Article:
Burgon, R.H. and Waller, G. orcid.org/0000-0001-7794-9546 (2024) Body image concerns among individuals with different levels of sporting engagement and exercise: a longitudinal study. Eating Behaviors, 53. 101881. ISSN 1471-0153

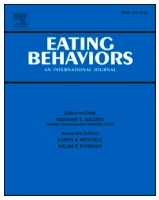
https://doi.org/10.1016/j.eatbeh.2024.101881

Eating Behaviors 53 (2024) 101881

Contents lists available at ScienceDirect

Eating Behaviors

journal homepage: www.elsevier.com/locate/eatbeh



Body image concerns among individuals with different levels of sporting engagement and exercise: A longitudinal study

Rachel H. Burgon, Glenn Waller *

University of Sheffield, Sheffield, UK

ARTICLE INFO

Keywords:
Body image
Eating disorder
Sport

ABSTRACT

This longitudinal study examined whether body image concerns (general; sporting) predicted eating disorder psychopathology, and whether the link differed according to nature of sport engagement. Participants were competitive sports engagers, non-competitive sports engagers, or sports non-engagers. At baseline, 510 adults completed online measures of sports demographics, eating psychopathology and body image. Eating psychopathology and body image measures were taken at follow-up (6 months later). Competitive sports engagers had better body image than the other two groups. Poorer body appreciation and better appearance-related body image predicted higher eating disorder psychopathology. Engaging in sports competitively may be beneficial for body image. However, positive appearance-related sporting body image may pose a risk for later eating psychopathology.

1. Introduction

In sport and exercise research, body image has received increasing attention (Sabiston et al., 2019). The term 'body image' encompasses a variety of constructs, ranging from 'negative body image' (e.g., body dissatisfaction) to 'neutral body image' to 'positive body image' (e.g., body appreciation). The experience of body image is largely explained by appearance-related pressures from society (e.g., parents, peers, media) for certain body ideals (Frederick & Reynolds, 2021). Such body ideals vary with context, such as an ideal for thinness, muscularity, and/or a specific body shape (Culbert et al., 2015).

Overall, engaging in sports can protect individuals from body image concerns (Burgon et al., 2023). However, the concept of body image in sporting populations is complex, and numerous factors can increase the risk of body image concerns in such individuals. Such factors can include gender, pressures from coaches, performance-related pressures, sports uniforms, and regular anthropometric measurements (e.g., Burgon et al., 2023; Cordes et al., 2016). Those engaging in sports where a thin physique is believed to maximise performance (e.g., distance running) can also report more body image concerns than those engaging in sports that are not reliant on thin physique for success (e.g., American football), due to increased pressure towards low body weight in the former group (Burgon et al., 2023). Higher competition levels might also explain differences in body image across sports populations, but the relationship is complex (Beckner & Record, 2016). Some reviews have found less body dissatisfaction in competitive athletes versus sports non-engagers (Burgon et al., 2023; Karrer et al., 2020). However, others have highlighted higher sporting competition levels as a risk factor for body image concerns (DiBartolo & Shaffer, 2002; Hoag, 2012; Kato et al., 2011; Robinson & Ferraro, 2004).

When considering positive body image terms, body appreciation is defined as holding a favourable attitude and respect towards one's body (Linardon et al., 2022). Engaging in sports can increase body appreciation since individuals are more likely to value their bodies for how they function, rather than how they look (Soulliard et al., 2019). However, body image in sports is complex, as demonstrated by the observation that sports engagers have multiple body images (de Bruin et al., 2011). Thus, the context in which sporting individuals evaluate their body might impact body appreciation. General body appreciation refers to body evaluation in the context of daily life, whilst 'sporting body image' refers to an individual's evaluation of body image in a sporting environment (de Bruin et al., 2011). For example, Russell (2004) found that women rugby players positively interpret their body shape as a tool for successful performance (sporting body image), whilst also feeling that their bodies failed to meet westernised ideals outside of that context (general body appreciation).

The importance of understanding body image in sport engagers is emphasised by the fact that such body image concerns are a potential

* Corresponding author at: Clinical and Applied Psychology Unit, University of Sheffield, Cathedral Court, 1 Vicar Lane, Sheffield S1 2LT, UK.
E-mail address: g.waller@sheffield.ac.uk (G. Waller).

https://doi.org/10.1016/j.eatbeh.2024.101881
Received 1 March 2024; Received in revised form 25 April 2024; Accepted 29 April 2024
Available online 1 May 2024

risk factor for an eating disorder (Petrie & Greenleaf, 2007, 2012). Athletes who do not fit the ideal body type for their sport can feel pressured to use unhealthy methods to achieve this (e.g., restricting their nutritional intake), which can result in disturbed eating attitudes/behaviours and development of an eating disorder (Sundgot-Borgen & Torstveit, 2010). However, there are mixed findings on the link between body image and eating psychopathology, as not all research findings support it in sporting groups (Krentz & Warschburger, 2013; Neves et al., 2017).

