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REVIEW — META-ANALYSIS

Body image and eating disorders in aesthetic sports: A systematic review of assessment and risk

Image corporelle et troubles de l'alimentation dans les sports esthétiques : une analyse systématique de l'évaluation et du risque

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Eating disorders;
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Summary
Objective. — Conduct a systematic review to analyse the assessment of body image perception and risk of developing eating disorders, as a consequence of the practice of aesthetic sports.
News. — The procedures of this review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Four electronic databases were searched: MEDLINE (Pubmed), Scopus, SportDiscus (EBSCO) and PsycInfo (Ovid). Twenty-five academic studies have evaluated the perception of body image and the incidence of eating disorders in aesthetic sports. Rhythmic gymnastics is the most analysed sport modality; 80.0% of studies were conducted only with women, and the most studied group of athletes are adolescents (61%). Body Shape Questionnaire and Eating Attitudes Test-26 were the most frequently used instruments. In all research, aesthetic sports athletes were found to have disordered eating attitudes and behaviours and therefore at risk of developing eating disorders. In the majority of research on body image perception, athletes showed body dissatisfaction.

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Conclusion. — Aesthetic sports athletes analysed are at risk of developing eating disorders and are dissatisfied with their body image, as well as having a higher risk of developing eating disorders and greater body dissatisfaction with respect to athletes of sports where aesthetics is not as relevant. Rhythmic gymnastics is the most studied sport modality, and the female gender is the most analysed. The EAT-26 is the instrument most frequently used to assess ED, and BSQ test for assessment of body image.

MOTS CLÉS
Troubles de l'alimentation ;
Image corporelle ;
Sports esthétiques

Résumé
Objectif. — Effectuer une revue systématique pour évaluer la perception de l'image corporelle et le risque de développer des troubles alimentaires, comme conséquence de la pratique des sports esthétiques.
Actualités. — Les méthodes mises en œuvre dans cette étude ont suivi les directives PRISMA (*Preferred Reporting Items for Systematic Reviews and Meta-Analyses*). Quatre bases de données électroniques ont été consultées : MEDLINE (Pubmed), Scopus, SportDiscuss (EBSCO) et PsycInfo (Ovid). Vingt-cinq études ont évalué la perception de l'image corporelle et l'incidence de troubles alimentaires dans les sports esthétiques. La gymnastique rythmique est la modalité sportive la plus analysée ;80 :% des études ont été menées uniquement auprès de femmes, et la classe d'âge la plus étudiée est celle des adolescents (61 %). Le *Body Shape Questionnaire* et le *Eating Attitudes Test-26* sont les instruments les plus fréquemment utilisés. Dans toutes les études, on a constaté que les athlètes de sports à composante esthétique avaient des attitudes et des comportements alimentaires désordonnés et risquaient donc de développer des troubles de l'alimentation. Dans la majorité des études sur la perception de l'image corporelle, les athlètes ont montré une insatisfaction corporelle.
Conclusion. — Les athlètes de sports à composante esthétique étudiés risquent de développer des troubles de l'alimentation et sont généralement insatisfaits de leur image corporelle. Ils présentent également un risque plus élevé de développer des troubles de l'alimentation et une plus grande insatisfaction corporelle par rapport aux athlètes des sports où l'importance de l'esthétique n'est pas aussi marquée. La gymnastique rythmique est la modalité sportive la plus étudiée, surtout chez les gymnastes féminines. L'EAT-26 est l'instrument le plus fréquemment utilisé pour évaluer les troubles alimentaires, et le test BSQ pour l'évaluation de l'image corporelle.

1. Introduction

Over the last years, eating disorders (ED) have been increasing due to the changes in our society in relation to health and sport [1]. ED are not only developed in the general population, but, in a generic way, the sports environment is one of the environments where these disorders appear more frequently [2].

The sports practice, in addition to bringing great health benefits, can have negative aspects such as sports injuries, substance abuse or the appearance of ED [3,4]. In relation to the nature of the sport, there is a classification of sports in which their athletes have a higher risk of developing ED, specifically, sports by categories, aesthetic sports, gym sports and endurance sports [3,5]. The ''risk sports'' are those in which, due to their characteristics, they must constantly control their weight and have an impact on its importance, being therefore the athletes who practice them more vulnerable to suffer ED, highlighting the sports that are considered of aesthetics [6].

