Psychometric Properties of the Contextual Body Image Questionnaire for Athletes: A Replication and Extension Study in Female Collegiate Athletes

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Abstract

Background: Although the link between body dissatisfaction and eating disorder (ED) pathology is well-established in general female samples, less is known about correlates of contextual body image (CBI) among female athletes. CBI refers to female athletes experiencing body image concerns in two distinct contexts: sport and daily life (de Bruin et al., 2011). The Contextual Body Image Questionnaire for Athletes (CBIQA) measures four factors of body image (Appearance, Thin-Fat Self-Evaluation, Thin-Fat Others' Evaluation, and Muscularity) in both contexts. This study sought to A) investigate the psychometric properties of the CBIQA, B) examine the prospective relation of CBI with ED pathology and negative affect among female collegiate athletes, and C) the degree to which CBI prospectively predicts ED pathology and negative affect in female collegiate athletes.

Method: Using self-report data collected from a multi-site parent trial, we first examined the psychometric properties of the CBIQA by conducting a confirmatory factor analysis. We assessed construct validity via cross-sectional bivariate correlation analyses with thin-ideal internalization, negative affect, and ED pathology. Lastly, using data collected at Time 1 and 6 months later (Time 2), we investigated the degree to which CBI prospectively predicted ED pathology and negative affect.

Results: Results from the CFA largely confirmed de Bruin et al.'s (2011) original factor analysis. Two CBIQA factors (Thin-Fat Self and Appearance) in both contexts correlated with ED pathology and negative affect. Thin-Fat Others also correlated with ED pathology in both domains and negative affect in the sport domain. The Muscularity domain was predominantly orthogonal with other measures. CBIQA factors were uncorrelated with thin-ideal internalization. Finally, when controlling for BMI and Time 1 scores, daily life and sport appearance concerns predicted ED pathology, whereas perceived evaluation of thin-fat by others in the sport context predicted negative affect 6 months later.

Conclusions: Results support the psychometric validity of the CBIQA and suggest that this measure appears to capture variance discrete from thin-ideal internalization. The Muscularity factor largely was not related to other outcomes. Further, specific elements of perceived self- and other-evaluation in both contexts is relevant to risk for ED pathology and negative affect. Future research could examine the impact of dual body image between seasons and after transitioning out of sport.

Clinical trials registration: NCT01735994

Plain English Summary

Female athletes evaluate their bodies in two separate contexts based on their identities in their sport and daily life; this is called contextual body image (CBI). The Contextual Body Image Questionnaire for Athletes (CBIQA) measures four specific parts of CBI among athletes. This study found that the CBIQA measures its intended four elements of CBI, and that it measures an aspect of body image that is different from traditional thin-ideal internalization. Except for evaluation of Muscularity, the elements of CBI were also related to eating disorder measures. Lastly, taking into account earlier scores on the two outcomes (eating disorder behaviors and negative mood), appearance concerns in both daily life and sport predicted eating disorder symptoms 6 months later. Only perceived evaluation of being fat in sport predicted negative mood 6 months later. Our

findings suggest that the CBIQA is measuring body image elements that are unique from other types of body image measures, but are still related to eating disorder symptoms, among female competitive athletes. More research is needed to better understand how athletes are affected by body image concerns in both contexts of their identity.

Introduction

Contextual body image (CBI) refers to the dual nature of female athlete body image, which consists of body image in sport and in everyday life (1). Body dissatisfaction has been identified as a significant risk factor for numerous negative outcomes (e.g., depression, eating disorders (ED), unhealthy weight control behaviors) in non-athletic populations (2, 3); yet the association of CBI with negative outcomes has received less attention. One challenge in studying CBI has been the lack of a well-established measure. Recently developed by de Bruin and colleagues (1), the Contextual Body Image Questionnaire for Athletes (CBIQA) assesses various aspects of body image within these two dimensions (i.e., sport and daily life). In the only validation study to date, de Bruin et al. (1) found that the CBIQA assessed four factors for each of two body image dimensions (i.e., sport and daily life). The sport body image dimension refers to body evaluation within an athletic context, whereas the daily life body image dimension refers to body evaluation in the context of daily life. The four factors assessed in both of these body image dimensions assess the following: (1) "Appearance" - Evaluation of appearance (ugly to beautiful); (2) "Muscularity" - Level of muscularity (unmuscular to muscular); (3) "Thin-Fat Self" - Self-evaluation of shape/weight/fat (thin/low to fat/high); and (4) "Thin-Fat Others" - Perceived opinions of others on shape/weight/fat (thin/low to fat/high).