To summarise, sporting individuals can have multiple body images (general; sporting), but the link between their body image and eating psychopathology is not understood fully. Competition level might explain different findings regarding body image and eating concerns in sports populations. This study used a longitudinal design to examine whether a link between body image and eating psychopathology is found in sporting (competitive; non-competitive) and non-sporting populations. It will also consider whether body image concerns (general; sporting) predict eating psychopathology six months later. We hypothesise that greater levels of body image concerns (general, sporting) will predict eating disorder psychopathology six months later, over and above any impact of initial eating disorder psychopathology at time 1.

2. Method

2.1. Ethical issues and pre-registration

Ethical approval was granted by the University of Sheffield Research Ethics Committee. The study was pre-registered on Open Science Framework (https://osf.io/shpcn/?view_only=af5b6019e53b4438a7c98eee016f2991).

2.2. Design

This study used a quantitative longitudinal design over six months. We collected measures of eating disorder psychopathology, body appreciation and body image (general and sporting body image), at time 1 (between March 2022–September 2022). At time 2 (six months after participants completed time 1), the eating psychopathology and body image measures (including body appreciation) were readministered.

2.3. Participants

An a priori sample size calculation was undertaken using Cohen's (1992) table. For the most complex analysis (hypothesis 2 - a hierarchical linear regression with six predictors, and assuming a medium effect size, 80 % power, and $p = .05$), the required sample size was 97 participants per group ('competitive sports engagers', 'non-competitive sport engagers', 'sports non-engagers), resulting in a total sample of 291. We hypothesised an attrition rate of 35 %, though we were not able to identify longitudinal studies that would have supported this level of attrition. Therefore, the current study aimed to recruit 150 participants per group and a total of 448 participants. [We note that Messer et al., 2022 published such a paper that suggested higher a higher rate of participant loss (55 %) over a similar time period, but we had already undertaken our initial data collection at the time that the Messer et al. paper was available].

A non-clinical sample was obtained via social media and in local gyms and sports clubs. The advertisement stated that the study required participants to complete a set of questionnaires relating to body image and eating behaviours at different timepoints. It also detailed that participants could enter a draw for one of three £50 Amazon vouchers. Inclusion criteria were adults aged 18+ who were fluent in English. Exclusion criteria included people who self-reported any eating disorder or current or recent eating disorder treatment (<12 months). Participants were sorted into sports category (competitive sports, non-competitive sports and sports non-engagers) based on their answers to the sports demographic questionnaire (detailed below). Five hundred and ten participants consented and took part, though the numbers varied across groups (Sports non-engagers = 117; Non-competitive sports engagers = 276; Competitive sports engagers = 117). The attrition rate was 54.9 %, which was higher than the 35 % anticipated. There were 230 participants who completed measures at six months and similar group attrition rates (Sports non-engagers = 52; Non-competitive sports engagers = 130; Competitive sports engagers = 48).

2.4. Procedure

The measures were delivered via the Qualtrics platform. At Time 1, the study was advertised online through social media streams (Facebook, Instagram), as well as via leaflets at sporting clubs. Participants were required to follow a link to the information sheet and consent form. If eligible for inclusion, they were directed to the online questionnaire battery. A further email link was sent six months later, for completion within two weeks. Following completion, participants received a debrief sheet, which detailed the research aims and summarised how the participant had contributed to them. It also included helpline services for eating disorder/mental health support for individuals to access if the study had raised concerns for them.

2.5. Measures

Participants completed the following measures at baseline (Sports Demographic Measure; Eating Disorder Examination-Questionnaire; Body Appreciation Scale; Contextual Body Image Questionnaire for Athletes), and the six month follow-up (Eating Disorder Examination-Questionnaire; Body Appreciation Scale; Contextual Body Image Questionnaire for Athletes).

2.6. Sports demographic questionnaire

The sports demographic questionnaire was designed by the researchers (available from the lead author, on request). It addressed demographic information (age, gender, height, weight), and questions relating to participation in sport and competition level (type of sport, hours per week of training, competition level). Answers were used to split the sample according to sporting category. Details of sports undertaken are given in Appendix 1.

