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Investigating eating disorders and body image dissatisfaction in physically and non-physically active Icelandic females

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Abstract

The objectives of this study were (i) investigate the prevalence of body image concerns, eating disorder symptoms, orthorexia nervosa and in Icelandic female exercisers and compare them to non-exercisers and (ii) to know the differences in body image concerns and eating disorder symptoms based on exercise status and exercise frequency. Four-hundred and fifty-eight responses were received, finally forming the study sample 256 Icelandic females older than 18 years participated in the study (39.6 ± 11.4 years old, range 18–69 years old). Four questionnaires were used: the Body Shape Questionnaire to assess body image concerns; the Eating Disorder Examination Questionnaire to identify disordered eating attitudes and behaviours; the Bulimia Test-Revised to assess the main symptoms of bulimia; and the Dusseldorf Orthorexia Scale to assess orthorexic behaviours. A Mann-Whitney U was used to examine differences in questionnaire scores according to the exercise status of participants. Kruskal-Wallis H test was used to examine differences in medians between weekly exercise frequencies. A Chi-square test was performed to assess differences in the level of body image dissatisfaction between exercisers and non-exercisers. The results showed (i) the percentage of exercisers with body dissatisfaction (moderate and severe) was higher (45%) than in non-exercisers (31%); however, the prevalence of clinical cut-off scores was higher in non-exercisers, especially in orthorexia nervosa (63% vs 43%); (iii) only in orthorexia nervosa were there differences in total values between exercisers and non-exercisers), and (iv) there were no significant differences in any of the questionnaires based on the number of weekly sessions of exercise.

KEYWORDS: Bulimia, orthorexia nervosa, body satisfaction, exercise

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Introduction

Body image is defined as the evaluation of both positive and negative emotions that a person has for his or her body parts (Nayir et al., 2016). An individual's feelings and behaviours may vary based on how positive or negative their body image is (Campbell & Hausenblas, 2009). A negative body image can negatively affect an individual's mental and physical health and lead to emotional distress, social anxiety, depression and unhealthy behaviours (Glashouwer et al., 2019). Furthermore, it can lead to an unhealthy eating pattern that can later develop into an eating disorder (Cruz-Sáez et al., 2020). Individuals who are dissatisfied with their body tend to feel the need to change their appearance (Putra et al., 2020). Literature concerning body image has focused mainly on the association between physical activity (PA), sport and positive body image, or ways that physical activity may be used to increase one's body image (Sabiston et al., 2019). Positive body image is associated with greater participation in sport and/or PA and that there is a connection between low PA and negative body image (Hausenblas & Fallon, 2006). Moreover, research suggests that that exercise interventions may result in improved body image in exercisers (Glashouwer et al., 2019). Moreover, body image may be a factor in the amount of exercise that one performs, with factors such as body mass, attractiveness and maintenance of fitness levels contributing components of exercise participation (Brudzynski & Ebben, 2010). In this sense, it should be noted that if athletes are compared to non-athletes, the former show lower levels of body dissatisfaction (Chapa et al., 2022).

An eating disorder is often described as a mental disorder, characterised by an obsession with body mass/shape and behaviours with food that may lead to purging, starvation, fasting and excessive exercise (Sharps et al., 2022), with research suggesting there may be a relationship between exercise and eating disorders (Yilmaz et al., 2020). Eating disorders, disordered eating and, as a result of these conditions, potential for low energy availability can impact physiological and psychological function (Melin et al., 2014). Research has suggested that these conditions may be a risk factor for female athletes from a range of differing sports and competitive levels (Sharps et al., 2022), and that the prevalence of that exercisers are more likely to show symptoms of eating disorders than non-exercisers (Yilmaz et al., 2020). In this regard, intervening immediately when a problem of this nature is suspected, as well as education, could be useful tools in the fight against these types of disorders (Plateau et al., 2015). One of the most common eating disorders is bulimia nervosa. This can be defined as an intense preoccupation with body weight and shape, with regular episodes of uncontrolled overeating (binge eating) associated with extreme measures to counteract the feared effects of overeating. Studies on this topic have shown that exercise, along with cognitive therapies and nutritional counselling, can be effective in treating this pathology (Sundgot-Borgen et al., 2002). However, differences based on gender and the level of sports practice are present. Thus, a study conducted with more than 900 participants showed that female athletes scored higher on the bulimia and preoccupation with food subscale compared to both female non-athletes and males (athletes and non-athletes) (Fortes et al., 2014).

