a score of 2, answers 13-15 days are given a score 3, answers 16-22 days are given a score 4, answers 23-28 days are given a score of 5, and answers every day are given a score of 6. Meanwhile, for the Body Shape Questionnaire (BSQ-16) scale, answer choices will be given a score, answers never given a score of 1, answers rarely given a score of 2, answers sometimes given a score of 3, answers often given a score of 4, answers very often given a score of 5, and answers are always given a score of 6. Lastly, the Figure rating scale (FRS) provides more data that can help researchers determine why someone would choose a particular silhouette on a numerical rating scale. The body dissatisfaction scale consists of nine items and measures the extent to which individuals feel satisfied with certain body parts. Of the three questions that respondents answered based on the silhouette chosen, it would show how they saw themselves. There is no highest or lowest score in this measurement.

Results

Socio-demographic characteristics

This study measures eating disorders and body fatigue in elite and non-elite Indonesian gymnastics athletes. Based on sociodemographic characteristics in Table 1, elite gymnastics athletes are mostly female (70%) and male (30%) with an average age, weight, height, and BMI of 16.70 ± 4.20 years, 47.10 ± 10.90 kg, 156.4 ± 10.82 cm, and 18.98 ± 2.47 kg/m². Meanwhile, the majority of non-elite gymnast athletes are female (70%), and male (30%), with an average age of 16.36 ± 3.23 years and a lower body weight (45.82 ± 7.65 kg), height (154.6 ± 11.63 cm), as well as BMI (19.14 ± 1.89 /m²), respectively, there were significant results between elite and non-elite athletes. In terms of BMI, elite gymnast athletes have a BMI in the thin category of (50%), normal (45%), and overweight (5%), while non-elite gymnast athletes have a BMI in the thin category of (36.4%), and normal of (63.6%). Based on the gymnast category, there are elite gymnast athletes (55%) in Women's Artistic Gymnastics (WAG), (30%) Men's Artistic Gymnastics (MAG), (10%) Rhythmic Gymnastics (RG), and (5%)

Aerobic Gymnastics (AG). Meanwhile, non-elite athletes were (81.2%) in Women's Artistic Gymnastics (WAG), and (18.2%) in Men's Artistic Gymnastics (MAG). Some elite gymnastics athletes carry out training 1 - 2 times (10%), 3 - 4 times (20%), and > 4 times (70%) more than non-elite gymnasts. Non-elite gymnast athletes carry out training 3 - 4 times (36.4%), and > 4 times (63.6%). The duration of training for elite gymnasts is less for those who carry out training with a duration of 2 hours (5%), and more for those who carry out training with a duration of > 2 hours (95%). Meanwhile, non-elite athletes exercise for 2 hours (18.2%), and > 2 hours (81.8%).

Table 1. Sociodemographic characteristics of the respondent

Characteristics	Elite	Non-Elite	Sig
Gender (n, %)			
Man	6 (30)	2 (30)	
Woman	14 (70)	9 (70)	
Age (years; mean ± SD)	16.70 ± 4.20	16.36 ± 3.23	0.820
Weight (kg; mean ± SD)	47.10 ± 10.90	45.82 ± 7.65	0.733
Height (cm; mean ± SD)	156.4 ± 10.82	154.6 ± 11.63	0.675
Body Mass Index (BMI) (kg/m ² ; mean ± SD)	18.98 ± 2.47	19.14 ± 1.89	0.847
Body Mass Index (BMI) (n,%)			
Underweight	10 (50)	4 (36.4)	
Normal	9 (45)	7 (63.6)	0.589
Overweight	1 (5)		
Category (n, %)			
Men Artistic Gymnastics (MAG)	6 (30)	9 (81.8)	
Women Artistic Gymnastics (WAG)	11 (55)	2 (18.2)	0.112
Rhythmic Gymnastics (RG)	2 (10)		
Aerobic Gymnastics (AG)	1 (5)		
Training Frequency/Week (n, %)			
1-2x	2 (10)		
3-4x	4 (20)	4 (36.4)	
>4x	14 (70)	7 (63.6)	
Exercise Duration (n,%)			
2 hours	1 (5)	2 (18.2)	0.880
> 2 hours	19 (95)	9 (81.8)	