Aesthetic sports are characterized by the presence of harmony, a great artistic component in form, rhythm, style, expression, interpretation and symbolism. Technique, execution and skill, stand out for the search for perfection. Sports that best represent these characteristics are figure skating, rhythmic gymnastics, synchronized swimming and dance, although artistic gymnastics and other similar sports are also included in this group [7,8]. Cheerleading has also been included within this group of sports [9], a discipline in which, as in gymnastics, its activities require a low body weight for the performance of somersaults and acrobatic flights, in addition to presenting the inherent characteristics of the aesthetic sports.

These characteristics are included in the artistic value section of the scoring codes. The evaluation is carried out by a jury, in which, although the aesthetics and physical appearance of the athletes is not evaluated as such, it does have an influence, since it can intensify the artistic effect of the staging [10] The norms of this staging refer to certain aspects such as attire and make-up, which are also covered by the codes.

In the scientific literature, studies that have analysed aesthetic sports show that there is an alteration of self-concept due to dissatisfaction with body image [11], and that the development of ED is likely to have a higher risk in this type of sport, with vomit being the most common risk behavior [12] Other studies indicate that the rigorous nature of sports practice, from the point of view of the

Table 1 Search strategy.

Search category	Search terms
Participant	A: (''athlete'' or athlet* or ''professional sport*'' or ''female athlete'' or ''non-professional sport*'')
	B: (sportsman or sportswoman or sportsperson or amateur)
Intervention	C: (''eating attitudes test'' or EAT-26 or EAT-40 or CEDRI)
	D: (CAD or EDI-3 or EDI3 or MROAS)
Comparison	Not considered at the time of the search
Results	E: ('eating disorders' or 'anorexia' or 'bulimia' or 'disordered eating')
	F: ('EDs' or 'vigorexia' or 'bigorexia' or 'orthorexia' or 'physical self-concept')
	G: ('body image' or 'body dysmorphic concerns' or 'body image distortion' or 'body image dissatisfaction')
	H: ('nutritional disorders' or 'eating problems' or 'muscular dissatisfaction' or 'abnormal eating behaviors')
	I: ('eating attitudes' or 'restrained eating' or 'health food junkies' or 'muscle dysmorphia')
	J: ('restrained eating' or 'health food junkies' or 'muscle dysmorphia')
	K: ('food restriction' or 'weight-control' or 'attitudes toward eating')
Combination	Combinations of all the search options of the different groups with each other, joined by the Boolean operator AND. Example: ''A'' AND ''C'' AND ''E''

scoring canons, seems to force insecurity in athletes, leading to a poor relationship with food, putting them at risk of suffering ED [6]. Also, body weight control behaviours may be responsible for significant health problems, and there is a concordance between the degree of physical self-concept and the probability of developing ED [13].

Based on the existing evidence and data, the aim of the study was to conduct a systematic review to analyse the assessment body image perception and risk of developing ED as a consequence of the practice of aesthetic sports. The secondary objectives were to review the aesthetic modalities and samples investigated, the assessment instruments used to measure ED and body image perception, and to analyse the ED risk and body image perception in aesthetic sports.

2. Method

2.1. Search strategy

The guidelines established by the PRISMA Declaration [14], reference guidelines for the publication of Systematic Reviews and Meta-analyses, have been followed for the systematic review.

In order to adequately define the research objective, the PICO Definition Model was carried out as follows: the search terms for the assessment of image perception and the incidence of ATT in aesthetic sports were established in three groups: (p) participants; (i) intervention; (o) outcome. The terms used in the search strategy for the different databases were a combination of the ones represented in Table 1.

Different databases were selected to include a wide range of areas related to this interdisciplinary study, including human nutrition and dietetics, psychology, and sports sciences. The databases used were Web of Science, MEDLINE (Pubmed), Scopus, SportDiscus (EBSCO) and PsycInfo (Ovid).