Sports non-engagers were those who participated in exercise for <2.5 h per week and/or those who scored 0 ('I never prioritise training') or 1 ('I rarely prioritise training') on '*Where would you rate your training in relation to other priorities (e.g., socialising/work/family)?*'. This level of exercise (2.5 h) was selected in accordance with National Health Service guidelines for physical activity. The remainder of the participants were categorised as 'sporting individuals'. In answer to 'what is your competition level?', non-competitive sports engagers scored 0 ('I don't compete') or 1 ('I compete recreationally'), whilst competitive sports engagers scored 2–5 (compete locally, nationally, internationally or professional level).

2.7. Contextual Body Image Questionnaire for Athletes (CBIQA)

The CBIQA (de Bruin et al., 2011) assesses differences in body image for athletes when in sport vs outside of sport, and has been validated for use in athletes (de Bruin et al., 2011; Stewart et al., 2021). It considers two contexts (sport; daily life) and four dimensions within each: Appearance, Muscularity, Thin-Fat Self (self-evaluation of shape/weight/fat), and Thin-Fat Others (perceived opinion of others on shape/weight/fat). The current study only used the measures of the sporting context, rather than the daily life dimensions, since broader body appreciation was our selected measure for general body image. Each question is scored on a Likert scale from 1 to 7. Scale scores are given by

dividing the sum scores by the total number of items of the scale. It has good psychometric validity, capturing variance discrete from thin-ideal internalisation (Stewart et al., 2021). In this study, the internal consistency (Cronbach's *alpha*) for each scale was good to strong at both time points (Time 1 - Appearance = 0.860; Muscularity = 0.851; Thin-Fat Self = 0.944; and Thin-Fat others = 0.906: Time 2 - Appearance = 0.907 Muscularity = 0.893; Thin-Fat Self = 0.894; and Thin-Fat others = 0.941).

2.8. Body Appreciation Scale 2 (BAS-2)

The BAS-2 (Tylka & Wood-Barcalow, 2015) was used to measure body appreciation in general, (rather than in a sporting context). It consists of statements relating to body appreciation, such as 'I respect my body'. Answers for each statement were measured on a Likert scale ranging from 1 (never) -5 (always). Item mean scores are used (ranging = 1–5), where higher scores indicated greater body appreciation. The BAS-2 has good internal consistency, test-retest reliability and construct validity (Tylka & Wood-Barcalow, 2015). Internal consistency was strong in this study at both time points (Time 1 - *alpha* = 0.941; Time 2 – alpha = 0.948).

2.9. Eating Disorder Examination-Questionnaire (EDEQ)

The EDEQ (Fairburn & Beglin, 2008) is a 28-item self-report questionnaire assessing eating disorder psychopathology consisting of four subscales. Higher scores reflect more severe eating concerns. The global score (EDEQ-G) was used here, as it has good validity and psychometric properties (Mond et al., 2004) for both clinical and general populations (Berg et al., 2012; Luce & Crowther, 1999; Peterson et al., 2007). The EDEQ items are scored using a 7-point Likert scale. Questions 1–12 and 19–21 were scored based on the frequency of the behaviour listed (e.g. 0 = no days, 6 = every day). Questions 22–28 were rated from 0 (not at all) to 6 (markedly). The global score is the sum of the four subscale scores divided by the number of subscales, and had strong internal consistency at both timepoints in this study (Time 1 *alpha* = 0.880; Time 2 – alpha = 0.935).

2.10. Data analysis

Statistical analyses were conducted using IBM SPSS Statistics Software, Version 27. One-way ANOVAs were conducted to determine any baseline differences at time 1 between competitive sports engagers, non-competitive sports engagers and sports non-engagers. Internal consistency of each scale used in this study was also reported, as Cronbach's *alpha*.

A hierarchical linear multiple regression examined whether baseline body appreciation (BAS-2) and sporting body image (the four CBIQA sporting subscales) predicted ED psychopathology at time 2 (EDEQ-G), above and beyond the effect of eating disorder psychopathology at time 1 (EDEQ-G). The predictors were entered in two blocks: i) EDEQ-G time 1 scores and ii) BAS-2 and the four CBIQA sporting subscale scores (Appearance, Muscularity, Thin-Fat self, Thin-fat other). Except for the CBIQA sporting appearance subscale, the remaining three CBIQA sporting subscale scores (muscularity; thin-fat self; thin-fat other) were converted for the regression analyses, since their scoring differs substantially (Myers et al., 2012). For the CBIQA sporting appearance subscale, the higher the score, the more beautiful a person perceives themselves. The remaining subscale scores use a score of 4 on a Likert scale for the most positive rating, with higher and lower scores each indicating different patterns of poor body appearance. Thus, the converted subscale scores used in the regression were calculated by subtracting 4 from the raw score and taking the absolute score (any negative scores were converted to positive numbers by omitting the negative sign), meaning that a higher score indicated more negative body image.

