Psychometric Properties of the Chinese version of the Female Muscularity Scale among Chinese young women

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Research Article

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Abstract

Purpose: The Female Muscularity Scale (FMS) was specifically developed for assessing drive for muscularity in women. The current study aimed to translate the FMS into Chinese (FMS-C) and examine its psychometric properties among Chinese young women.

Methods: Based on standard procedures, the FMS was translated into Chinese. With a sample of 517 Chinese women college students (= 18.86 years), the current study examined the factor structure, reliability, and convergent and incremental validity of the FMS-C.

Results: Results showed a 2-factor structure including attitudes and behaviors of the FMS-C. The internal consistency reliability (Cronbach's α) was .91 for the total FMS-C scale and .89 and .88 for Attitudes and Behaviors subscales, respectively. Results also revealed evidence for good convergent and incremental validity of the FMS-C.

Conclusion: Findings suggest that the FMS-C can be a useful tool to measure both attitudes and behaviors underlying drive for muscularity and muscle tone concerns among Chinese young women.

Level of Evidence: Level V, cross-sectional descriptive study

Introduction

Although women have long been at the center of body image and eating disorders research, they gain little attention on the topic of muscularity [1]. Part of this discrepancy may be due to the different social standards about bodily attractiveness and ideals among men and women. Women are more often encouraged to be much thinner than the average woman's body shape (drive for thinness) while the social standard for men is more muscular [2–4]. The construct of drive for muscularity was originally described as an individual's desire to achieve an ideal muscular body, which is reflected by both attitudes and behaviors [4]. Although this construct was first built for exploring male body image concerns, and related research is well-documented in men, drive for muscularity is becoming an increasing pressure for women [5–8]. Similar thinness, toneness has become an important element in cultural ideals about female body [6, 8–11]. One of the possible reasons for this shift is increased exposure to popular media in which there is an increasing percentage of exercise-related content with lean, smooth, and fit models in magazines and advertisements [7,12]. Indeed, social media tends to present exercise as a viable method of obtaining both thinness and fitness [7].

Interestingly, what men and women desire with their drives for muscularity are quite different. Jacobi, Cash [13] found that 78% of women wanted to be more muscular, but this drive for muscularity overlapped with a desire for thin, tone, and smooth muscles rather than bulky, well-defined muscles [6, 7, 10, 14]. In contrast, the male's muscular ideal is described as a lean, muscular mesomorphic shape with a well-developed chest and arms [6,10,15,16].

Higher levels of the drive for muscularity have been linked to detrimental effects on health and associated with negative outcomes [4, 9, 11, 17–19]. A systematic review [17] identified that high levels of drive for muscularity were associated with exercise dependence, drug abuse, depression, anxiety, body shame, muscle dysmorphia, dietary manipulation, and impaired social and occupational functioning. Importantly, findings from this systematic review were bound to men; thus, findings cannot be generalized to women. Another study by Grossbard et al. [20] revealed that men with greater drive for muscularity were at greater risk of eating disorder symptoms and depressed mood. Related research found that boys who reported higher drive for muscularity were more likely to report purposeful muscle-enhancing dietary practices, like using protein powders or shakes, and steroids (Eisenberg et al., 2012). While several interpretations for this sex-specific bias exist, one explanation holds that muscularity-related body image has long been the ideal image of body attractiveness for men [6]. Of note, drive for muscularity is a relatively newer concept in the body image literature than other constructs, and its presence and assessment in women is vastly underexplored relative to men.

The commonly used measurement for the assessment of drive for muscularity is the Drive for Muscularity Scale (DMS), which showed a 2-factor structure (muscularity attitudes and behaviors) for men [2, 4] and has been used in both men and women [2, 9]. However, some of the items in the DMS appear to be inappropriate for women [2, 9] such as “I think I would look better if I gained 10 pounds in bulk” [2]. To this end, the assessment of drive for muscularity via the DMS may not be fully suitable for women due to the discrepancies in the core elements of drive for muscularity between men and women. To help address these discrepancies, the Female Muscularity Scale (FMS) was developed to specifically assess muscularity concerns among women [6].

The FMS has been reported to have a 2-factor structure (Attitude and Behavior), both in the original [6] and Brazilian [21] versions. The FMS has also shown good test-retest reliability and good divergent and convergent validity [6, 21]. For example, Rodgers et al. [6] reported moderate-to-large associations between the FMS overall and body image concerns ($r = .42, p < .01$), and also the attitude subscale and body image concerns ($r = .44, p < .01$). Campos et al. [21] found the FMS was correlated with higher drive for muscularity ($r = .54, p < .01$), higher disordered eating ($r = .45, p < .01$), and lower overall body satisfaction ($r = -.23, p < .01$). For depression, it has been reported to not correlate with drive for muscularity in women [4, 21]. Taken together, muscularity-related concerns were well-documented in mainly English-speaking and Western countries [6, 5]. To the best of our knowledge, there are no such measures available in Chinese for assessing women’s muscularity-oriented body image disturbances.