Eating Disorder among elite and non-elite gymnastics athletes

In this study, table 2 shows the difference in subscale scores (EDE-Q 6.0) between elite gymnasts and non-elite gymnasts. Elite gymnasts with average scores restraint (10.09 ± 5.28), eating concern (2.01 ± 1.49), shape concern (2.35 ± 1.04), and weight concern (2.27 ± 0.88) with a total global score (4.18 ± 1.64) is lower compared to non-elite gymnasts with a score restraint (11.30 ± 6.90), eating concern (2.64 ± 4.47), shape concern (4.00 ± 4.69), and weight concern (2.65 ± 1.31) with a global total score of (5.14 ± 2.588).

Table 2. The average EDE-Q 6.0 subscale

Subscale	Elite	Non-Elite	Sig
	Mean ± SD	Mean ± SD	
Restraint	10.09 ± 5.28	11.30 ± 6.90	0.591
Eating concern	2.01 ± 1.49	2.64 ± 4.47	0.245
Shape concern	2.35 ± 1.04	4.00 ± 4.69	0.138
Weight concern	2.27 ± 0.88	2.65 ± 1.31	0.335
Global Total	4.18 ± 1.64	5.14 ± 2.588	0.213

The results in Figure 1 shows that there is a tendency for eating disorders in men with a mean (>1.6) of 75% and in women with a mean (>2.8) of 91.3%. The results for the two categories of elite gymnasts tend to be 80%, and 20% tend not to experience eating disorders. Meanwhile, in non-elite gymnastics, athletes are 100% more likely to experience eating disorders.

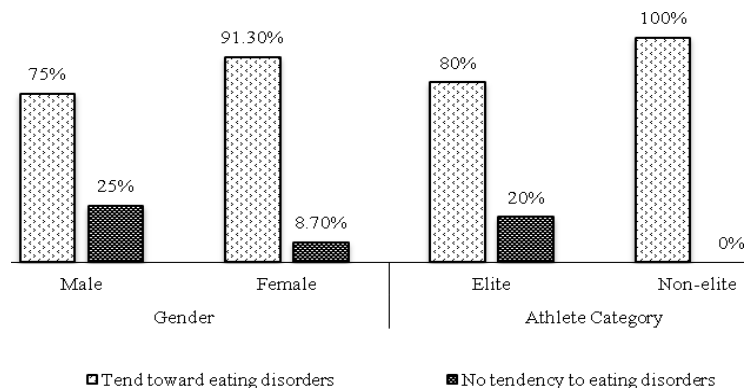


Figure 1. Results of eating disorder predisposition graph

The Spearman correlation test between each variable shown in Table 4 shows the correlation between restraint and weight concern ($r=0.885$; $p=-0.000$), and there is a correlation between eating concern and shape concern ($r=0.842$; $p=0.000$).

Table 3. Correlations between EDE-Q 6.0 subscales

Variable	N = 31							
	Restraint		Eating concern		Shape concern		Weight concern	
	r	p-value	r	p-value	r	p-value	r	p-value
Restraint	1.000	-	-0.158	0.396	0.010	0.957	0.885	0.000*
Eating concern	-0.158	0.396	0.100	-	0.842	0.000*	-0.041	0.827
Shape concern	0.010	0.957	0.842	0.000*	1.000	-	0.103	0.582
Weight concern	0.885	0.000*	-0.041	0.827	0.103	0.582	1.000	-

*Correlation is significant at the 0.02 level (2-tailed)

Body satisfaction

Table 5 shows that elite gymnastics athletes are not included in the category classification concerning shape, mild concern with shape (5%), moderate concern with shape (60%), and marked concern with shape (35%). Meanwhile, non-elite gymnasts are included in the classification category; no concern with shape (9.1%), mild concern with shape (81.8%), and moderate concern with shape (9.1%). The table shows that elite gymnasts are not included in the category of any concern with shape. In contrast, non-elite gymnasts are not included in their concern with shape. Looking at the four classifications, the BSQ measurement results show that the majority of elite and non-elite gymnasts have a low to moderate level of concern about their body shape.