2.2. Study eligibility criteria

For the purposes of this review, empirical articles from peer-reviewed journals were included, excluding dissertations and abstracts. The inclusion criteria of articles in the search were: i) journal articles; ii) quantitative or mixed studies; iii) publications in English, Spanish, or Portuguese; iv) ED in sports associated with image; v) without time limitation. Exclusion criteria were: i) conference proceedings, book chapters, books or other types of publications; ii) not measuring ED or body image perception in aesthetic sports; iii) theoretical studies, qualitative approaches or reviews; iv) articles that did not break down specific results in aesthetic sports; v) duplicate articles; vi) articles with partial and/or no access.

2.3. Publication selection

Fig. 1 shows the flow diagram proposed by Moher et al. [15] following the PRISMA methodology, at all the points that could be common to a systematic review of these characteristics. The initial database search yielded 519 results, 212 duplicate records were eliminated, resulting in a total of 307 records without duplicates. A reviewer performed a full analysis of the title, then a review of the abstract, and finally a review of the full text using the inclusion and exclusion criteria. The number of final papers for the literature review synthesis was 25.

The reference lists of the initially selected articles were also used to find other frequently cited academic papers that do not appear in various databases. The process of eliminating duplicate records was carried out through the Zotero bibliographic reference manager.

The data were collected in Microsoft Excel, and the following data blocks were entered: i) academic data such as year of publication, authors and country of origin, country of publication, journal or duration of the study; i) authors and year; ii) affiliation; iii) sample; iii) objectives of the study;

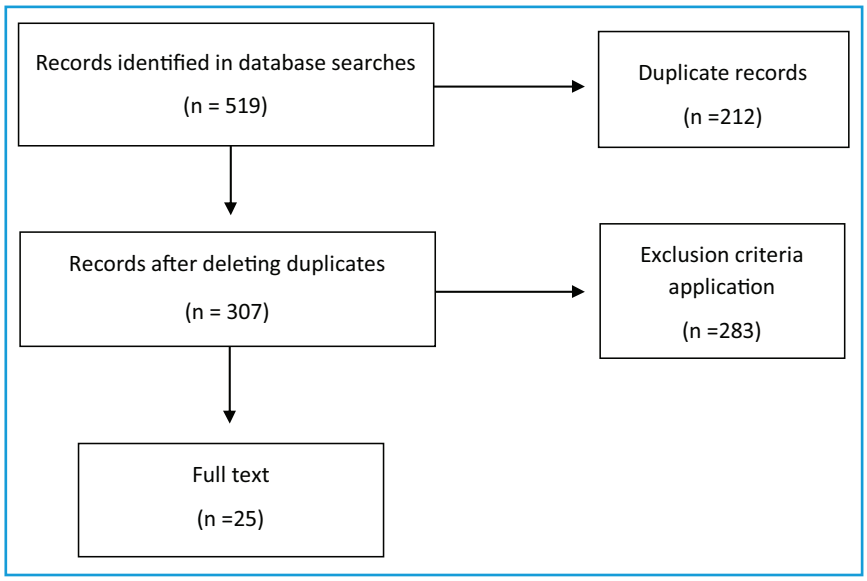

Figure 1 Selection process of studies included in the systematic review.

iv) questionnaires used; iv) main results; v) conclusions and implications of the results.

3. Results

A total of 25 academic studies have evaluated the perception of body image and the incidence of ED in aesthetic sports. The articles have been published between January 2020 and March 2022, with half of these studies published in the last six years. The research was carried out by a total of 99 researchers from 17 different countries. Most of the authors ($n = 33$) were from Brazilian institutions (33.3%), followed by Italy (15.5%), Spain (9.1%), France, Japan, Germany and Serbia, with 5.0% of authors each.

Regarding the publication year, 2020 was the year with the highest number of publications ($n = 4$).

3.1. Sports modalities and samples

Within the 25 studies it was observed that the most analysed sports modalities were rhythmic gymnastics, 47.8% of the studies, followed by artistic gymnastics (33.3%), dance (29.1%), synchronised swimming (25.0%). There were two sports with only one study, skating and cheerleading.