3. Results

3.1. Sample characteristics

The 510 participants (400 female, 108 male, one non-binary, one declined to say) completed all Time 1 questionnaires. Their mean age was 34.05 years (*SD* = 10.65; range = 18–71), and their mean BMI was 24.28 (*SD* = 5.03). Of the 510, 117 met criteria for competitive sports engager (41 male, 74 female, 1 non-binary, 1 did not disclose; mean age = 31.97 years, SD = 10.54; mean BMI = 22.59, SD = 3.00), 276 for non-competitive sports engager (44 male, 232 female; mean age = 34.59 years, SD = 9.68; mean BMI = 23.90, SD = 3.68), and 117 sports non-engagers (23 male, 94 female; mean age = 34.87 years, SD = 12.68; mean BMI = 26.86, SD = 7.74). The most popular sports that participants engaged in were running (n = 344), hiking (n = 210) and gym-going (weights) (n = 192).

3.2. Differences between competitive sports engagers, non-competitive sports engagers and sports non-engagers

Table 1 shows Time 1 scores on EDEQ, BAS-2 and CBIQA for the three groups. Scores were comparable to other non-clinical populations. Cronbach's alpha demonstrates strong to excellent internal consistency for each of the baseline measures.

One-way ANOVAs were used to determine differences between sports engagers and non-engagers. Competitive sports engagers had generally more positive body image (general and sporting) than the other groups. There were very few differences between the non-competitive sports engagers and sports non-engagers. However, there were no differences across the three groups in eating psychopathology. As the dependent variable in the subsequent analyses was eating psychopathology (EDEQ-G scores), the groups were combined to test the longitudinal element of the study.

3.3. Association of body image with subsequent eating pathology

For the longitudinal analyses, missing data (due to participant drop-out/participants missing the deadline for response) were excluded (54.9 % attrition rate) and the analysis was conducted on participants who completed all time 1 and time 2 measures (n = 230). A hierarchical linear regression was conducted to determine the most parsimonious set of predictors of eating psychopathology, with EDEQ-G scores at time 2 as the dependent variable. EDEQ-G scores at Time 1 were entered first, to ensure that any effects of body image measures were over and above the impact of eating disorder psychopathology. BAS-2 and the four CBIQA sporting subscales were entered in the second block of the regression.

Table 2 shows that, as expected, EDEQ-G scores at Time 1 predicted EDEQ-G scores at Time 2. Adding the body image variables (BAS-2; CBIQA sporting subscales) in block 2 explained a small but significant additional 3 % of the variance in ED psychopathology at time 3. This was due to significant effects of BAS-2 and CBIQA Sporting Appearance scores. To summarise, there was continuity of eating pathology across the six months. This impact on EDE-Q scores was reduced by greater body appreciation, but enhanced by more negative sporting appearance perception.

4. Discussion

The primary aim was to determine whether body image concerns (general; sporting) at time 1 would predict ED psychopathology six months later for competitive sports engagers, non-competitive sports engagers, and sports non-engagers. As these three groups did not differ in eating concerns from the outset (though they did differ in body image), the three groups were combined (ensuring adequate power in the regression analysis). The regression analysis confirmed that body appreciation and appearance-related sporting body image predicted

Table 1
Mean baseline scores (Time 1 measures) and standard deviations for participants across the conditions, with one-way ANOVA statistics.

Baseline Measure	Group			ANOVA		
	Competitive sports engager (n = 117) M (SD)	Non-competitive sports engager (n = 276) M (SD)	Sports non-engager (n = 117) M (SD)	F	p	Partial eta^2 (np^2)
EDEQ Global Score	1.79 (1.37)	2.00 (1.25)	1.97 (1.24)	1.076	0.342	0.004
BAS-2	3.40 (0.83)$^{a*; b***}$	3.17 (0.74)^{a*}	2.99 (0.90)^{b***}	7.608	<0.001	0.029
CBIQA sporting appearance	4.20 (1.02)$^{a***; b*}$	3.83 (0.78)^{a***}	3.82 (1.10)^{b*}	7.430	<0.001	0.028
CBIQA sporting muscularity	3.77 (0.85)$^{a***; b***}$	3.38 (0.83)^{a***}	3.19 (1.05)^{b***}	13.471	<0.001	0.050
CBIQA sporting thin-fat self	4.69 (0.88)^{b*}	4.85 (0.79)	4.97 (1.05)^{b*}	3.047	0.048	0.012
CBIQA sporting thin-fat other	4.17 (0.79)^{b***}	4.27 (0.72)^{c*}	4.58 (1.02)$^{b***; c*}$	8.512	<0.001	0.032

Note. M = Mean; SD = Standard Deviation; ns = not significant.
EDEQ = Eating Disorder Examination Questionnaire; CBIQA = Contextual Body Image Questionnaire for athletes; BAS-2 = Body Appreciation Scale 2.
Same superscripts represent significant differences: [a] competitive vs non-competitive sports engagers; [b] competitive sports vs sports non-engager; [c] non-competitive sports vs non-engager (*** significant at $p < .001$ level; * significant at $p < .05$ level).

