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HEALTH-ORIENTED FOOD CHOICES AND EATING DISORDER PSYCHOPATHOLOGY IN AEROBIC GYMNASTICS ATHLETES: AN EDE-Q 6.0 STUDY

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Abstract. Aesthetic sports are associated with increased vulnerability to eating disorder (ED) symptoms due to a strong emphasis on body shape and weight, while athletes often report a high orientation toward health-promoting food choices. However, it remains unclear whether such behavior reflects adaptive performance-supporting strategies or is associated with elevated ED psychopathology. This study aimed to examine associations between health-oriented food choices and ED psychopathology among aerobic gymnastics athletes. A cross-sectional quantitative study was conducted among 72 female athletes. ED psychopathology was assessed using the Eating Disorder Examination Questionnaire (EDE-Q 6.0), and health-oriented eating was evaluated based on the perceived importance of health-promoting food choices and food label reading. Pearson correlation and independent-samples t-tests were applied ($p < 0.05$). Greater importance placed on health-promoting food was positively associated with Restraint ($r = 0.564$, $p < 0.001$) and Global score ($r = 0.464$, $p < 0.001$), while food label reading was positively correlated with all EDE-Q subscales ($p \leq 0.008$). Athletes competing at the international level demonstrated significantly higher ED psychopathology scores compared to national-level athletes. These findings suggest that, in aesthetic sports, a stronger orientation toward health food choices may coexist with higher ED psychopathology, indicating the need for targeted screening and prevention strategies in this population.
Keywords: eating disorder psychopathology, aerobic gymnastics, health-oriented eating, food choice behaviour, EDE-Q 6.0.

Introduction

Eating habits play an important role in the health, performance, and recovery of elite athletes. Female athletes usually require higher energy, macro- and micronutrient intake than non-athletic populations in order to meet daily energy expenditure, maintain training capacity, support recovery, and reduce the risk of injuries. Inadequate energy intake combined with high training demands may lead to low energy availability and relative energy deficiency in sport (RED-S), which can negatively affect hormonal regulation, menstrual function, bone mineral density, growth, recovery, and overall health (Villa et al., 2021).

Aesthetic sports are considered a particularly vulnerable context because athletic performance is closely related not only to physical capacity but also to body shape, appearance, and judges' perception. Previous studies indicate that eating disorders and disordered eating behaviours are more prevalent among female athletes than among non-athletic girls and women, especially in sports in which leanness, low body weight, and aesthetic appearance are emphasised (Rutkowska et al., 2022). Gymnastics disciplines, including aerobic gymnastics, are associated with increased pressure to achieve technical precision, maintain a lean body shape, and meet high aesthetic standards (Mari-Sanchis et al., 2022; Donti et al., 2021; Thompson et al., 2021). In aerobic gymnastics, athletes often begin training at a young age, and the period of intensive training frequently overlaps with adolescence, a critical stage of biological, psychological, and social development. During this period, nutritional needs are increased, while vulnerability to body dissatisfaction, restrictive eating, and external appearance-related pressure is also higher (Branje, 2022; Desbrow, 2021).

The aetiology of eating disorders in sport is multifactorial. It may include low self-esteem, body dissatisfaction, perfectionism, anxiety, pressure from coaches or peers, social media influence, and the internalisation of sport-specific body ideals (St-Cyr et al., 2024; Rodriguez et al., 2017). In aerobic gymnastics, perfectionism may be especially relevant, as athletes are expected to achieve precision and control not only in performance but also in body appearance. Although health-oriented food choices may reflect adaptive behaviour aimed at supporting performance and recovery, they may also coexist with excessive dietary restraint, food preoccupation, and elevated eating disorder psychopathology. Therefore, the boundary between health-promoting eating and disordered eating tendencies may be difficult to identify in this population. Despite increasing scientific attention to low energy availability and eating disorder risk in female athletes, evidence focusing specifically on aerobic gymnastics remains limited. Most studies address gymnastics disciplines or aesthetic sports more broadly, while fewer examine how athletes' eating habits and health-oriented food choices are associated with eating disorder risk in aerobic gymnastics. This gap is relevant both scientifically and practically, as early identification of risky eating behaviours may help prevent more severe physical and psychological consequences among young female athletes.