Regarding the samples, 80.0% of them were conducted only with women (20 of 25 studies), and in the remaining five studies the samples were composed of subjects of both sexes, in which the female sample predominated, with 73% of women on average among each of these articles. The most studied group of athletes are adolescents (61%), followed by adult athletes (25.6%), and pre-adolescence (13.4%).

Regarding age, the results are contradictory. There are studies that find a higher risk in adults [16], and others a higher risk in young athletes [17].

3.2. Assessment instruments

In relation to the different methods used to assess ED, the perception of body image and other psychological aspects, it is worth mentioning that the Eating Attitudes Test-26 (EAT-26) [18], is one of the most widely used questionnaires for the detection of ED, instrument that has been used in 79.3% of the studies, followed by the Bulimic Investigatory Test, Edinburgh (BITE) [19] (13.7%), and Eating Attitudes Test-40 (EAT-40) [20] (9.1%). Instruments such as SCOFF Questionnaire [21], Eating Disorder Inventory-2 (EDI-2) [22], and Eating Disorder Inventory-3 (EDI-3) [23], have only been used in one study.

Regarding the methods used to evaluate the perception of body image, the most predominant is the Body Shape Questionnaire (BSQ) [24], which is used in 39.4%. Other assessment methods have been used to evaluate other psychological aspects (self-esteem, psychological commitment to exercise, perfectionism, etc.), including the Multidimensional Perfectionism Scale (MPS) [25], with three studies, and the Sociocultural Attitudes Towards Appearance Scale-3 (SATAQ-3) [26] and Rosenberg Self-Esteem Scale [27] with two studies.

3.3. ED risk and body image

In studies, aesthetic sports athletes were found to have disordered eating attitudes and behaviours (DEAB) and therefore at risk of developing ED.

Among the 18 studies that used the EAT-26, there are five studies that report that between 40 and 49.9% of the evaluated subjects present DEAB and therefore risk of developing ED according to the EAT-26 [28—31]. Another four studies indicate the same with a frequency of 10-19.9% of the athletes evaluated [32—34]. Three studies indicate that between 30 and 39.9% of the tested athletes report being positive in EAT-26 test [35—40]. Only one study indicates percentages between 20 and 29.9% [41]. However, there is

no study that reports that the number of evaluated subjects present is < 2% in terms of DEAB, and therefore at risk of developing ED, and neither < 50%. Thus, the data from each of the studies analysed indicate that the values of athletes with DEAB, according to the EAT-26, range between 2.5% and 45% of the aesthetic sports athletes surveyed.

Other tests, such as the BITE questionnaire [19], which helps to identify bulimic symptoms, have been used in three studies, of which one identified 29.5% of dancers [34], another 29% of dancers [36], and the third 25.9% in rhythmic gymnastics with an unusual eating pattern [32], in which in general not all criteria for bulimia are present but may represent a group with certain subclinical concerns.

In addition, other types of questionnaires were used for the assessment of ED, but to a lesser extent (in a single study and therefore it is not possible to make comparisons between results with the same instrument). Among this type of instruments, we can mention results such as the prediction of a possible presence of ED in 5% of a group of rhythmic gymnastics according to the SCOFF test [39], and the prevalence of eating disorders in a group of ballet dancers, with 1.8% of anorexia nervosa, 2.7% of bulimia nervosa and 22.1% of other feeding and eating disorder unspecified in EDE-12 [42].

Regarding body image, according to the BSQ test, the most widely used for this purpose, among the eight studies in which this test was used, 32.3% of all the athletes evaluated showed body dissatisfaction. Of these eight studies, three indicate the level of body dissatisfaction of the athletes, classified as mild, moderate and severe concern. The first of these studies, in which the BSQ test was administered to a artistic gymnastics group, reveals that 15% of the subjects show mild concern, 5% moderate and 5% severe concern [29]. In another group of rhythmic gymnastics and synchronised swimming the results indicate that 27.2% have mild concern, 11.6% moderate and 4% severe [16], and in the third study the data indicate that 100% of a group of adult female rhythmic gymnastics athletes have mild concern [17]. Other studies using other types of tests to assess image perception, such as the body shape rating scale or FRE or the Stunkard mine silhouettes scale, indicate high body dissatisfaction values compared to other athletes in ''non-aesthetic'' sports [43], and in terms of their perception of their own body image in cheerleaders, who wish to be thinner with respect to their perception of their body image with each of the outfits [37], respectively.