The Current Study

The current study aimed to translate the Female Muscularity Scale (FMS) into Chinese (i.e., FMS-C) and examine its psychometric properties among Chinese young women. According to previous findings, the current study hypothesized that: 1) the FMS-C would present a 2-factor structure; 2) the FMS-C would have adequate internal consistency reliability; 3) the FMS-C would be closely related with Drive for Muscularity Scale (DMS), but FMS-C would be more suitable for women; 4) the scores of the FMS-C will demonstrate convergent validity via positive relations with negative psychological measures (e.g., psychosocial impairment, thinness-oriented body image dissatisfaction, thinness-oriented eating disorder symptomatology, muscularity-oriented disordered eating); and 5) the FMS-C will demonstrate incremental validity via FMS scores significantly predicting thinness-oriented eating disorder symptomatology and muscularity-oriented disordered eating after controlling for thinness-oriented body image dissatisfaction and covariates (e.g., age).

Method

Participants and Procedure

The data used in the current study were from a project about Chinese cross-cultural adaption of eating and body image measures. The protocol of the project was approved by the Institutional Review Board of the Chinese University of Hong Kong, Shenzhen (No. EF20201024001). The project contains two different datasets collected respectively from undergraduate students in two different universities (i.e., Hunan Agriculture University and Hunan University of Chinese Medicine) from Hunan Province, China. The dataset used in the current study was from Hunan University of Chinese Medicine. The survey was conducted in a paper-and-pencil format. Psychological teachers at the two universities introduced the project to first- and second-year undergraduate students during class time and invited them to participate. Finally, 812 undergraduate students (63.7% women; 517) were included. More details about the sampling procedure can be found in our previous publication using the male sample [22]. As the current study is about women’s body image, only the sample of 517 women were used in the current study, and they had a mean age of 18.86 ($SD = .96$) years. Body mass index (BMI) was obtained with self-reported height and weight, which was calculated by the division of weight in kilograms by the square of height in meters. The sample had a mean BMI of 20.49 ($SD = 2.95$) kg/m^2 .

Scale Translation

In this study, to obtain the FMS-C, the English version of FMS was first translated to Chinese (Mandarin) based on the guidelines from Beaton and colleagues (2000) as recommended by Swami, Barron [23]. Specifically, two bilingual postgraduate

students (Chinese and English) first translated the scale into Chinese independently. After the first translation, the two translations were compared and differences were discussed, resulting in a synthesized translation. Back-translation was conducted independently by a new postgraduate student and an undergraduate student. Both the postgraduate and undergraduate students were bilingual (Chinese and English), and they had no prior knowledge about the FMS. Afterwards, the research team, consisting of two experts in body image and the four translators evaluated the forward-and back-translations (in this process, the developer of the FMS, Rachel Rodgers, also helped review the back-translations and gave comments). After some minor revisions on the wording of certain items, a pre-final Chinese translation of the FMS was obtained. During the next piloting, we recruited 30 female university students to test the meanings, clarity, and understandability of the items in the pre-final Chinese translation. However, 4 did not attend the post-survey interviews because the schedule of the interview overlapped with their classes. These 26 students were asked to rate 1 (I don't understand this item at all/this item is very unclear) to 5 (I totally understand this item very much/this item is very clear) for each item. Based on the responses and feedback of the 26 students in the post-survey interviews, all students were able to correctly interpret each item of the scale with a mean of 4.65. As such, the preliminary Chinese translation (FMS-C) was approved by the research team without any further revisions, and it was then used in the subsequent studies.

Measures

Female Muscularity Scale (FMS)

Female Muscularity Scale (FMS)

The Female Muscularity Scale (FMS) [6] was used to measure the drive for muscularity in women which has been demonstrated as a promising measure for assessing muscularity concerns among young adult women [6, 21]. The FMS includes 10 items scored on a 5-point Likert-type scale with response options from 1 (never) to 5 (always). Previous studies have confirmed that the FMS has a 2-factor structure both in the U.S. [6] and Brazilian [21] versions, including a five-item Attitudes subscale and a five-item Behaviors subscale. Example items include “I wish my body was tighter” (attitude) and “I exercise to try and look fit and sculpted” (behavior). In this study, the aforementioned Chinese translated version was used. The total FMS-C had a Cronbach's α of .91. The Attitudes subscale and the Behaviors subscale had a Cronbach's α of .89 and .88, respectively.