Table 4. Percentage of BSQ-16 classification

Classification	Elite	Non-Elite	Sig
	n (%)	n (%)	
< 38 No concern with shape		1 (9.1)	
38 -51 Mild concern with shape	1 (5)	9 (81.8)	0.000*
52 - 66 Moderate concern with shape	12 (60)	1 (9.1)	
> 66 Marked concerns with the shape	7 (35)		

*Significant p-value <0.05

Figure 2 shows the Figure Rating Scale (FRS), the Stunkard scale. This number rating scale is used to learn about body image, body satisfaction, and gender, which influence an athlete's sensitivity to their physical appearance. The scale displays nine schematic silhouettes of nine people, ranging from very thin to fat. It shows nine silhouettes of male body shapes and nine female body shapes, which will be divided into two based on the category and type of gymnasts.

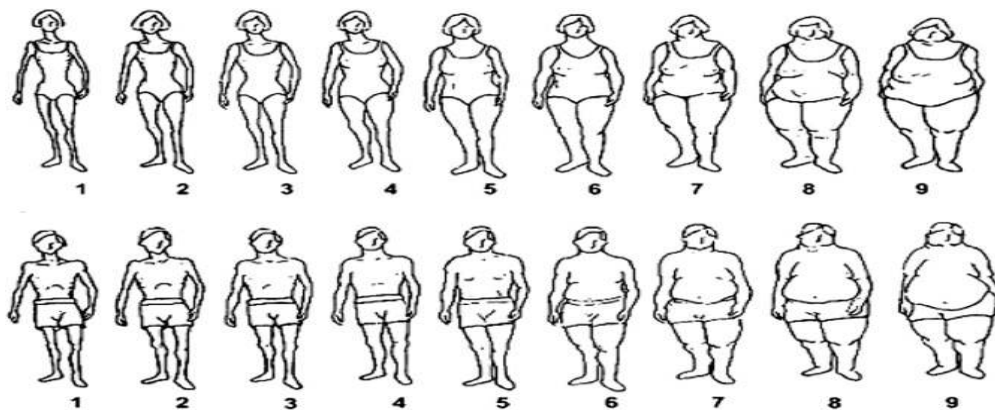


Figure 2. Figure Rating Scale (FRS)

Figure 3 shows the results of the FRS graph in Figure 2 based on elite and non-elite gymnasts, showing the current body condition and the desired body. First, in the statement of a figure similar to their body, most elite athletes choose silhouette numbers 3 and 4, while most non-elite athletes choose silhouette number 4. Second, in the statement of an attractive figure, most elite athletes choose silhouette number 3, while non-elite athletes -The majority of elites chose silhouette number 2. Finally, in the statement about their favorite figure, most elite athletes chose silhouette number 3, while most non-elite athletes chose silhouette number 2.

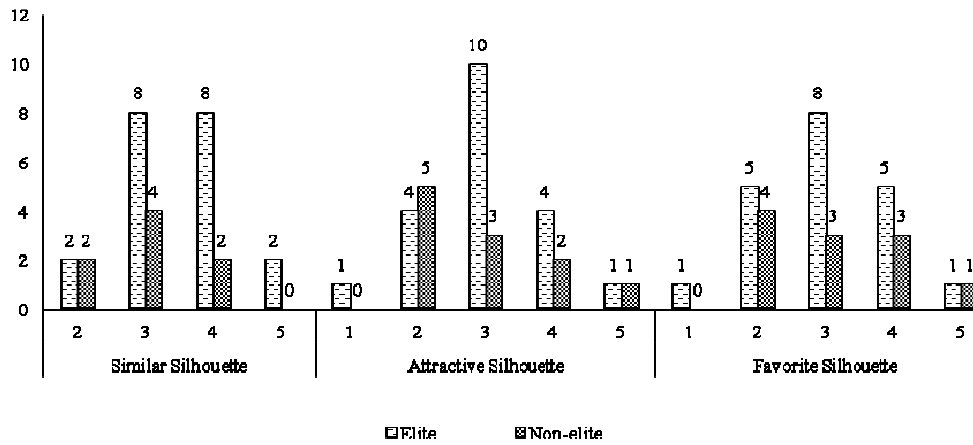


Figure 3. The FRS outcome derived from Figure 2 between elite and non-elite gymnasts