4. Discussion

The aim of the study was to identify those research that have evaluated body image and ED risk in aesthetic sports through a literature review of the existing literature. The main results obtained from this study indicate that there has been an upward trend in recent years in research on the subject of this review by researchers.

Rhythmic gymnastics is the most analysed aesthetic sport, possibly because it is the modality with the highest risk of ED compared to other sports modalities [44]. In addition, the instruments used for the evaluation of ED, body image and other psychological aspects, the use of three of them was highlighted: EAT-26 to evaluate ED, BSQ for body image and, for other psychological aspects, MPS to evaluate perfectionism, the latter being the most studied variable in relation to ED and body image.

According to the large number of research covered in the scientific literature on ED and body image, it can be stated that there are several factors that can significantly increase or decrease the risk of ED in aesthetic sports athletes, which are described below.

Age is one of these factors, finding research that indicate that adults are a population group with a higher risk of developing ED and distorted body image. An research indicated that within the group of adult rhythmic gymnastics athletes studied, 43.6% have unusual eating patterns (8.3% high risk) compared to 18.2% in young rhythmic gymnastics athletes (all medium risk and no high risk) according to the BITE test [31]. However, other authors [17] obtained contradictory results, in which a higher percentage of youth rhythmic gymnastics athletes obtained values of 20 in the EAT-26 (18.2% of the child sample and 19.1% of the youth sample) compared to adults, none of whom obtained scores of 20 in the EAT-26, indicating that all adolescents (whether or not they are athletes) will be subject to this type of distortions or disorders.

Regarding the body image, based on the BSQ test, we find studies that indicate very different values between young people and adults, with percentages of body dissatisfaction among youth rhythmic gymnastics athletes surveyed of 33.8% compared to percentages of 100% in adult rhythmic gymnastics athletes [45]. Another research suggests that playing artistic gymnastics is associated with a positive body self-perception in a child [46]. These results differ from other research that obtained a higher body dissatisfaction in youth synchronized swimmers compared to senior swimmers [47], and moderate concern in 21.1% and severe concern in 5.3% of youth synchronized swimmers surveyed compared to 0% moderate and severe concern in senior swimmers (although a high percentage did present mild concern) in terms of body dissatisfaction [16].

Regarding gender, social status and geographic/cultural location, although most of the existing research focus on the female gender in aesthetic sports, it is possible to make certain comparisons between sexes. It has been shown that a group of Turkish female dancers have more problematic eating attitudes compared to male dancers [48]. These data are in agreement with other research that reported that 94.2% of female dancers had DEAB compared to 5.7% of men [36]. However no differences were found between female and male dancers in EAT-26 test and also in BITE test, although a higher proportion of women (30.8%) had used some strategy for weight loss compared to men (9.1%) [34].

Another factor that may influence the development of ED is social status. A high prevalence was found in those subjects who were single compared to athletes who were married or in a couple [36], data that are in line with another research that stated that those who live alone are more vulnerable to ED development [34].

Comparing ED among populations of athletes from different geographic locations, the comparison between Japanese and Chinese rhythmic gymnastics and artistic gymnastics athletes is remarkable [40]. Chinese athlete status significantly decreased the risk of developing ED with values of 2% ED risk in Chinese rhythmic gymnastics athletes and

0% in Chinese artistic gymnastics athletes, compared with 19% in Japanese rhythmic gymnastics athletes and 15% in Japanese artistic gymnastics athletes. This comparison is also interesting when comparing the low risk of Chinese female athletes with those from other countries such as Brazil [4,16,29—31,34,36], France [35], Greece [28], or Spain [38].