Drive for Muscularity Scale (DMS)

The 15-item Drive for Muscularity Scale (DMS) [4, 2] was used in this study to measure drive for muscularity. Previous low-order exploratory factor analysis has confirmed 2 factors (muscularity attitudes and behaviors) only for men while higher-order EFA using the male 2-factor structure revealed the presence of a single, higher-order DMS factor in both sexes [2, 4]. Exemplar items are “I think my legs are not muscular enough” and “I lift weights to build up muscle”. Each item is scored on a 6-point Likert-type scale, with response options from 1 (always) to 6 (never). Higher total scores indicate greater levels of drive for muscularity. The Chinese version of DMS was obtained in similar procedures as the FMS-C and showed good reliability and validity in Chinese adult men [22]. In this study, the total DMS had a Cronbach's α of .84.

Body Image Acceptance and Action Questionnaire (BI-AAQ)

The Body Image-Acceptance and Action Questionnaire (BI-AAQ) [24] was used to assess body image inflexibility. In the original questionnaire, BI-AAQ has 12 items. Items are rated on a 7-point Likert scale ranging from 1 (never true) to 7 (always true), with higher scores indicating higher levels of body image inflexibility. An example item is “Worrying about my weight makes it difficult for me to live a life that I value”. The short form of the BI-AAQ (BI-AAQ-5) was confirmed to have comparable performance to the long-form (BI-AAQ) in terms of its factor structure and correlations with theoretically relevant constructs [25]. In this study, the Chinese version of the 5-item Body Image-Acceptance and Action Questionnaire [26] was used. The Chinese BI-AAQ-5 had exhibited sound psychometric properties [26]. It had a Cronbach's α of .92 in the present sample.

Eating Disorder Inventory—Body Dissatisfaction Subscale (EDI-BD)

To measure thinness-oriented body dissatisfaction, the Body Dissatisfaction subscale of the Eating Disorder Inventory (EDI-BD) [27] was administered. The EDI-BD subscale has 9 items. An exemplar item reads like “I think that my thighs are too large”. Each item has response options ranging from 1 (never) to 6 (always). Five items are reverse scored. Higher total scores indicate higher levels of body dissatisfaction. In this study, the Chinese version of EDI [28, 29] was used, and it has demonstrated good internal consistency reliability and good convergent and discriminant validity in both clinical and non-clinical Chinese populations [28, 29]. In the current study, the Chinese version of EDI-BD had a Cronbach’s α of .92.

Clinical Impairment Assessment Questionnaire (CIA)

The 16-item Clinical Impairment Assessment (CIA 3.0) [30] was used to measure severity of psychosocial impairment as a result of eating disorder symptoms. Each item is rated on a 4-point Likert scale from 0 (not at all) to 3 (always). All items are summed to get a total score, and higher scores indicate greater psychosocial impairment. The CIA 3.0 has been reported with good psychometric properties [30, 31]. The Chinese version of CIA 3.0 [22] was used in the current study. In the current study, the CIA 3.0 had a Cronbach’s α of .93.

Muscularity-Oriented Eating Test (MOET)

To measure muscularity-oriented disordered eating, the 15-item Muscularity-Oriented Eating Test (MOET) [32] was used. Items are rated on a 5-point Likert scale from 0 (never true) to 4 (always true). An example item is “I have used meal replacement supplements when I felt full”. Scores of items are summed, and higher scores indicate a higher level of muscularity-oriented disordered eating. Murray et al. [32] revealed good psychometric properties with samples of undergraduate men. The Chinese version of MOET was used and showed good psychometric properties in Chinese adult men [22]. The MOET had a Cronbach’s α of .85 in the current sample.

Short Form of the Eating Disorder Examination Questionnaire (EDEQS)

The Short form of Eating Disorder Examination Questionnaire (EDE-QS) [33] was used to examine thinness-oriented eating disorder symptomatology. EDE-QS contains 12 items with response options ranging from 0 to 3. Scores of items are summed, and higher scores indicate a higher level of eating disorder symptomatology. An example item is “Have you had a sense of having lost control over your eating (at the time that you were eating)?” The Chinese version of the EDE-QS [34] was used in this study. The EDE-QS has been suggested as a useful tool to assess key attitudes and behavioral features of eating disorder psychopathology in the Chinese context [34]. In the current study, the EDE-QS had a Cronbach’s α of .86.