Results from the de Bruin validation study also indicated that all four factors in the sport dimension cross-sectionally correlated with the total score from the Eating Disorder Examination Questionnaire (EDE-Q). For the daily life dimension, both the Appearance and Thin-Fat Self factors correlated with the EDE-Q total score. One limitation of this additional set of analyses, however, was that they were conducted in a relatively small sample (N = 52) of elite female athletes (i.e., competing at the national or international level) whose sports tend to emphasize leanness (e.g., aesthetic or distance sports). Thus, it is unclear to what degree these findings would generalize to a larger, more inclusive, sample of female athletes.

The aim of the present study was to further investigate the psychometric properties of the CBIQA and to investigate its prospective relation to negative outcomes using data collected as a part of a larger, multi-site, randomized controlled trial, the Female Athlete Body (FAB) Project (baseline N = 481: [NIMH 1 RO1 MH094448-01]). Female collegiate athletes at four different universities in the United States completed the CBIQA at 12 months (n = 380) and 18 months (n = 347) after randomization into the main FAB trial. The objectives of this study are to investigate (1) the psychometric properties of the CBIQA (via the CFA ran at M12 for both daily and sport), (2) the relationship of CBIQA domains and factors to eating disorder pathology, thin-ideal internalization, and negative affect, and (3) the degree to which CBI prospectively predicts ED pathology and negative affect in female collegiate athletes.

Methods

Study Design

The parent study included a four-university, three-site parallel-group randomized control trial comparing the FAB group to a waitlist control group (4). The FAB group participated in an intervention delivered over three weeks and broken into three, 80-minute sessions led by their peers. The waitlist control group received a Female Athlete Triad brochure at the beginning of the study. Data were collected at baseline, 3 weeks (post-intervention for the FAB group), 6 months, 12 months, and 18 months for both groups. For more detailed information on study design, baseline data, and main outcomes, please see Stewart et al. (4, 5).

Ethics

The study was monitored and approved by the Institutional Review Board (IRB) of the coordinating center at Pennington Biomedical Research Center (Baton Rouge, LA). Each partner site had IRB approval as well. Participants provided informed consent and those under the age of 18 also provided assent. Each participant earned compensation based on completing a packet of questionnaires that included the measures of focus in this paper ($20) and phone interviews ($30) at five time points for a possible total of $250 earned from this study. These incentives were in line with National Collegiate Athlete Association (NCAA) guidelines and provided motivation to student athletes constricted by time and responsibilities. A data and safety monitoring board provided study oversight.

Recruitment

Participants included female athletes at each university within the ages of 17–27 years (mean age at baseline for the parent study = 19 years); mean BMI at 12-month follow-up (Time 1 for this study) was 22.70 (SD = 2.91). The majority of participants reported White race (81%); 14.8% reported Black race and 13.1% endorsed Hispanic ethnicity. Recruitment of participants occurred outside of regularly scheduled team meetings to reduce coercion by athletics staff. Participants were also informed that study participation was anonymous and voluntary, and that coaches and athletic staff would not know who did or did not participate (4). Study enrollment began in August 2012 and completed in October 2014.

Procedure

As noted above, data for the current study are a part of the larger, parent study. For the parent study, participation in the FAB intervention program was separate from participation in the study (questionnaires and phone interviews) because the athletic departments wanted all athletes to participate in the program. Thus, all athletes participated in the program, but only those who consented to participate in the research study completed the questionnaires and phone interviews. Athletes were allowed to drop out of the study at any time, consistent with community participatory research methods and similar trials conducted previously (6). Follow-up data collection was conducted at set times for each group and participants who could not attend completed measures either individually with study staff or electronically via email. Some data were lost to follow-up and those participants were recorded only as missing only for that time point, as some participants returned at later follow-up points.

The CBIQA was introduced at the 12- and 18-month follow-up time points of the parent study. For the purposes of this study, data collected at 12-month follow-up in the parent trial serve as Time 1 data (baseline), while data collected at 18-month follow-up of the parent trial (i.e., 6 months later) comprise Time 2.