On the other hand, previous research has tended to focus on orthorexic tendencies in exercisers. Orthorexia nervosa is described as a pathological obsession with biologically pure and healthy nutrition that is characterised by a restrictive diet, strict and ritualised

eating patterns, and avoidance of food that one believes to be impure or unhealthy and, compared with individuals with eating disorders, individuals with orthorexia nervosa do not fear gaining weight (Koven & Abry, 2015). However, some symptoms of eating disorders and orthorexia nervosa overlap, such as displacement of control over life onto food and lack of enjoyment while eating (Brytek-Matera et al., 2015). Orthorexic tendencies may increase in individuals who regularly participate in physical activity and more frequent exercisers, than those who do not perform physical exercise (Yilmaz et al., 2020). It is therefore not surprising that orthorexic eating behaviours have been positively correlated with exercise addiction in both university students (Oberle et al., 2018) and fitness practitioners (Rudolph, 2018). However, Orthorexia nervosa has been shown to be more prevalent in those individuals who engage in more than 150 min of exercise per week compared to those who exercise less (Bert et al., 2019).

In this context, the objectives of this study were (i) investigate the prevalence of body image concerns, eating disorder symptoms, orthorexia nervosa and in Icelandic female exercisers and compare them to non-exercisers and (ii) to know the differences in body image concerns and eating disorder symptoms based on exercise status and exercise frequency.

Material and methods

Participants

Two-hundred and fifty-six Icelandic females older than 18 years participated in the study ($\bar{x}$ = 39.64 years old, σ = 11.24, range 18–69 years old). Four-hundred and fifty-eight responses were received. However, 196 responses were deleted because they did not meet the criteria of completing the Body Shape Questionnaire (n = 145), the participants were male or other gender and were not included in this study (n = 50) and one response did not specify exercise status (n = 1). The participants were grouped as exercisers (n = 180) or non-exercisers (n = 83) based on question “Do you exercise regularly?”

Instruments

All the participants completed a battery of four questionnaires. The questionnaires were presented in their Icelandic versions.

Body shape questionnaire (BSQ)

The BSQ is a self-report questionnaire composed of 34 items, with each question scored on six-point Likert scale (e.g. 1 = Never and 6 = Always). Higher scores on BSQ indicate greater risk of body dissatisfaction. The total scores are divided into four levels of body image concern with shape: no concern with shape (total score < 80), mild concern with shape (total score 80–110), moderate concern with shape (total score 111–140) and marked concern with shape (total score > 140) (Cooper et al., 1987). The psychometric properties of the English version of the questionnaire are known to be good (Rosen et al., 1996), and, while those of the Icelandic version of the questionnaire are unknown, the test’s internal consistency was acceptable in this study (Cronbach α = 0.97). The cut-off score for having a moderate to high concern about body shape was set at ≥ 110 points (Neves et al., 2017).

Eating disorder Examination questionnaire (EDE-Q)

The EDE-Q is a 28-item self-reported version of the semi-structured interview called Eating Disorder Examination (EDE) to assess the range and severity of features associated with a diagnosis of eating disorders (Cooper & Fairburn, 1987). EDE-Q provides scores on four subscales: restraint, eating concerns, shape concerns and weight concerns. Each item is scored on seven-point Likert scale. Higher scores indicate a higher eating-related pathology. The overall score is the mean of the four subscales (Overall Score = Restraint + Eating Concern + Weight Concern + Shape Concern)/4) (Cooper & Fairburn, 1987; Fairburn & Beglin, 1994). The psychometric properties of the English (Luce & Crowther, 1999) and Icelandic (Olafsdottir, 2011) versions of EDE-Q have been tested and found to be good. The internal consistency of the subscales and overall score has been calculated and appeared to be excellent (overall: Cronbach $\alpha = 0.92$; restraint: Cronbach $\alpha = 0.88$; eating concern: Cronbach $\alpha = 0.86$; shape concern: Cronbach $\alpha = 0.92$; weight concern: Cronbach $\alpha = 0.84$). The cut-off score for showing symptoms of eating disorder was set at ≥ 4 points (Carter et al., 2001).