In relation with sport level, many of the research present in the scientific literature focus on making comparisons between aesthetic sports athletes of different sporting levels, showing that those athletes with high athletic levels (participants in national or international championships) had a greater probability of developing ED [40]. Comparing elite dancers with amateur dancers, were found higher scores on the EAT-40 in elite dancers compared to amateurs [48], and higher scores in EAT-26 in a sample of elite artistic gymnastics athletes compared to amateurs (54.3% vs. 26.2% respectively) [30]. In contrast, a research shows an upward trend in ED in amateur dancers compared to professional dancers according to the EAT-26 [36].

Regarding the relationship between ED and other psychological aspects in aesthetic vs. non-aesthetic sport, most of the scientific literature indicates that athletes of aesthetic sports presented DEAB and therefore a higher risk of developing ED compared to athletes of non-aesthetic sports and/or non athletes [35,43,48—50]. Also higher levels of body dissatisfaction [41—43], and tend to apply diets with respect to non-aesthetic sports athletes [43]. The data suggest that athletes in these types of sports in which the selection factor is a body biotype where thinness and a specific body weight are emphasized, are more vulnerable to pressure to control weight and are more at risk for these types of disorders. In addition, a significant association has been demonstrated between ED risk and other psychological aspects such as body dissatisfaction of athletes [29,30,32,41] high psychological engagement with exercise [41], and stress generated by negative evaluation by others [28]. However, in other research perfectionism was not associated with ED [29].

These data are consistent with others who report that synchronized swimmers athletes present more negative feelings in relation to their appearance, in comparison with a group of athletes in sports where aesthetics is not emphasized and with respect to a group of non-athletes, adding that they also present a low perception of how other people evaluate their physical appearance [49]. However, found contradictory results in other study [39] that report higher scores on EAT-26 in sports where aesthetics do not predominate (soccer) and in non-athletes compared to rhythmic gymnastics athletes (12.5% vs. 20% vs. 2.5%, respectively). Other studies show how body image distortion appears to be similarly likely in the sports environment as in any other social context where body aesthetics is demanded as a reference [17,49].

Regarding ED and energy level, 100% of rhythmic gymnastics athletes with ED presented general fatigue throughout the day; however, only 25.8% of the rhythmic gymnastics athletes without ED reported having general fatigue, and these rhythmic gymnastics athletes with ED slept fewer hours on average (5.6 hours) compared to those without ED risk (7.7 hours) [38]. The feeling of fatigue in athletes has also been related to ED [29].

Also, inverse correlations were found between carbohydrate and lipid intake per kilogram with the risk of ED and with body image distortion, and inverse correlations between energy intake per kilogram and the ED risk and body image distortion [50].

The relationship between ED and menstrual cycle has also been analysed. In the research carried out by Okano et al. [40], it was seen that the prevalence of amenorrhea in Japanese athletes was higher than in Chinese athletes (Japanese gymnasts 9% vs. 0% of Chinese gymnasts), indicating that this low incidence of amenorrhea in Chinese athletes is due in part to the low prevalence of ED.

According the weight control methods, purging behaviours, such as binge eating or self-induced vomiting, may not be a common weight characteristic among synchronized swimmers [51]. In contrast, a research found pathogenic weight control behaviours by the group of cheerleaders under study, reporting that 11.8% engaged in binge eating at least 2 or 3 times a month, 9.6% vomited seeking to control shape or weight at least once a month, and 19% used diet pills, laxatives or diuretics seeking to control weight at least once a month [52].

Considering the influence on ED development, pressure and influence from close people (family members, coaches, experts, teammates) are factors that may play a role in the development of ED. Rhythmic and artistic athletes revealed pressure from parent for thin bodies and not from coaches, experts and peers [28]. Also, those athletes with ED receive more pressure to have a thin body from ''significant others'' than those with normal eating behaviours. Other authors found that out of a sample of 18 elite coaches of sports in the three categories with the highest risk of eating disorders (aesthetic, weight category and endurance sports), 12 of them consider that, within the sporting environment, ED are not a problem [53].

4.1. Limitations and strengths

Regarding the limitations, despite having carried out an exhaustive search and selection of scientific articles on body image perception and ED in aesthetic sports, there are certain appreciable weaknesses. In each of the studies, different types of questionnaires are used to assess both ED and image perception, which is why comparing the results obtained between the different assessment methods may lead to results of low validity and reliability.