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The research problem addressed in this study is the association between eating habits and eating disorder risk among female aerobic gymnastics athletes. The subject of the research is the relationship between eating habits and eating disorder risk in this population. However, research specifically focusing on aerobic gymnastics athletes remains limited, particularly in Lithuanian and broader Eastern European contexts. Therefore, the aim of this study was to evaluate associations between eating habits and eating disorder risk among female aerobic gymnastics athletes.

A cross-sectional quantitative study was conducted between January 2025 and April 2025. The empirical data were collected using a questionnaire survey. Eating disorder psychopathology was assessed using the Eating Disorder Examination Questionnaire (EDE-Q 6.0), while eating habits were evaluated using a structured questionnaire comprising sociodemographic items and questions on dietary habits, including health-oriented food choices and food label reading. The study sample consisted of 72 female aerobic gymnastics athletes aged 14–23 years competing at national and international levels. Data analysis was performed using descriptive statistics, correlation analysis, and group comparisons with SPSS and Microsoft Excel.

Research methods and conditions

Study design and participants

A cross-sectional quantitative study was conducted to examine the associations between eating habits and eating disorder risk among aerobic gymnastics athletes. The study sample consisted of 72 female athletes aged 14–23 years who were actively engaged in aerobic gymnastics at either national or international competitive levels. Participants were recruited through aerobic gymnastics clubs and coaches. Inclusion criteria included female athletes aged 14–23 years competing in aerobic gymnastics at national or international level. Participation in the study was voluntary and no financial or other incentives were provided.

Data collection methods and instruments

Data were collected using a structured self-administered questionnaire, which consisted of three parts. The first part included sociodemographic questions assessing participants' age, duration of participation in aerobic gymnastics, and current competitive level (national or international). The second part comprised 19 items designed to evaluate eating habits among aerobic gymnastics athletes. These questions were based on the "Nutrition" section of the Lithuanian Adult Lifestyle Survey (2014) questionnaire developed by Grabauskas et al., which is publicly available and has been widely used in population-based research. The items assessed meal patterns, food choices, food preparation habits, and frequency of consumption of selected food products. Food consumption frequency was evaluated using ordinal response categories ranging from "never" to "6–7 days" during the previous week. The perceived importance of healthy eating and food label reading behaviours were assessed using single-item ordinal response scales. The eating-habit items were analysed individually and were not aggregated into a composite score. The third part assessed eating disorder psychopathology using the Eating Disorder Examination Questionnaire (EDE-Q 6.0), originally developed by Fairburn and Beglin (1994). The instrument evaluates behavioural and cognitive symptoms associated with eating disorders, including dietary restraint, binge eating, compensatory behaviours, and body image concerns. The EDE-Q 6.0 consists of 22 items and yields four subscales: Restraint, Eating Concern, Shape Concern, and Weight Concern, as well as a global score reflecting overall eating disorder risk. Each item is rated on a 7-point scale ranging from 0 to 6, with higher scores indicating greater symptom severity. Subscale scores are calculated as the mean of the corresponding items, and the global score represents the average of all subscale scores. The Lithuanian version of the EDE-Q 6.0 has been validated in previous research (Bacevičienė et al., 2020) and demonstrates good psychometric properties. Prior to data collection, permission to use the validated Lithuanian version of the EDE-Q questionnaire was obtained. Ethical approval for the study was obtained from the Lithuanian University of Health Sciences Bioethics Centre (No. 2025-BEC2-028(K)). Participation in the study was voluntary. Informed consent was obtained from all participants, and parental consent was additionally obtained for participants under 18 years of age. Participants were informed about their right to withdraw from the study at any time.