Bulimia test-revised (BULIT-R)

The BULIT-R can be used to assess changes in bulimia symptoms over time and also as a screening instrument to find individuals at risk of developing bulimia (Thelen et al., 1991). It is a self-report questionnaire composed of 36 items. Each item is scored on five-point Likert scale with one being an extreme normal response and five being an extreme bulimic response. Higher scores on BULIT-R indicate more symptoms of bulimia nervosa. The psychometric properties of the English (Thelen et al., 1991) and Icelandic (Jonsdottir et al., 2005) versions of BULIT-R have been tested and found to be good. The internal consistency of BULIT-R was calculated and seems to be excellent (Cronbach's $\alpha = 0.95$). The cut-off score for demonstrating significant bulimia symptoms was set at ≥ 98 points (Jonsdottir et al., 2005).

Dusseldorf orthorexia scale (DOS)

The DOS questionnaire is a ten-item self-reported questionnaire used to assess orthorexic behaviours in participants. Each item is scored on four-point Likert scale (e.g. 1 = this does not apply to me, 4 = this applies to me) (Barthels et al., 2015). The psychometric properties of the English (Barthels et al., 2015) and Icelandic (Gudmundsdottir, 2020) versions of DOS have been tested and found to be good. The internal consistency of BULIT-R was calculated and seems to be excellent (Cronbach's $\alpha = 0.89$). The cut-off score for demonstrating Orthorexia Nervosa symptoms was set at ≥ 30 points (Barthels et al., 2015).

Procedure

A descriptive cross-sectional study was performed to estimate the prevalence of body image concerns and eating disorder symptoms in exercisers in order to compare them to non-exercisers (independent variable). Quantitative data was gathered with the use of a background questionnaire and four standardised questionnaires: BSQ, EDE-Q, BULIT-R, and

DOS (dependent variables). The data was acquired through an online QuestionPro questionnaire. Snowball sampling was used to gather data. Participants were recruited *via* social media advertisements and word of mouth, using convenience and snowball sampling methods. The study was approved by the Icelandic Data Protection Authority, and permission for the study was obtained from the National Bioethics Committee (VSN-22-005). Participation in the study was voluntary, and participants could quit at any time and skip any item on the questionnaires. Participants received no compensation of any kind.

Statistical analysis

The basic descriptive statistics (mean and standard deviation) were calculated. None of the variables satisfied the tests of normality (Kolmogorov-Smirnov test) and homoscedasticity (Levene's homogeneity test). So non-parametric tests were used. A Mann-Whitney *U* was used to examine differences in questionnaire scores according to the exercise status of participants. Kruskal-Wallis *H* test was used to examine differences in medians between weekly exercise frequencies. Post-hoc testing was conducted where appropriate. A Chi-square test was performed to assess differences in the level of body image dissatisfaction between exercisers and non-exercisers. Effect sizes (ES) were calculated in accordance with Cohen's *d* (0.1 small, 0.3 moderate, 0.5 large, 0.7 very large, and 0.9 nearly perfect) (Hopkins et al., 2009). An alpha level of $p \leq 0.05$ denoted significance. All data were analysed *via* SPSS (IBM Corp. Released 2017. IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp).

Results

Table 1 presents the frequencies of levels of dissatisfaction in exercisers and non-exercisers. Prevalence of exercisers who reported experiencing moderate and severe dissatisfaction about their body was 26%, and 48% of exercisers did not experience body dissatisfaction. Non-exercisers showed a higher prevalence of body dissatisfaction (31%), and 45% showed no body dissatisfaction. The results showed that level of body dissatisfaction did not differ by exercise status, $\chi^2(1, 106)=104.86, p=0.51$.