Assessments

In addition to the measures listed below, we collected demographics and calculated body mass index (BMI) from self-reported height and weight (see Table 1 for descriptive statistics).

Table 1
12-month (Time 1) and 18-month (Time 2) descriptive statistics

	Time 1 (N = 380)	Time 2 (N = 347)
	M(SD)	M(SD)
CBIQA Daily Life		
Appearance	5.15 (.89)	5.20 (.90)
Muscle	4.05 (.68)	4.04 (.67)
Thin-fat self	4.42 (.68)	4.41 (.71)
Thin-fat other	4.02 (.61)	4.04 (.61)
CBIQA Sport		
Appearance	4.97 (.98)	4.98 (1.01)
Muscle	3.81 (.66)	3.78 (.66)
Thin-fat self	4.40 (.72)	4.39 (.72)
Thin-fat other	4.10 (.55)	4.11 (.61)
EDE-Q		
EDE-Q Res	1.04 (1.19)	1.07 (1.16)
EDE-Q EC	.48 (.78)	.54 (.84)
EDE-Q WC	1.06 (1.16)	1.09 (1.26)
EDE-Q SC	1.32 (1.24)	1.39 (1.31)
EDE-Q Global	.97 (.99)	1.02 (1.02)
IBSS-R	3.39 (.65)	3.37 (.65)
PANAS	1.51 (.57)	1.57 (.64)

Note: CBIQA = Contextual Body Image Questionnaire for Athletes; EDE-Q = Eating Disorders Examination – Questionnaire; EDE-Q Res = restraint subscale; EDE-Q EC = eating concerns subscale; EDE-Q WC = weight concerns subscale; EDE-Q SC = shape concerns subscale; EDE-Q Global = EDE-Q global score; IBSS-R = Ideal Body Stereotype Scale – Revised; PANAS = Positive and Negative Affect Schedule, negative affect subscale.

Contextual body image. The Contextual Body Image Questionnaire for Athletes (CBIQA), developed by de Bruin (1), was used to assess the differences in body image in athlete when in sport compared to out of sport. This measure uses a 7-point Likert scale, and has been validated as an appropriate measure to measure both dimensions of body image in athletes (1). The CBIQA uses two dimensions (daily life and sport), and there are four factors within each dimension (Appearance, Muscularity, Thin-Fat Self, and Thin-Fat Others). Lower scores

signify perception as "too ugly" on Appearance and "too unmuscular" on the Muscularity factor. Higher scores on the Thin-Fat Self and Thin-Fat Others factors indicate perceiving one as "too fat."

Eating disorder (ED) pathology. We used the Eating Disorder Examination Questionnaire (EDE-Q; 7,8), which evaluates eating attitudes and behaviors over the past 28 days, and higher scores indicate greater pathology. The EDE-Q includes four subscales (restraint, eating concerns, weight concerns, and shape concerns) and a global score. We used the EDE-Q global score to measure overall ED pathology in the predictive models. Past research (9) supports the internal consistency of this measure ($\alpha = .92$) and test-retest reliability ($r = .90$). Current sample internal consistency was good.

Thin-ideal internalization. We used the Ideal-body Stereotype Scale-revised (IBSS-R; 10) to assess internalization of the traditional thin-ideal. The IBSS-R has demonstrated good internal validity and test-retest reliability in past research, and predictive validity for onset of bulimic symptomatology (9). Higher scores indicate greater internalization of the thin-ideal, and internal consistency in the current sample was good (Cronbach's $\alpha = .89$).

Negative affect. The sadness, guilt, and fear/anxiety subscales of the Positive and Negative Affect Scale-revised (PANAS-X; 11) assessed negative affect; higher scores indicate greater negative affect. The negative affect subscale of the PANAS has demonstrated good internal consistency in past research (11), and internal consistency in this sample was good (Cronbach's $\alpha = .93$).