Statistical analysis

Data analysis was performed using IBM SPSS and Microsoft Excel software. Descriptive statistics (means and standard deviations) were calculated to summarise the data. The Shapiro–Wilk test was used to assess the normality of data distribution. Although minor deviations from normality were observed for some variables, most variables demonstrated approximately normal distributions. Considering the sample size ($n = 72$) and the robustness of parametric methods to slight deviations from normality, parametric tests were applied. Internal consistency of the EDE-Q subscales and the global score was evaluated using Cronbach's alpha coefficient. Associations between variables were assessed using Pearson's correlation coefficient. Differences between groups (athletes competing at national vs. international level) were analysed using independent-samples t-tests.

No correction for multiple testing was applied due to the exploratory nature of the study. Statistical significance was set at $p < 0.05$.

Results and discussion

Eating disorder psychopathology among aerobic gymnastics athletes

A total of 72 completed EDE-Q questionnaires were included in the analysis (n = 72). The internal consistency of the EDE-Q subscales and the global score was assessed using Cronbach's alpha coefficient. All subscales demonstrated acceptable to excellent internal consistency (α = 0.807–0.935), indicating good reliability of the instrument in this sample (Table 1).

Table 1. Cronbach's alpha coefficients for EDE-Q subscales and global score (n = 72)

Variables	Number of items	Cronbach α
Restraint	5	0.837
Eating Concern	5	0.807
Shape Concern	8	0.812
Weight Concern	5	0.856
Eating disorder risk (global score)	22	0.935

Note. Cronbach's α ≥ 0.8 indicates good internal consistency, while α ≥ 0.9 indicates very good internal consistency (Vaske et al., 2016).

The mean scores of the EDE-Q subscales showed that the highest values were observed in the Shape Concern (2.34 ± 0.18) and Weight Concern (2.25 ± 0.71) subscales, while lower scores were found for Restraint (1.75 ± 0.14) and Eating Concern (1.43 ± 0.14). The overall eating disorder risk (global score) was 1.94 ± 0.22 (Table 2).

Table 2. Mean EDE-Q subscale and global scores among athletes (n = 72)

Variables	Aerobic gymnastics athletes (n = 72)
Restraint	1.75 ± 0.14
Eating Concern	1.43 ± 0.14
Shape Concern	2.34 ± 0.10
Weight Concern	2.25 ± 0.71
Eating disorder risk (global score)	1.94 ± 0.22

Due to the limited number of studies focusing specifically on aerobic gymnastics athletes, direct comparison of these findings is restricted. However, when compared with non-athlete populations, including Lithuanian student samples and adolescent girls reported in previous studies, the observed EDE-Q scores appear relatively higher in this sample. Higher scores in the shape- and weight-related subscales suggest that body image concerns are particularly relevant in this group. This is consistent with previous research indicating that athletes in aesthetic sports are exposed to increased pressure to maintain a lean body shape and meet appearance-related expectations. Such pressures may contribute to greater body dissatisfaction and weight-related concerns, which are recognised risk factors for eating disorder psychopathology. A moderate negative correlation was found between eating disorder psychopathology and BMI ($r = -0.321$, $p = 0.008$), indicating that athletes with lower BMI tend to demonstrate higher levels of eating disorder psychopathology. No statistically significant association was found between eating disorder psychopathology and age ($r = 0.225$, $p = 0.060$), although a non-significant tendency suggests that younger athletes may be more vulnerable. Athletes competing at the international level demonstrated higher scores across most EDE-Q subscales and the global score compared to those competing at the national level. Independent-samples t-test analysis showed that these differences were statistically significant for most subscales and the global score (Table 3). Effect size analysis indicated moderate to large differences between groups, particularly for Restraint and Shape Concern.