Table 2 shows the prevalence of body dissatisfaction, eating disorders and orthorexia nervosa was calculated using the cut-off points described above. Prevalence of body dissatisfaction, eating disorders and orthorexia nervosa appears higher in non-exercisers compared to exercisers (29% vs 25%, 22% vs 13% and 63% vs 43% respectively. Prevalence is higher for orthorexia nervosa in both groups. The fewest number of participants reached

Table 1. The prevalence of body dissatisfaction in exercisers and non-exercisers.

Level of dissatisfaction	Exercisers <i>n</i> = 172 <i>n</i> (%)	Non-Exercisers <i>n</i> = 76 <i>n</i> (%)	Total <i>n</i> = 248 <i>n</i> (%)
No dissatisfaction	82 (48%)	34 (45%)	116 (47%)
Mild dissatisfaction	45 (26%)	18 (24%)	63 (25%)
Moderate dissatisfaction	29 (17%)	14 (18%)	43 (17%)
Severe dissatisfaction	16 (9%)	10 (13%)	26 (11%)

Table 2. The prevalence of exercisers and non-exercisers scoring above the clinical cut-off score.

Scale	Exercisers <i>n</i> = 180 <i>n</i> (%)	Non-exercisers <i>n</i> = 82 <i>n</i> (%)	Total <i>n</i> = 262 <i>n</i> (%)
BSQ	45 (25%)	24 (29%)	69 (26%)
EDE-Q	24 (13%)	18 (22%)	42 (16%)
BULIT-R	7 (4%)	5 (6%)	12 (5%)
DOS	77 (43%)	52 (63%)	129 (49%)

the cut-off score for Bulimia Test – Revised Questionnaire compared to the other questionnaires used in this study.

Table 3 shows the differences between exercisers and non-exercisers. Means and medians for every scale are higher for non-exercisers than exercisers, which indicates more body dissatisfaction and higher eating-related pathology. However, the difference between these groups was only significant for Dusseldorf Orthorexia Scale ($U = 2292.00$, $p < 0.01$, $ES = -0.99$).

Table 4 presents values for each of the questionnaires and subscales of the EDE-Q questionnaire. Mean, standard deviation, median and Mann Whitney U test values for weekly frequency of exercising. No significant differences were found in any of the questionnaires between participants who exercised four times per week or less and those who exercised five sessions or more. However, in DOS, the difference was close to being statistically significant ($U = 1159.50$, $p = 0.07$).

Discussion

The objectives of this study were (i) investigate the prevalence of body image concerns, eating disorder symptoms, orthorexia nervosa and in Icelandic female exercisers and compare them to non-exercisers and (ii) to know the differences in body image concerns and eating disorder symptoms based on exercise status and exercise frequency. The results revealed that 45% of the exercisers had moderate or severe dissatisfaction with their body compared to non-exercisers (41%). Of possible concern, are the findings relating to orthorexia nervosa which show that approximately 43% of exercisers and 63% of non-exercisers reach the cut-off score for orthorexia nervosa. However, surprisingly, there were no differences in the values of BSQ, BULIT-R, and EDEQ (neither in total nor in their four subscales) between exercisers and non-exercisers; on the contrary, there were differences in DOS in favour of the non-exercisers. Regarding the frequency, no significant differences in any of the questionnaires based on the number of weekly sessions of physical exercise was observed.

Exercise participants show higher dissatisfaction with body image (moderate and severe) than non-exercisers (Table 1). This dissatisfaction may be one of the reasons that lead individuals to engage in exercise, seeking greater attractiveness and maintenance or improvement of fitness (Brudzynski & Ebben, 2010; Homan & Tylka, 2014). In the same vein, a study suggests that females athletes exhibit lower levels of body dissatisfaction compared to females non-athletes (Chapa et al., 2022). With respect to the prevalence of clinical cut-off scores (Table 2), values in the present study for BSQ (26%), BULIT-R (5%), and EDE-Q (16%)

Table 3. Values for each of the questionnaires.