Table 2
Hierarchical regression model of EDEQ-G scores at time 2 (n = 230).

	R	R^2	R^2 Change	B	SE	β	t
Step 1	0.79	0.63***	0.63				
EDEQ-G (T1)				0.77	0.04	0.79	19.67***
Step 2	0.81	0.66**	0.03**				
EDEQ-G (T1)				0.65	0.05	0.68	12.21***
BAS-2				−0.31	0.09	−0.21	−3.58***
CBIQA sporting appearance				0.18	0.07	0.13	2.50*
CBIQA sporting muscularity[$]				−0.07	0.08	−0.04	−0.94
CBIQA sporting thin-fat self[$]				0.12	0.09	0.08	1.26
CBIQA sporting thin-fat other[$]				0.08	0.10	0.04	0.80

Note. T1 = time 1. EDEQ-G = Eating Disorder Examination Questionnaire Global Subscale; CBIQA = Contextual Body Image Questionnaire for athletes; BAS-2 = Body Appreciation Scale 2.
[*] Statistical significance: $p < .05$.
[**] Statistical significance: $p < .01$.
[***] Statistical significance: $p < .001$.
[$] Indicates subscales using the converted scores (as described above).

eating psychopathology six months later, over and above the continuity of eating concerns. However, three of the sporting body image subscales did not predict eating psychopathology.

Competitive sports engagers had more positive body image compared with sports non-engagers, mirroring previous findings (Burgon et al., 2023; Karrer et al., 2020). The relationship between higher competition levels and differences in body image is complex and has produced mixed findings in the past (Beckner & Record, 2016). The current study provides support for competitive sports engagers having better body image (both sporting and general) than non-competitive sports engagers. The finding that competitive sports engagers had better general and sporting body image might be due to their body image better matching Westernised body image ideals (e.g., runners, who were the largest sporting group here) (Torstveit et al., 2008). Competitive athletes might judge their body based on its functionality. Sports participation has been associated with better body functionality due to promoting appreciation of the body and its functional abilities (Soulliard et al., 2019). Competing and setting personal goals (e.g., a personal best) might encourage people to think more functionally about their bodies, rather than purely aesthetically.

Poor body appreciation predicted higher eating psychopathology across the whole sample. This outcome mirrors extensive findings that body image is a risk factor for eating psychopathology (Askew et al., 2020; Petrie & Greenleaf, 2007, 2012). *Lower* appearance-related body image concerns (i.e., individuals rating themselves as more beautiful) predicted higher eating psychopathology. This result appears to contrast with previous findings (Petrie & Greenleaf, 2007, 2012), those authors did not consider sporting body image, which may explain the contrasting finding. Since body appreciation (i.e., body image in a general context) and sporting body image separately predicted ED psychopathology here, there is support for the notion that two separate body images exist (general; sporting) (de Bruin et al., 2011), among adults as well as adolescent populations.

Whilst increasing body functionality can reduce eating disorder risk (Linardon, 2021), findings might not generalise when considering sporting body image specifically. In this study, higher self-ratings of appearance in a sporting context were linked to greater eating psychopathology. In a sporting context, people may experience a polarisation over time towards thinner ideals by comparing themselves to more 'athletic' bodies rather than the general westernised ideals (Stoyel et al., 2021). Moreover, maintaining an 'athletic' body image might become increasingly hard with age, leaving individuals to engage in eating behaviours (e.g., restrictive eating) as a means of achieving the harder ideal. Thus, within sporting contexts, the short-term benefit of positive body image related to exercise might have negative consequences over time (increased ED psychopathology risk).