Statistical Analysis

To test the validity of the results from de Bruin et al. (1), a confirmatory factor analysis (CFA) was conducted with Time 1 (12-month data from the FAB study. We examined construct validity by conducting cross-sectional bivariate correlation analyses with measures of thin-ideal internalization, ED pathology, and negative affect using the Time 1 (12-month) data. To adjust for multiple comparisons, we used a cutoff of $p < .01$ as the threshold for significance for the correlation analyses. Finally, to examine the degree to which contextual body image prospectively predicts ED pathology and negative affect 6 months later, we conducted linear regression models using CBIQA domains at Time 1 to predict each outcome at 6 months later (Time 2). For predictive models, we controlled for BMI, which is in line with the de Bruin et al. (1) validation paper, as well as Time 1 scores on each dependent variable. We did not control for intervention group because we did not see a strong rationale that an 80-minute intervention conducted a year earlier would differentially affect the possible predictive relationship between CBI and outcomes. All analyses were completed using SPSS version 26 and IBM SPSS Amos 26 (IBM Corp. Released 2019. IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp.)

Results

The ancillary study comprised data from 380 female collegiate athletes with a mean age of 20 years. Results from the CFAs (Time 1 data) largely confirmed de Bruin's original factor analysis (1) with slightly different loadings (Tables 2–3). Internal consistency in the current sample for all factors in the daily life dimension was good (see Table 2), as was internal consistency for all factors in the sport dimension (see Table 3). Correlation analyses (Table 4) indicated that Appearance, Thin-Fat Self, and Thin-Fat Other factors in both dimensions of

body image (sport and daily life) correlated with EDE-Q subscales and global scores, as well as with negative affect (except Thin-Fat Others in daily life). Traditional thin-ideal internalization as measured by the IBSS-R largely was orthogonal with all factors except Muscularity in sport, which indicated a small negative correlation (i.e., more Muscularity in sport was correlated with lower thin-ideal internalization). Only within the sport dimension did the Muscularity factor correlate with negative affect; no correlations were significant for Muscularity in the daily life dimension. Thus, three of the CBIQA factors (Appearance, Thin-Fat Self, and Thin-Fat Others) within both body image dimensions largely correlate with ED pathology and negative affect, while thin-ideal internalization did not.

Table 2
Confirmatory factor analysis for daily life dimension using 12-month (Time 1) data

Factors	Thin-fat dimension		Appearance	Muscularity
	Self	Other		
CBIQA Daily Life				
Appearance[a]			0.871	
Appearance[b]			0.842	
Appearance[c]			0.743	
Body shape[a]	0.766			
Body shape[b]	0.797			
Body shape[c]		0.525		
Muscularity[a]				0.777
Muscularity[b]				0.840
Muscularity[c]				0.650
Body weight[a]	0.801			
Body weight[b]	0.877			
Body weight[c]		0.752		
Fat percentage[a]	0.827			
Fat percentage[b]	0.861			
Fat percentage[c]		0.803		
Reliability (α)	0.934	0.887	0.883	0.822
Variance proportion	39.44%	27.53%	20.45%	12.51%

Note: [a]Own perception; [b]Own perception compared to others; [c]Perceived opinion of others

Table 3
Confirmatory factor analysis for sport dimension using 12-month (Time 1) data

Factors	Thin-fat dimension		Appearance	Muscularity
	Self	Other		
CBIQA Sport				
Appearance[a]			0.916	
Appearance[b]			0.919	
Appearance[c]			0.847	
Body shape[a]	0.879			
Body shape[b]	0.899			
Body shape[c]		0.676		
Muscularity[a]				0.808
Muscularity[b]				0.894
Muscularity[c]				0.773
Body weight[a]	0.842			
Body weight[b]	0.847			
Body weight[c]		0.779		
Fat percentage[a]	0.869			
Fat percentage[b]	0.879			
Fat percentage[c]		0.792		
Reliability (α)	0.952	0.896	0.933	0.876
Variance proportion	40.00%	25.75%	21.00%	14.15%

Note: [a]Own perception; [b]Own perception compared to others; [c]Perceived opinion of others

Table 4

Cross-sectional correlations of CBIQA domains with key body image constructs (N = 380)

	Daily Life				Sport			
	Appearance	Muscularity	Thin-fat self	Thin-fat other	Appearance	Muscularity	Thin-fat self	Thin-fat other
EDEQ Res	− .232**	.023	.443**	.226**	− .246**	.027	.391**	.276**
EDEQ EC	− .260**	.059	.401**	.280**	− .294**	.015	.369**	.339**
EDEQ WC	− .375**	.016	.620**	.387**	− .383**	.014	.568**	.428**
EDEQ SC	− .391**	− .021	.594**	.385**	− .407**	− .029	.559**	.422**
EDEQ Global	− .354**	.017	.581**	.358**	− .371**	.006	.533**	.408**
IBSSR	.059	− .082	.053	− .086	− .023	− .143**	.048	− .044
PANAS	− .224**	− .125	.222**	.130	− .250**	− .188**	.226**	.163**