The same occurs with the samples used as the object of study, where we find a large number of articles within aesthetic sports, but there is not a large number of studies within each sport modality that meet the necessary characteristics to evaluate the objective of this review. On the other hand, 81.8% of the studies are focused on the detection of EDs in general, with few studies focusing on a specific disorder, as is the case of three studies that focus on the evaluation of bulimia [32,34,36], and a fourth study that focuses on the evaluation of anorexia nervosa, bulimia nervosa and other feeding and eating disorder unspecified [42].

But we think believe that this review also presents some strengths. The wide variety of sports modalities included as the object of study, in addition to the inclusion of a considerable number of scientific studies, should be noted. The

use of different databases has made it possible to obtain a greater number of search results. Another aspect to highlight is the large number of comparative studies that have been carried out in the context of aesthetic sports and their association with ED and body image, where it has been possible to compare subjects by age, gender, social status, geographical location-culture, sporting level, etc., offering much more extensive information on this topic.

4.2. Future research

Future research lines should analyse athletes from more sports modalities to test and compare the risk of ED in different sports populations, which will further explore the key factors in ED, while allowing for symptom analysis and early detection of the disorders [54]. Also, due to the limited number of related studies, research is needed to analyse men in greater depth in order to understand their specific characteristics and symptoms, and, with large samples, to generalise the results to the population [55].

Special relevance would be methodologically rigorous prospective studies on risk factors, the causal influence of supposed risk factors, longer follow-up periods, validated and objective measures of a wider range of risk factors, data from multiple informants, and prediction of the occurrence of ED [56].

Because of the rigidity and inflexibility of established clinical criteria, many athletes who experience and report notable symptoms of ED, such as body dissatisfaction and engaging in unhealthy behaviours, go undiagnosed [57]. Therefore, research is needed to analyse the behaviours and eating disturbances that may lead to an increased risk of ED in aesthetic athletes.

4.3. Practical applications

Results of this review should help to understand the high risk of athletes in aesthetic sports, and therefore the need to seek solutions to this problem, with the proposal of actions that can help in the prevention of ED [54].

It is needed to implement educational programmes aimed at the promotion of mental health, the development of more adaptive emotional regulation strategies in relation to body image in athletes, especially in aesthetic sports [58] and the need for a multidisciplinary approach in order to raise awareness and prevent possible ED in these athletes [50]. It is important to work on the risk factors in these sports, and to promote the improvement of personal and social adaptation behaviours, as well as the promotion of an adequate self-concept and self-esteem [54]. The development of effective screening systems and methods to detect the most vulnerable athletes, will help to intervene at a preventive level from an early age and contribute to quality education [57].

Furthermore, it is essential to raise awareness and educate all those people and entities (family, coaches, clubs and federations) who are around the athlete about the associated risk factors. In this way they will be able to detect symptoms and risk behaviours linked to poor body image and ED at an early stage.

5. Conclusions

The aesthetic sports athletes analysed are at risk of developing ED and are dissatisfied with their body image, as well as having a higher risk of developing ED and greater body dissatisfaction with respect to athletes of sports where aesthetics is not as relevant. There are significant associations between the risk of developing ED and body dissatisfaction, high psychological commitment to exercise, stress generated by a negative evaluation of others, and general fatigue.

Rhythmic gymnastics is the most studied sport modality, and the female gender is the most analysed. The EAT-26 is the instrument most frequently used to assess ED, and BSQ test for assessment of body image. Women, singles, and athletes with higher sports level (professional/elite) have a higher risk of developing ED than men, married/partnered and amateur/beginner athletes respectively, finding controversy of prevalence of ED development by age groups.

Future research is needed to explore in depth the key factors of ED, and to allow symptom analysis and early detection of disorders. Educational programs are essential for the prevention of ED and the promotion of a positive body image in athletes, and awareness and education on the detection of associated symptomatology in all those people who are around the athlete.

Disclosure of interest

The authors declare that they have no competing interest.

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