This study had a number of limitations that should be considered. The researchers were unable to collect the full data set needed, due to

constraints of completing the first author's doctoral thesis. The longitudinal analysis was under-powered and could not be conducted separately for each group, given that only 230 of the necessary 291 participants completed all measures, though the combination of the groups into a single sample went some way to addressing this limitation. Future research needs to address this limitation by working to recruit disproportionately into sports engager groups. The attrition rate (54.9 %) was higher than expected, which might be a product of the research being conducted completely online and point to a need to assume a high attrition rate in similar longitudinal work, or which might suggest a need for more substantial incentives for individuals to maintain participation. However, it is noteworthy that this attrition rate is similar to that found by other authors examining body image over such a long period (e.g., Messer et al., 2022), and therefore this might be the rate of attrition that can be expected in future research. Furthermore, the sample had a substantial majority of females, meaning that any gender-specific regression analysis would have been underpowered for males. Finally, the age range was wider than in other studies and individuals engaged in a range of different sports (e.g., gym-going and running), which might have impacted findings.

Furthermore, the measures might not have been the optimum set. In particular, the sporting body image measure (CBIQA) required participants to evaluate their body image in a sporting context, which might have been less relevant to sports non-engagers, who partake in limited physical activity. The sport demographic questionnaire was designed by the researchers, which may have limited how the groups were categorised.

The nature of sporting activity might also need further consideration. The categorisation of sports could have led to heterogeneity within the groups (e.g., competitive sports engagers could have included athletes ranging from local competitions to elite status). Similarly, the aim and level of sport engagement might be important, since those motivated by appearance-related factors to engage in sports might be more prone to body image dissatisfaction and/or eating disorder psychopathology (Panão & Carraça, 2020). Future research should consider recruiting across competition levels and explore differences in body image/ED psychopathology according to aim of sports engagement.

Future studies could recruit different samples to explain the body image-eating psychopathology link, such as all genders and gender identities and other sports types (e.g., gymnastics). Ethnicity should also be considered, given the fact that the thin-ideal is differently experienced in different groups. Finally, future research should consider whether these findings are generalisable to those with eating disorders who engage in different exercise patterns.

This study also offers clinical guidance relating to sporting activity and athletes. Healthy individuals might be recommended to partake in sports, particularly competitive sports, due to their association with more positive body image and reduced social anxiety. However, this cannot be an unequivocal recommendation, given that this study has shown that better appearance-related sporting body image can increase risk of eating psychopathology six months later. Competitive sporting individuals (and their support network of coaches, family and peers) might be encouraged to celebrate the athlete's body's functional capabilities rather than aesthetics (e.g., that they have strong legs for running rather than 'chunky legs').

To conclude, this longitudinal study contributes to understanding of the relationship between poor body image and eating psychopathology over time, and across sporting sub-samples (competitive, non-competitive and sports non-engagers). Poor body appreciation and better appearance-related sporting body image predicted eating psychopathology for the whole sample. However, the psychological mechanisms that explain that link remain unclear, suggesting a need for further consideration of how body image has its impact on eating psychopathology over time.

Ethical approval

Was granted by the University of Sheffield Research Ethics Committee (IRB equivalent).

CRediT authorship contribution statement

Rachel H. Burgon: Writing – review & editing, Writing – original draft, Project administration, Methodology, Formal analysis, Data curation, Conceptualization. **Glenn Waller:** Writing – review & editing, Supervision, Methodology, Conceptualization.

Declaration of competing interest

The authors have no conflict of interest to declare

Data availability

Data will be made available on reasonable request.

Appendix 1. Number of participants engaging in the different activities. Note that participants could record more than one activity. Sports non-engagers may have listed sports, but did not fulfil the criteria for 'sports engagers'

Group	Running	Cycling	Swimming	Hiking	Team sports	Other endurance	Gymgoer HIIT	Gymgoer Weights	Weight category sport	Posture/ balance	Combat sport	Racket sport	Gymnatics	Dance	Crossfit	Other sport	No Sport
Competitive sports	87	40	19	33	25	6	13	45	5	29	5	5	4	5	5	7	0
Non-competitive sports	214	66	43	127	13	5	80	124	15	102	8	4	2	5	22	18	0
Non sports engager	43	18	13	50	13	3	14	23	5	26	7	8	1	4	3	9	24
Total	344	124	75	210	51	14	107	192	25	157	20	17	7	14	30	34	24

References

Askew, A. J., Peterson, C. B., Crow, S. J., Mitchell, J. E., Halmi, K. A., Agras, W. S., & Haynos, A. F. (2020). Not all body image constructs are created equal: Predicting eating disorder outcomes from preoccupation, dissatisfaction, and overvaluation. *International Journal of Eating Disorders, 53*(6), 954–963. https://doi.org/10.1002/eat.23277

Beckner, B. N., & Record, R. A. (2016). Navigating the thin-ideal in an athletic world: influence of coach communication on female athletes' body image and health choices. *Health Communication, 31*(3), 364–373.