Table 3. Differences in EDE-Q subscale and global scores by competition level

Variables	National level (n = 37)		International level (n = 35)		t	p	Cohen's d
	mean	SD	mean	SD			
Restraint	1.43	0.82	2.09	0.74	−3.58	0.001	0.84
Eating Concern	1.29	0.92	1.56	0.77	−1.33	0.096	0.32
Shape Concern	1.99	1.16	2.71	0.81	−3.10	0.001	0.72
Weight Concern	1.95	1.19	2.57	0.76	−2.59	0.006	0.62
Eating disorder risk (global score)	1.67	0.97	2.24	0.71	−2.82	0.006	0.67

This finding suggests that higher competitive level may be associated with increased eating disorder psychopathology, possibly due to greater performance demands, stricter body expectations, and more intensive training environments. This is consistent with previous research indicating that athletes competing at higher levels, particularly in aesthetic sports, may be at increased risk of disordered eating behaviours.

Behavioural indicators further showed that dietary restriction was common, with more than 65% of athletes reporting prolonged periods without eating in the past 28 days. Binge eating episodes with loss of control were reported by 29.17% of participants, while compensatory behaviours such as self-induced vomiting and laxative use were relatively rare (Table 4).

Table 4. Prevalence of disordered eating and compensatory behaviours (past 28 days)

Behaviour	Range (days)	Any occurrence (%), n = 72	Regular occurrence (%), n = 72
Dietary restraint (≥ 8 h fasting)	–	65.27	2.70
Objective binge eating (loss of control)	0–15	29.17	6.94
Self-induced vomiting	0–4	4.16	0.00
Laxative use	0–20	0.00	1.38
Excessive exercise	0–25	68.05	4.16

Note. Regular occurrence was defined as ≥ 4 episodes in the past 28 days. For dietary restraint, regular occurrence was defined as ≥ 13 days, and for excessive exercise as ≥ 20 episodes.

These findings indicate that subclinical disordered eating patterns, particularly dietary restriction and occasional binge eating, may be prevalent among aerobic gymnastics athletes, even in the absence of more severe compensatory behaviours.

Health-Oriented Food Choices and Eating Disorder Psychopathology

The Shapiro–Wilk test was used to assess normality of data distribution. Although some variables showed minor deviations from normality, most variables were approximately normally distributed. Considering the sample size (n = 72) and the robustness of parametric methods, Pearson's correlation coefficient was applied.

No statistically significant associations were found between general eating habits, such as meal frequency, breakfast consumption, meal location, or basic food choices, and EDE-Q subscales or the global score. This suggests that overall dietary structure may not be directly associated with eating disorder psychopathology in this population.

In contrast, consistent patterns emerged when analysing specific food choices. Higher EDE-Q scores were positively associated with the consumption of foods typically perceived as health-promoting, such as fresh fruits and berries, vegetables, poultry, and fish. At the same time, higher scores were negatively associated with the consumption of foods commonly considered less health-promoting, including red meat, processed meat products, sugar-sweetened beverages, and fast food.

This pattern suggests that athletes with higher eating disorder psychopathology may be more likely to engage in selective and controlled eating behaviours, favouring foods perceived as healthier while avoiding those associated with higher energy density or potential weight gain.

Furthermore, statistically significant positive correlations were observed between all EDE-Q subscales and both the perceived importance of healthy eating and food label reading behaviour (Table 5).

Table 5. Associations between EDE-Q scores and health-oriented eating behaviours (n = 72)

Variables	Importance of healthy eating		Food label reading	
	r	p	r	p
Restraint	0.564	< 0.001	0.343	0.003
Eating Concern	0.402	0.001	0.326	0.005
Shape Concern	0.451	< 0.001	0.350	0.003
Weight Concern	0.339	0.004	0.310	0.008
Eating disorder risk (global score)	0.464	< 0.001	0.346	0.003

The strongest associations were found between dietary restraint and the perceived importance of healthy eating, as well as between the global EDE-Q score and this variable. Although correlations with food label reading were somewhat weaker, they remained statistically significant across all subscales.