Note: ** = p < .01; CBIQA = Contextual Body Image Questionnaire for Athletes; EDE-Q = Eating Disorders Examination − Questionnaire; EDE-Q Res = restraint subscale; EDE-Q EC = eating concerns subscale; EDE-Q WC = weight concerns subscale; EDE-Q SC = shape concerns subscale; EDE-Q Global = EDE-Q global score; IBSS-R = Ideal Body Stereotype Scale − Revised; PANAS = Positive and Negative Affect Schedule, negative affect subscale.

Note: appearance lower scores = "too ugly;" muscularity lower scores = "too unmuscular;" thin/fat both dimensions higher = "too fat"

Regarding prospective prediction of ED pathology 6 months later (Table 5), Time 1 daily life and sport Appearance factors predicted EDE-Q global scores when controlling for Time 1 EDE-Q global scores and BMI. For negative affect, only Time 1 sport Thin-Fat Others predicted negative affect 6 months later, when controlling for Time 1 PANAS scores and BMI (Table 6).

Table 5

Summary of multiple linear regression predicting disordered at 6-month follow-up

	B	SE B	ß	*t* value	Sig
BMI 12mo	− .019	.016	− .053	-1.168	.244
EDE-Q 12mo	**.656**	**.050**	**.646**	**13.187**	**.000**
Daily					
Appearance	**.168**	**.074**	**.145**	**2.267**	**.024**
Muscle	− .073	.074	− .050	− .985	.325
Thin-fat self	.052	.126	.035	.411	.682
Thin-fat other	.046	.109	.027	.419	.675
Sport					
Appearance	**− .206**	**.066**	**− .200**	**-3.118**	**.002**
Muscle	.097	.077	.064	1.255	.210
Thin-fat self	.023	.111	.016	.208	.836
Thin-fat other	.180	.118	.101	1.526	.128

Note: Bold indicates statistical significance at α =0.05; BMI = body mass index; EDE-Q = Eating Disorders Examination-Questionnaire global score; 12mo = data collected at 12-month follow-up in the parent trial, comprising Time 1 in the current study.

Table 6

Summary of multiple linear regression predicting negative affect at 6-month follow-up

	B	SE B	ß	*t* value	Sig
BMI 12mo	− .001	.012	− .003	− .059	.953
PANAS 12mo	**.591**	**.050**	**.572**	**11.719**	**.000***
Daily					
Appearance	− .007	.054	− .010	− .128	.898
Muscle	− .066	.054	− .074	-1.214	.226
Thin-fat self	− .031	.088	− .035	− .353	.724
Thin-fat other	− .087	.080	− .084	-1.077	.282
Sport					
Appearance	− .029	.048	− .046	− .596	.552
Muscle	.012	.057	.013	.218	.827
Thin-fat self	.020	.081	.024	.249	.803
Thin-fat other	**.176**	**.086**	**.161**	**2.050**	**.041***

Note: Bold indicates statistical significance at α =0.05; BMI = body mass index; PANAS = Positive and Negative Affect Schedule negative affect subscale; 12mo = data collected at 12-month follow-up in the parent trial, comprising Time 1 in the current study.

Discussion

Dual body images for female athletes exist for different contexts, both on and off the field. The aims of the present study were to further investigate both the psychometric properties of the CBIQA and to explore the degree to which constructs assessed by the CBIQA predicted ED pathology and negative affect six months later. With regards to the confirmatory factor analysis, results largely replicated those of de Bruin et al. (1) and provide further support for the psychometric validity of the CBIQA.

de Bruin and colleagues (1) also examined the association of the four factors assessed in daily and sport life with global EDE-Q scores. We sought to both replicate and extend these findings by correlating the factors in both dimensions with both the global score and the EDE-Q subscale scores. With two exceptions, global score findings replicated. More specifically, both studies found that the Appearance and Thin-Fat Self factors in both domains correlated with EDE-Q global scores and that daily life Muscularity did not. Findings differed with regards to daily life Thin-Fat Others, which correlated in our study but not de Bruin et al., and sport Muscularity, which correlated in de Bruin, but not our study. One explanation for this may be related to the different nature of our samples as de Brun's sample comprised more elite athletes than our sample.