Questionnaire	Exercise status	N	$\bar{x} \pm SD$	M	Mean rank	Sum of ranks	U	p
BSQ	Exerciser	172	87.89 $\pm$ 34.38	81.00	122.92	21142.00	6264.00	0.60
	Non-exerciser	76	90.91 $\pm$ 37.06	83.50	128.08	9734.00		
	Total	248	88.81 $\pm$ 35.18	81.00				
EDEQ restraint subscale	Exerciser	133	2.36 $\pm$ 1.45	2.00	101.89	13551.50	4137.50	0.51
	Non-exerciser	66	2.32 $\pm$ 1.66	1.60	96.19	6348.50		
	Total	199	2.35 $\pm$ 1.52	1.80				
EDEQ eating concerns subscale	Exerciser	128	1.88 $\pm$ 1.19	1.20	96.11	12302.50	4046.50	0.89
	Non-exerciser	64	2.06 $\pm$ 1.43	1.20	97.27	6348.50		
	Total	192	1.94 $\pm$ 1.28	1.20				
EDEQ shape concern subscale	Exerciser	129	3.38 $\pm$ 1.67	3.38	92.91	11986.00	3601.00	0.15
	Non-exerciser	64	3.78 $\pm$ 1.80	3.75	105.23	6735.00		
	Total	193	3.51 $\pm$ 1.72	3.50				
EDEQ weight concern subscale	Exerciser	128	3.12 $\pm$ 1.64	2.80	90.86	11629.50	3373.50	0.07
	Non-exerciser	63	3.67 $\pm$ 1.68	3.40	106.45	6706.50		
	Total	191	3.27 $\pm$ 1.66	3.00				
EDEQ – Total score	Exerciser	124	2.69 $\pm$ 1.33	2.40	91.17	11304.50	3554.50	0.32
	Non-exerciser	63	2.94 $\pm$ 1.50	2.45	99.58	6273.50		
	Total	187	2.78 $\pm$ 1.40	2.41				
BULIT-R	Exerciser	147	50.65 $\pm$ 21.23	43.00	102.77	15107.00	4229.00	0.70
	Non-exerciser	68	56.82 $\pm$ 24.53	46.00	119.31	8113.00		
	Total	215	52.60 $\pm$ 22.45	44.00				
DOS	Exerciser	123	30.66 $\pm$ 6.57	32.00	80.63	9918.00	2292.00	<0.01
	Non-exerciser	61	34.72 $\pm$ 5.03	36.00	116.43	7102.00		
	Total	184	32.00 $\pm$ 6.39	33.00				

Mean, standard deviation and Mann Whitney U test values for the differences between exercisers and non-exercisers.

Table 4. Values for each of the questionnaires and subscales of the EDE-Q questionnaire.

Questionnaire	Weekly exercise frequency	N	$\bar{x} \pm SD$	M	Mean rank	Sum of ranks	U	p
BSQ	1–4	126	86.73 ± 33.18	80.00	83.82	10561.00	2984.00	0.45
	≥5	44	92.39 ± 37.80	84.00	90.32	3974.00		
	Whole sample	248	88.81 ± 35.18	81.00				
BULIT-R	1–4	103	49.80 ± 19.30	43.00	72.58	7476.00	2206.00	0.85
	≥5	42	52.88 ± 25.63	42.00	74.02	3109.00		
	Whole sample	215	52.60 ± 22.45	44.00				
EDEQ restraint subscale	1–4	94	2.31 ± 1.44	1.90	64.14	6029.00	1914.00	0.37
	≥5	37	2.52 ± 1.50	2.00	70.73	2617.00		
	Whole sample	189	2.35 ± 1.52	1.80				
EDEQ eating concerns subscale	1–4	92	1.84 ± 1.16	1.20	61.61	5668.50	1737.50	0.33
	≥5	34	2.02 ± 1.30	1.50	68.60	2332.50		
	Whole sample	192	1.94 ± 1.28	1.20				
EDEQ shape concern subscale	1–4	91	3.34 ± 1.64	3.25	62.66	5702.00	1760.00	0.51
	≥5	36	3.58 ± 1.71	3.81	67.39	2426.00		
	Whole sample	193	3.51 ± 1.72	3.50				
EDEQ weight concern subscale	1–4	90	3.08 ± 1.57	2.80	62.59	5633.50	1701.50	0.66
	≥5	36	3.31 ± 1.79	2.90	65.76	2367.50		
	Whole sample	191	3.27 ± 1.66	3.00				
EDEQ – Total score	1–4	88	2.66 ± 1.28	2.39	60.35	5311.00	1597.00	0.56
	≥5	34	2.87 ± 1.45	2.50	64.47	2192.00		
	Whole sample	187	2.78 ± 1.40	2.41				
DOS	1–4	87	31.52 ± 5.93	33.00	64.67	5626.50	1159.50	0.07
	≥5	34	28.41 ± 7.81	39.50	51.60	1754.50		
	Whole sample	184	32.00 ± 6.39	33.00				