Furthermore, Figure 4 shows the results of the FRS graph in Figure 2 based on the categories men's artistic gymnastics (MAG), women's artistic gymnastics (WAG), rhythmic gymnastics (RG), and aerobic gymnastics (AG), which shows their current body condition and the desired body. First, in the statement of a figure similar to their body, most MAG and WAG chose silhouette number 3, RG chose silhouette number 3 and 4, and AG chose silhouette number 4. Second, in the statement of the attractive figure, the majority of MAG and AG chose silhouette numbers 2; in WAG, the majority chose silhouette numbers 2 and 3; in RG, they chose silhouette numbers 1 and 3. Finally, in the favorite figure statement, most MAG and AG chose silhouette number 3, while most WAG chose silhouette number 2, and RG chose silhouette numbers 1 and 3.

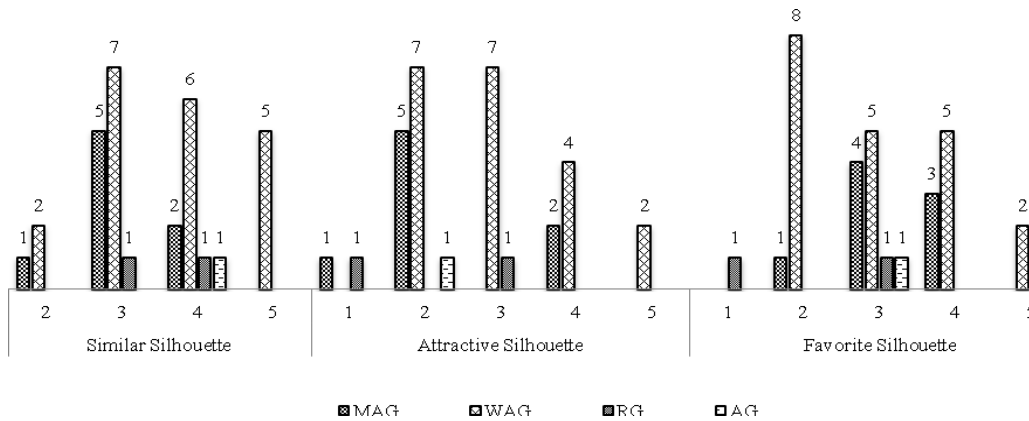


Figure 4. The FRS results from Figure 2 based on the gymnastics category

Discussion

In this study, we aimed to detect eating disorders and body image perception through body satisfaction (Godoy-Izquierdo et al., 2020). This measure may elucidate the correlation between eating disorders (Ruiz-Turrero et al., 2022) and body satisfaction in elite and non-elite Indonesian gymnasts. To our knowledge, there are few studies examining the interaction of three elements such as weight loss behavior, appearance perception, and body satisfaction (Gearhart et al., 2018). According to Thiemann et al., (2015), research indicates that athletes engaged in aesthetic sports, such as gymnastics, are at a significantly elevated risk of developing eating disorders. According to Neves et al., (2013), in the sport of gymnastics, perfectionism is deeply rooted due to the expectations set for the execution of movements and the subjective assessment system that assesses the performance of gymnasts. Wade & Tiggemann, (2013) showed significant associations were established between several aspects of perfectionism and adverse body image in adult females. Boone et al., (2013) outlined that perfectionism has a significant impact on body image problems in eating disorder patients. Hence, a particular emphasis on perfectionism within a specific setting, such as in the case of gymnasts, might give rise to apprehensions over technique and body mass.

The primary risk factor associated with eating disorders is undeniably the societal expectation to have a slim physique, a phenomenon that is comparable to similar circumstances in other nations (Batista, 2018). Within the gymnastics community, the main pressure source is from coaches, who often make disparaging remarks about eating habits, closely monitor players' weight, and provide guidance on dietary limitations (Geary, 2020). Various

studies have consistently shown a significant correlation between the pressure exerted by coaches of high-performing athletes to reduce weight, patterns of dieting, and the development of eating disorders. Although the pressure to be thin and control one's weight is also associated with the world of gymnastics, it suggests that these factors are based on the gymnastics subculture (Carl et al., 2017). Another risk factor that has been studied is the influence of gymnasts' clothing on body self-esteem. Although most gymnasts are happy with their weight, research includes that intentional weight loss behavior is facilitated by perceptions of appearance (Batista, 2018).