These findings indicate that a stronger orientation toward health-promoting food choices is associated with higher levels of eating disorder psychopathology. This suggests that health-oriented eating in this population may not reflect solely adaptive behaviour aimed at improving health or performance, but may also be associated with increased dietary control, cognitive preoccupation with food, and restrictive eating tendencies. In the context of aesthetic sports, where body appearance and performance are closely intertwined, health-oriented eating may therefore represent both a performance-related strategy and a behavioural expression linked to eating disorder psychopathology.

Discussion

The present study contributes to the growing body of research on eating disorder risk in athletes by examining the relationship between health-oriented food choices and eating disorder psychopathology in aerobic gymnastics athletes. The findings indicate relatively elevated levels of eating disorder psychopathology, particularly in domains related to body shape and weight concerns. This is consistent with previous research demonstrating that athletes in aesthetic sports are at increased risk due to the strong emphasis on body appearance and leanness (Rutkowska et al., 2022; Donti et al., 2021; Thompson et al., 2021). These findings may also reflect sociocultural and sport-specific pressures related to body appearance and idealised body standards (Li et al., 2024; Jani & Bradley, 2024; Cherian et al., 2020).

Compared with non-athlete normative data, the observed EDE-Q scores suggest higher eating disorder psychopathology, although such comparisons should be interpreted cautiously due to differences in sample characteristics (Lichtenstein et al., 2021; Bacevičienė et al., 2020; Luce et al., 2008; Carter et al., 2001).

A key finding of this study is the consistent association between higher eating disorder psychopathology and stronger orientation toward health-promoting food choices. Athletes with higher EDE-Q scores reported healthier food choices, greater attention to food labels, and lower consumption of less health-promoting foods. This pattern aligns with previous research suggesting that restrictive eating behaviours may manifest through selective food choices and avoidance of energy-dense foods (Villa et al., 2021).

These findings suggest that health-oriented eating in this population may not solely reflect adaptive behaviour, but may also represent a form of dietary control. Athletes with greater eating disorder tendencies may also adopt health-oriented eating behaviours and "healthy eating" language as socially acceptable strategies for dietary restraint. The boundary between health-conscious eating and restrictive eating may therefore become less distinct, particularly in aesthetic sports where perfectionism, body image concerns, and performance expectations are strongly emphasised (St-Cyr et al., 2024).

The study also demonstrated that athletes competing at higher levels exhibit greater eating disorder psychopathology, supporting previous findings that higher competitive demands are associated with increased risk (Kontele et al., 2022).

Several limitations should be considered. The cross-sectional design does not allow causal inferences, while the relatively small sample size and recruitment from a specific athletic population may limit the generalisability of the findings. Additionally, voluntary participation may have introduced selection bias, and self-reported data may be subject to reporting bias. The sample size may also have limited statistical power for detecting weaker associations. The EDE-Q is a screening instrument rather than a diagnostic tool, and some behavioural items may be interpreted differently in athlete populations, where certain eating and body-monitoring behaviours may reflect sport-specific performance practices rather than clinically relevant eating disorder psychopathology. Future studies with larger samples should consider multivariate analyses controlling for BMI, age, and competition level in order to better evaluate independent associations between health-

oriented eating behaviours and eating disorder psychopathology. Despite these limitations, the findings suggest that health-oriented eating behaviours in aerobic gymnastics athletes may reflect both adaptive nutritional strategies and potential indicators of increased eating disorder risk.

Conclusions

Aerobic gymnastics athletes demonstrated elevated levels of eating disorder psychopathology, particularly in shape- and weight-related domains, with higher scores observed among international-level athletes. Higher EDE-Q scores were consistently associated with greater orientation toward health-promoting food choices and food label reading, as well as reduced consumption of less health-promoting foods. These findings suggest that health-oriented eating in this population may not solely reflect adaptive behaviour, but may also be linked to increased dietary control and restrictive tendencies. Overall, health-oriented eating in aesthetic sports may represent a dual phenomenon, encompassing both performance-related strategies and potential indicators of elevated eating disorder risk.

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