Mean, standard deviation, median and Mann Whitney U test values for weekly frequency of exercising.

are similar to or lower than BSQ (25.35%) or BULIT-R (2.7%) or EDE-Q (10.6%) in a sample of athletes from the same country (Kristjánsdóttir et al., 2019). In regards, values in DOS are noteworthy (49% for the total sample, 43% for exercisers, and 63% for non-exercisers). In this case, it does not appear that clinical values of orthorexia are related to the practice of exercise; this may be because non-exercisers only consider diet as a means to improve satisfaction with their body without taking into account exercise. However, as has been shown in previous studies, in specific samples such as athletes, fitness practitioners (Rudolph, 2018), and university nutrition students (Oberle et al., 2018), a higher presence of orthorexia was observed compared to their counterparts.

When based on the practice or non-practice of exercise (Table 3), significant differences were shown only in DOS (Table 3). No significant differences were found in BSQ. These results were inconsistent with previous studies regarding body image in exercisers. A meta-analysis of 121 studies that examined the impact that exercise has on body image (Glashouwer et al., 2019). The authors found a small effect insinuating that exercisers have a more positive body image than non-exercisers, whereas the results of the current study indicate that there is no difference in body image between exercisers and non-exercisers (Hausenblas & Fallon, 2006). Similarly, no differences were found in EDE-Q and BULIT-R. While excessive exercise may be considered a risk factor in these eating disorders (Sharps et al., 2022); in the present study, approximately 50% of the sample practices four or fewer exercise sessions per week. This could be interpreted as non-excessive exercise potentially protecting against the onset of these disorders, considering that, although not statistically significant, exercisers within this study, score lower than non-exercisers in both BULIT-R and EDE-Q questionnaires (4 subscales). However, it is important to consider that the absence of differences could be due to the fact that exercisers use exercise to control their weight, whereas non-exercisers may feel the need to control their weight in other ways, including by using compensatory behaviours such as purging, laxative use, induced vomiting, and obsessing over eating only healthy foods to control their weight. Surprisingly, non-exercisers showed significantly higher values than exercisers for DOS. The results of this study differ from a previous study indicating that orthorexic tendencies seem to increase in individuals who regularly participate in exercise (Yilmaz et al., 2020). Conversely, another study indicated that individuals who engage in more than 150 min of exercise per week compared to those who exercise less have higher values of orthorexia (Bert et al., 2019). In regards to frequency, the present study did not show differences in any of the questionnaires based on the weekly practice frequency. However, a study done on university students that showed that the frequency of exercises was higher in individuals who thought of themselves as unattractive (Brudzynski & Ebben, 2010). More recently, another study presented the opposite result, identifying a positive relationship between exercise frequency and body satisfaction, implying that those who exercise more have a more positive body image (Homan & Tylka, 2014). These findings pose interesting parallels with the findings of the present study, and further research in relation to both positive and negative relationships with physical activity alongside potential factors relating to body dissatisfaction is warranted.