According to Knapp et al., (2014), female athletes had a greater likelihood of having eating disorders, with a prevalence rate of up to 50%, compared to the general population, which has a prevalence rate of 25%. In this study, female athletes had a 91.3% higher tendency towards eating disorders compared to male athletes at 75%; this is in line with research in Norway, which stated that 20% of women had a higher tendency towards eating disorders compared to men at 8% (Lichtenstein et al., 2022). According to Schaumberg & Anderson, (2016), study, dimension constraint was shown to be a strong predictor of overall risk for eating disorders, along with weight loss and BMI. Research has shown that there is a connection between dimensions-shape worry and eating concern and the presence of disordered eating behavior and body dissatisfaction (Donovan et al., 2014).

Extensive research has been conducted on body image and body satisfaction in overweight persons (Bibiloni et al., 2017). This study has shown that the average BMI of elite and non-elite Indonesian gymnastics athletes is in the underweight category (<18.5). This is not in line with the research (Lichtenstein et al., 2022) that none of the athletes in the study has anorexia nervosa (AN) due to BMI (>18.5) assuming high muscle mass, and no one exhibits regular overeating behavior. The correlation between BMI and constraint aligns with restraint theory and other research that supports the proposition that heightened restraint may be a potential hazard for engaging in eating disorder behavior and consequent weight growth (Anderson et al., 2016).

Body dissatisfaction was shown as a major predictor of eating disorders in the regression study. The regression analysis showed that the identified potential risk variables accounted for almost 60% of the variability in eating disorders. This emphasizes the need to take into account characteristics particular to sports (Thiemann et al., 2015). Eating disorders and body satisfaction in elite and non-elite gymnasts are mediated or moderated by levels of body image, such as body shape (Assyifa & Riyadi, 2023). Given the increasing prevalence of negative body attitudes and dissatisfaction, body image is increasingly seen as a significant public health problem (Brechan & Kvaem, 2015), and comprehending body image problems in overweight persons is crucial (Godoy-Izquierdo et al., 2020). The results of the current study are in line with Schwartz et al., (2021), which supports the hypothesis that greater attention to eating concerns is associated with more excellent shape or weight concerns and eating disorders, replicating previous findings.

Conclusion

Research shows that both elite and non-elite gymnasts are predisposed to eating disorders, with female gymnasts at higher risk. This highlights the need for special attention to the mental health of gymnasts, especially in terms of prevention, early detection, and management of eating disorders. The finding that female gymnasts have a higher risk of developing eating disorders than male gymnasts underscore the importance of understanding gender differences in the context of athlete's mental health and eating patterns. The correlation between certain dimensions in the assessment of eating disorders (such as restraint and weight concerns, and eating concerns and shape concerns) shows the complexity of the relationship between these aspects and highlights the importance of a holistic approach in the treatment of eating disorders.

The significant difference between elite and non-elite gymnasts in perceived body satisfaction highlights the importance of awareness of body image and social pressures that athletes may experience, especially at the elite level. It is crucial to implement eating disorder prevention strategies, which involve the implementation of screening and intervention programs. An essential element in preventing and treating eating disorders among gymnasts is the active participation of various stakeholders, such as sports nutritionists, coaches, and families. The significance placed on the cooperative involvement of these various stakeholders underscores the necessity of a multidisciplinary strategy in tackling mental health and eating disorders among gymnasts.

Therefore, this study establishes a solid foundation for advancing more efficient measures in preventing, identifying, and addressing eating disorders among gymnasts, as well as raising awareness about the significance of mental well-being in sports. Concerning this, gymnasts can enhance their mental and physical well-being by receiving comprehensive knowledge and guidance on mental health along with adhering to a well-rounded diet. This includes regular monitoring of their overall health, unrestricted access to psychological counseling, and a personalized treatment planning approach involving sports nutritionists, sports psychologists, coaches, and doctors to guarantee that athletes receive comprehensive support in achieving optimal health, well-being, and performance.

Conflicts of interest

There are no potential conflicts of interest to report.

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