Berg, K. C., Peterson, C. B., Frazier, P., & Crow, S. J. (2012). Psychometric evaluation of the eating disorder examination and eating disorder examination-questionnaire: A systematic review of the literature. *International Journal of Eating Disorders, 45*(3), 428–438. https://doi.org/10.1002/eat.20931

de Bruin, A. P., Oudejans, R. R., Bakker, F. C., & Woertman, L. (2011). Contextual body image and athletes' disordered eating: The contribution of athletic body image to disordered eating in high performance women athletes. *European Eating Disorders Review, 19*(3), 201–215. https://doi.org/10.1002/erv.1112

Burgon, R., Beard, J., & Waller, G. (2023). Body image concerns across different sports and sporting levels: A systematic review and meta-analysis. *Body Image, 46*, 9–31. https://doi.org/10.1016/j.bodyim.2023.04.007

Cohen, J. (1992). A power primer. *Psychological Bulletin, 112*, 155–159. https://doi.org/10.1037/0033-2909.112.1.155

Cordes, M., Vocks, S., Düsing, R., Bauer, A., & Waldorf, M. (2016). Male body image and visual attention towards oneself and other men. *Psychology of Men & Masculinity, 17*(3), 243–254. https://doi.org/10.1037/men0000029

Culbert, K. M., Racine, S. E., & Klump, K. L. (2015). Research review: What we have learned about the causes of eating disorders–a synthesis of sociocultural, psychological, and biological research. *Journal of Child Psychology and Psychiatry, 56*(11), 1141–1164. https://doi.org/10.1111/jcpp.12441

DiBartolo, P. M., & Shaffer, C. (2002). A comparison of female college athletes and nonathletes: Eating disorder symptomatology and psychological well-being. *Journal of Sport & Exercise Psychology, 24*, 33–41. https://doi.org/10.1123/jsep.24.1.33

Fairburn, C. G., & Beglin, S. J. (2008). Eating Disorder Examination Questionnaire (6.0). In C. G. Fairburn (Ed.), *Cognitive behavior therapy and eating disorders* (pp. 309–313). Guilford Press.

Frederick, D. A., & Reynolds, T. A. (2021). The value of integrating evolutionary and sociocultural perspectives on body image. *Archives of Sexual Behavior, 51*, 57–66. https://doi.org/10.1007/s10508-021-01947-4

Hoag, M. M. (2012). *Body image in female collegiate volleyball players: Are athletics detrimental or beneficial?*. Doctoral dissertation. Indiana University of Pennsylvania.

Karrer, Y., Halioua, R., Mötteli, S., Iff, S., Seifritz, E., Jäger, M., & Claussen, M. C. (2020). Disordered eating and eating disorders in male elite athletes: A scoping review. *BMJ Open Sport & Exercise Medicine, 6*(1), Article e000801. https://doi.org/10.1136/bmjsem-2020-000801

Kato, K., Jevas, S., & Culpepper, D. (2011). Body image disturbances in NCAA Division I and III female athletes. *Sport Journal, 14*(1), 1–2.

Krentz, E. M., & Warschburger, P. (2013). A longitudinal investigation of sports-related risk factors for disordered eating in aesthetic sports. *Scandinavian Journal of Medicine & Science in Sports, 23*(3), 303–310. https://doi.org/10.1111/j.1600-0838.2011.01380.x

Linardon, J. (2021). Positive body image, intuitive eating, and self-compassion protect against the onset of the core symptoms of eating disorders: A prospective study. *International Journal of Eating Disorders, 54*(11), 1967–1977. https://doi.org/10.1002/eat.23623

Linardon, J., McClure, Z., Tylka, T. L., & Fuller-Tyszkiewicz, M. (2022). Body appreciation and its psychological correlates: A systematic review and meta-analysis. *Body Image, 42*, 287–296. https://doi.org/10.1016/j.bodyim.2022.07.003

Luce, K. H., & Crowther, J. H. (1999). The reliability of the Eating Disorder Examination-self-report questionnaire version (EDE-Q). *International Journal of Eating Disorders, 25*(3), 349–351. https://doi.org/10.1002/(SICI)1098-108X(199904)25:3<349::AID-EAT15>3.0.CO;2-M

Messer, M., Tylka, T. L., Fuller-Tyszkiewicz, M., & Linardon, J. (2022). Does body appreciation predict decreases in eating pathology via intuitive eating? A longitudinal mediation analysis. *Body Image, 43*, 107–111. https://doi.org/10.1016/j.bodyim.2022.08.014

Mond, J. M., Hay, P. J., Rodgers, B., Owen, C., & Beumont, P. J. V. (2004). Validity of the Eating Disorder Examination Questionnaire (EDE-Q) in screening for eating disorders in community samples. *Behaviour Research and Therapy, 42*(5), 551–567. https://doi.org/10.1016/S0005-7967(03)00161-X