The relationship between body dissatisfaction in both exercising, and non-exercising individuals is a complex, and multi-faceted issue (Guo et al., 2025). Within exercising populations, it has been proposed that excessive exercise behaviours may be explained by

individual differences in the goals and expectations associated with engaging in exercise and potential improvements in body attributes bought about by engaging in exercise (Alcaraz-Ibáñez et al., 2021). Two different mechanisms have been suggested whereby experiencing body dissatisfaction may lead to excessive exercise behaviours (Alcaraz-Ibáñez et al., 2021); a negative reinforcement mechanism, whereby increased exercising is fuelled to avoid negative body-related consequences that may emerge as a result of not engaging in the behaviour (e.g. feeling guilty about missing exercise and losing an opportunity to compensate caloric intake) (Alcaraz-Ibáñez et al., 2021). Secondly, a positive reinforcement mechanism, in which undertaking exercise with the aim of obtaining a body-related pleasurable reward (e.g. increased muscle tone) (Alcaraz-Ibáñez et al., 2021; Szabo et al., 2018). Similarly, within non-exercising populations, body dissatisfaction may be linked to physical inactivity and negative health outcomes (e.g. obesity) and may help explain a link to eating disorders and disordered eating in adolescence (Gualdi-Russo et al., 2022). Sociocultural, media (including social media) have shown to influence how adolescents perceive their bodies, which may be carried in to adulthood (Gualdi-Russo et al., 2022; Vuong et al., 2021). Whether these influences help explain the findings of body dissatisfaction in both exercising and non-exercising populations Icelandic females included within the current study need further investigation.

This study is not without limitations. Firstly, snowball sampling was used to gather data. Therefore, there is no guarantee that the sample is representative of Icelandic exercising and non-exercising females. Nevertheless, this is one of the few studies conducted in this population, with very specific characteristics, and the sample size allows for interesting conclusions relating to body dissatisfaction. Secondly, the questionnaire was quite long, leading to a 43% dropout rate; however, the number of participants in the study is considerable. Within the current study, the main reasons for study drop-out was incompleteness of the BSQ ($n = 145$) and male and other genders ($n = 50$) choosing to participate in the study. Due to the anonymous nature of the study design and methods adopted in data collection, specific reasons to ascertain why this particular section was not completed could not be ascertained. However, speculatively, it may be that, despite being validated within previous research, participants felt a level of discomfort in answering questions within the BSQ, and chose to not complete the survey. Additionally, given that male and other identifiable genders chose to participate in the study, whilst these cohorts did not meet the inclusion criteria for the current study, investigating eating disorders and body image dissatisfaction in physically and non-physically active males and other identifiable genders presents an interesting avenue of future research.

The conclusions of the present study were: (i) the percentage of exercisers with body dissatisfaction (moderate and severe) was higher than in non-exercisers; however, the prevalence of clinical cut-off scores was higher in non-exercisers, especially in orthorexia nervosa; (iii) only in orthorexia nervosa were there differences in total values between exercisers and non-exercisers, and (iv) there were no differences in any of the questionnaires based on the number of weekly sessions of physical exercise.

The present study demonstrates that there are no differences between exercisers and non-exercisers for the variables studied, although body dissatisfaction (%) is higher in the former. This contradicts previous studies conducted mainly in athletes (Plateau et al., 2015) or specific populations (Oberle et al., 2018). However, when we put the findings into

perspective, we find that approximately 50% of our studied sample of exercisers practiced four or fewer times per week, which can be considered a regular or non-excessive exercise practice. Overall, this study poses interesting findings in an under-represented population, and may be of interest to medical and sports science practitioners involved with both active, and non-active female populations and could serve as a protective factor against eating disorders in such cohorts.

Author contribution

The study was designed by WB, JMS and HK; data was collected and analysed by WB; data interpretation and manuscript preparation were undertaken by WB, CC, JMS and HK. All authors approved the final version of the paper.

Clinical trial registration

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Data availability statement

Data are not available due to their sensitivity and to ensure the privacy of the participants.

Disclosure statement

The authors have no conflicts of interest, financial or otherwise, to declare.

Ethics approval statement

The study was approved by the Icelandic Data Protection Authority, and permission for the study was obtained from the National Bioethics Committee (VSN-22-005). All procedures performed in participants were in accordance with the ethical standards and with the 1964 Helsinki declaration and its later amendments.

Patient consent statement

Informed consent was obtained from all individual participants included in the study.

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