With regard to EDE-Q subscale scores, which were not examined in de Bruin, all domains except Muscularity correlated with all subscales in both contexts. Within the Appearance domain, viewing yourself (and perceiving

others' opinions of yourself) as ugly was related to more ED pathology in both the daily life and sport dimensions. Self-evaluation and perceived other-evaluation as fatter were also related to more ED pathology.

Traditional thin-ideal internalization was orthogonal to all domains except Muscularity in sport. Higher Muscularity in sport was associated with lower negative affect and less thin-ideal internalization. Muscularity in daily life appears to be tapping a different construct and was not related to ED pathology, thin-ideal internalization, or negative affect. It was also not predictive of negative outcomes at 6-month follow-up.

In daily life, perceiving oneself as too ugly and too fat was related to higher negative affect. In sport, viewing oneself as uglier, too unmuscular, and too fat (self and other) was related to higher negative affect. Interestingly, lower Muscularity and higher ratings of Thin-Fat Others' opinions correlated with higher negative affect in the sport context but not in daily life. Muscularity and how others perceive your body may play a larger role in sport than in daily life; the pressures associated with how one's body is perceived may lead to feeling worse about oneself. The "muscular ideal" and its psychological impact has been studied in men (12), but less so in women. Women show a drive for muscularity much like men, but may be more focused on achieving muscle tone than muscle mass (13).

In addition, the sport setting may particularly emphasize muscle tone and the opinions of others (such as teammates, coaches, and parents) about athletes' bodies (14). Feeling criticized or stigmatized in sport (Thin-Fat Others' opinions) due to body shape and size could affect one's perception of oneself in the sport overall, which may account for greater negative affect (15). Despite the association between higher Muscularity and more negative affect, our findings also revealed a small negative correlation between Muscularity in sport and thin-ideal internalization. Athletes who view themselves with higher Muscularity may have less of a drive toward the traditional thin-ideal. Although other domains of body image in the sport context aligned with traditional thin-ideal internalization, Muscularity may be a unique domain for female athletes that warrants closer examination.

CBIQA scores related to Appearance may predict future ED pathology and negative affect, suggesting that this measure may be helpful in screening for future issues with disordered eating and depression. Further research on contextual body image is needed to evaluate the impact of these dual body images with female athletes-not only while in sport, but while away or in transition from sport, including periods of injury, between seasons and when completing sport.

Strengths of this study include strong internal consistency for all assessments, a large sample, and a follow-up time point 6 months later. Limitations of the study include reliance on self-report data, attrition at follow-up, and that the CBIQA was delivered to participants 12 months into the FAB program as opposed to the beginning.

Conclusions

A dual body image exists for female collegiate athletes. In daily life and in sport, different domains of body image (Appearance, Muscularity, Thin-Fat Self, and Thin-Fat Others) correlate with ED pathology and negative affect. In both contexts, all domains of body image except for Muscularity correlate with more ED pathology. In the sport context, Muscularity and Thin-Fat Others' opinions may play a more salient role. Appearance-related scores could be used in a screening tool for athletes to predict future disordered eating and depression. This

study provides insight into the specific nature of female athlete body image in order to suggest new preventative measures (in terms of EDs and depression) for this population.

Abbreviations

1. **BMI:** body mass index
2. **CBI:** contextual body image
3. **CBIQA:** Contextual Body Image Questionnaire for Athletes
4. **ED:** eating disorder
5. **EDE-Q**: Eating Disorder Examination Questionnaire
6. **FAB:** Female Athlete Body Project
7. **IBSS-R**: Ideal-body Stereotype Scale-revised
8. **IRB:** Institutional Review Board
9. **NCAA**: National Collegiate Athlete Association
10. **NIMH: National Institute of Mental Health**
11. **PANAS-X**: Positive and Negative Affect Scale-revised

Declarations

Ethics approval and consent to participate

All participants provided consent to participate. Athletes were informed that participation in the study was both anonymous and voluntary (4). The study was monitored and approved by the IRB at Pennington Biomedical Research Center. A data and safety monitoring board also provided study oversight.