Myers, T. A., Ridolfi, D. R., Crowther, J. H., & Ciesla, J. A. (2012). The impact of appearance-focused social comparisons on body image disturbance in the naturalistic environment: The roles of thin-ideal internalization and feminist beliefs. *Body Image, 9*(3), 342–351. https://doi.org/10.1016/j.bodyim.2012.03.005

Neves, C. M., Filgueiras Meireles, J. F., Berbert de Carvalho, P. H., Schubring, A., Barker-Ruchti, N., & Caputo Ferreira, M. E. (2017). Body dissatisfaction in women's artistic gymnastics: A longitudinal study of psychosocial indicators. *Journal of Sports Sciences, 35*(17), 1745–1751. https://doi.org/10.1080/02640414.2016.1235794

Panão, I., & Carraça, E. V. (2020). Effects of exercise motivations on body image and eating habits/behaviours: A systematic review. *Nutrition & Dietetics, 77*(1), 41–59. https://doi.org/10.1111/1747-0080.12575

Peterson, C. B., Crosby, R. D., Wonderlich, S. A., Joiner, T., Crow, S. J., Mitchell, J. E., … Le Grange, D. (2007). Psychometric properties of the Eating Disorder Examination-Questionnaire: Factor structure and internal consistency. *International Journal of Eating Disorders, 40*(4), 386–389. https://doi.org/10.1002/eat.20373

Petrie, T. A., & Greenleaf, C. (2012). Eating disorders in sport. In S. M. Murphy (Ed.), *The Oxford handbook of sport and performance psychology* (pp. 635–659). Oxford University Press. https://doi.org/10.1002/9781118270011.ch16.

Petrie, T. A., & Greenleaf, C. A. (2007). Eating disorders in sport: From theory to research to intervention. In G. Tenenbaum, & R. C. Eklund (Eds.), *Handbook of sport psychology* (pp. 352–378). Hoboken: John Wiley & Sons Inc.

Robinson, K., & Ferraro, F. R. (2004). The relationship between types of female athletic participation and female body type. *Journal of Psychology, 138*, 115–128. https://doi.org/10.3200/JRLP.138.2.115-128

Russell, K. M. (2004). On versus off the pitch: The transiency of body satisfaction among female rugby players, cricketers, and netballers. *Sex Roles, 51*(9), 561–574. https://doi.org/10.1007/s11199-004-5466-4

Sabiston, C. M., Pila, E., Vani, M., & Thogersen-Ntoumani, C. (2019). Body image, physical activity, and sport: A scoping review. *Psychology of Sport and Exercise, 42*, 48–57. https://doi.org/10.1016/j.psychsport.2018.12.010

Soulliard, Z. A., Kauffman, A. A., Fitterman-Harris, H. F., Perry, J. E., & Ross, M. J. (2019). Examining positive body image, sport confidence, flow state, and subjective performance among student athletes and non-athletes. *Body Image, 28*, 93–100. https://doi.org/10.1016/j.bodyim.2018.12.009

Stewart, T., Kilpela, L., Wesley, N., Baule, K., & Becker, C. (2021). Psychometric properties of the contextual body image questionnaire for athletes: A replication and extension study in female collegiate athletes. *Journal of Eating Disorders, 9*(1), 59. https://doi.org/10.1186/s40337-021-00414-8

Stoyel, H., Delderfield, R., Shanmuganathan-Felton, V., Stoyel, A., & Serpell, L. (2021). A qualitative exploration of sport and social pressures on elite athletes in relation to disordered eating. *Frontiers in Psychology, 12*, Article 633490. https://doi.org/10.3389/fpsyg.2021.633490

Sundgot-Borgen, J., & Torstveit, M. (2010). Aspects of disordered eating continuum in elite high-intensity sports. *Scandinavian Journal of Medicine & Science in Sports, 20*, 112–121. https://doi.org/10.1111/j.1600-0838.2010.01190.x

Torstveit, M. K., Rosenvinge, J. H., & Sundgot-Borgen, J. (2008). Prevalence of eating disorders and the predictive power of risk models in female elite athletes: A controlled study. *Scandinavian Journal of Medicine & Science in Sports, 18*(1), 108–118. https://doi.org/10.1111/j.1600-0838.2007.00657.x

Tylka, T. L., & Wood-Barcalow, N. L. (2015). The Body Appreciation Scale-2: Item refinement and psychometric evaluation. *Body Image, 12*, 53–67. https://doi.org/10.1016/j.bodyim.2014.09.006