Consent for publication

Not applicable

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

None to disclose.

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Authors' contributions

CB and TS designed the study and disseminated CBIQA questionnaires to athletes as part of the FAB trial. LK analyzed and interpreted the athletes' CBIQA data, and was a major contributor in writing the manuscript. NW and KB assisted with writing and revising the manuscript. All authors read and approved the final manuscript.

References

1. de Bruin AP, Oudejans RRD, Bakker FC, Woertman L. Contextual body image and athletes' disordered eating: The contribution of athletic body image to disordered eating in high performance women athletes. Eur Eat Disord Rev 2011; 19(3): 201–215.

2. Stice E, Shaw HE. Role of body dissatisfaction in the onset and maintenance of eating pathology: a synthesis of research findings. J Psychosom Res. 2002;53(5):985–93.

3. Ward RM, Hay M.C. Depression, coping, hassles, and body dissatisfaction: Factors associated with disordered eating. Eating Behaviors 2015; 17: 14-18. Available from: https://doi.org/10.1016/j.eatbeh.2014.12.002

4. Stewart T, Pollard T, Hildebrandt T, Beyl R, Wesley N, Kilpela LS, Becker CB. The Female Athlete Body (FAB) study: Rationale, design, and baseline characteristics. Contemp Clin Trials 2017; 60: 63–71.

5. Stewart T, Pollard T, Hildebrandt T, Wesley NY, Kilpela LS, & Becker CB. The Female Athlete Body project study: 18-month outcomes in eating disorder symptoms and risk factors. Int J Eat Disord. 2019: 1-10. Available from https://doi.org/10.1002/eat.23145

6. Becker CB, McDaniel L, Bull S, Powell M, McIntyre K. Can we reduce eating disorder risk factors in female college athletes? A randomized exploratory investigation of two peer-led interventions. Body Image 2012; 9(1):31–42. Available from: https://doi.org/10.1016/j.bodyim.2011.09.005

7. Fairburn CG, Beglin SJ. Assessment of eating disorders: Interview or self-report questionnaire? Int J Eat Disord 1994; 16(4): 363–370. Available from: https://doi.org/10.1002/1098-108X(199412)16:4<363::AID-EAT2260160405>3.0.CO;2

8. Fairburn CG. Cognitive behavior therapy and eating disorders. 2008: Guilford Press.

9. Stice E., Shaw H., Burton E., Wade E. Dissonance and healthy weight eating disorder prevention programs: a randomized efficacy trial. J. Consult. Clin. Psychol. 2006;74(2):263–275. http://dx.doi.org/10.1037/0022-006X.74.2.263.

10. Stice E, Fisher M, Martinez E. Eating disorder diagnostic scale: Additional evidence of reliability and validity. Psychol Assess 2004; 16(1): 60–71. Available from: https://doi.org/10.1037/1040-3590.16.1.60

11. Watson D, Clark LA, Tellegen A. Development and validation of brief measures of positive and negative affect: The PANAS scales. J Pers Soc Psychol 1988; 54(6): 1063–1070. Available from: https://doi.org/10.1037/0022-3514.54.6.1063

12. Cafri G, Kevin Thompson J, Ricciardelli L, McCabe M, Smolak L, Yesalis C. Pursuit of the muscular ideal: Physical and psychological consequences and putative risk factors. Clin Psychol Rev 2005;25:215-239. doi:10.1016/j.cpr.2004.09.003

13. Kyrejto JW, Mosewich AD, Kowalski KC, Mack DE, Crocker PRE. Men's and women's drive for muscularity: Gender differences and cognitive and behavioral correlates. J Sport Exercise Psy 2008;6:69-84. Available at: http://dx.doi.org.libezp.lib.lsu.edu/10.1080/1612197X.2008.9671855

14. Cosh S, Tully PJ, Crabb S. Discursive practices around the body of the female athlete: An analysis of sport psychology interactions in elite sport. Psychol Sport Exerc 2019; 43: 90-104. Available from: https://doi.org/10.1016/j.psychsport.2018.12.021.

15. Essayli JH, Murakami JM, Wilson R.E, Latner JD. The impact of weight labels on body image, internalized weight stigma, affect, perceived health, and intended weight loss behaviors in normal-weight and overweight college women. Am J Health Promot 2017; 31(6); 484-490.