Statistical Analysis

The *psych* package version 2.1.6 [35] and the *lavaan* package version 0.6-8 [36] on R version 4.0.3 [37] were used in data analyses. The total sample ($N = 517$) was randomly split into two nearly equal subsamples, one for exploratory factor analysis (EFA) and the other for confirmatory factor analysis (CFA).

EFA has been confirmed as an appropriate method for ordinal data deprived from Likert-type scales [38]. In the current study, Oblimin rotation and the ordinary least squares estimator was used [39]. The parallel analysis was also used to determine the number of factors [40]. As recommended by Hair [41], factor loadings greater than 0.4 are considered adequate.

For CFA, the current study used the mean- and variance-adjusted weighted least squares estimator (WLSMV) for model estimation because WLSMV was confirmed to be less biased and more accurate than MLR in estimating the factor loadings for Likert-type rating scales [42]. In this study, the items of FMS-C were rated on a Likert scale which produced ordinal responses. To evaluate model fit, several model fit indices were used such as comparative fit index (CFI), Tucker-Lewis Index (TLI), and standardized root mean square residual (SRMR) [26]. The following commonly adopted cut-offs have been outlined in previous research [43]: both CFI and TLI greater or equal to .95 indicates a good fit while greater or equal to .90 indicates an acceptable fit, and SRMR less than or equal to .06 indicates a good fit while SRMR less than or equal to .08 indicates an acceptable fit. This study did not report the RMSEA as it was unreliable when used in ordinal responses by consistently rejecting closely-fitted models when sample sizes are large and data contains 5 categories [44].

Internal consistency of the FMS-C was used to assess the reliability (ordinal Cronbach's α greater than 0.70 suggests an acceptable internal consistency reliability), which is more accurate for Likert scales [45]. In addition, the current study evaluated the convergent validity of the FMS-C by exploring the bivariate correlations between the scores on the FMS-C and theoretically correlated measures. Since previous research on the drive for muscularity scale (DMS) revealed the presence of a single, higher-order DMS factor in both sexes [2], the current study assumed that FMS-C would have a moderate positive correlation with DMS. According to previous research [6, 9, 21], the current study expected significant and positive associations between the FMS-C scores and negative psychological constructs (e.g., body dissatisfaction, eating disorder symptoms). To examine incremental validity, hierarchical multiple regressions examined whether drive for muscularity as measured by the FMS-C could explain variance in eating disorder symptoms and muscularity-oriented disordered eating, as measured by EDE-QS and MOET, above and beyond confounding variables including age, BMI, and body dissatisfaction.

For interpreting effect sizes, the current study relied on the recommendations from Cohen [46] with correlations of 0.1, 0.3, and 0.5 equating small, medium, and large effects, respectively.

Results

Preliminary Analyses

The rate of data missing for the FMS-C items ranged from 0.2% ~ 0.4% for the female participants in current study's sample. Little's MCAR test showed $\chi^2(18) = 10.75$ ($p = .905$), indicating that the data missing was completely at random (MCAR). We decided not to impute these missing data in subsequent analyses due to the low missing rate (i.e., less than 5% as well as the missing pattern of MCAR [47]).

Exploratory Factor Analysis

Parallel analysis scree plot (Fig. 1) supported our assumption of a 2-factor structure of the FMS-C. This result was consistent with the EFA findings found in the original development of FMS [6] as well as the Brazilian version [21]. The detailed information of item loadings is demonstrated in Table 1.

Confirmatory Factor Analysis

Table 2 shows the means, standard deviations, and standardized factor loadings for the items of the FMS-C. Specifically, the standardized factor loadings of the items ranged from .80 to .96.

Based on the recommended model fit cut-offs from Hu, Bentler [43], fit indices, $\chi^2 = 209.91$ ($df = 34$, $p < .001$), CFI = .97, TLI = .96, SRMR = .07, provided sufficient support for a 2-factor structure of the FMS-C.

Reliability

Regarding the reliability of the FMS-C, the results showed that the ordinal Cronbach's α for the total FMS-C was .91, suggesting good internal consistency reliability of the scale. Furthermore, the ordinal Cronbach's α of the two subscales (Attitudes and Behaviors subscales) also suggested good internal consistency reliability of the scale, .89 and .88, respectively.

Convergent Validity

Bivariate correlations revealed good convergent validity of the FMS-C. As shown in Table 3, women-specific drive for muscularity as represented by the total scores of FMS-C was significantly and positively correlated with the scores of drive for muscularity (DMS) (medium to large effect sizes), and significantly and positively correlated with thinness-oriented body dissatisfaction (small to medium effect sizes), thinness-oriented eating disorder symptomatology (medium to large effect sizes), body image inflexibility (medium effect sizes), psychosocial impairment (small to medium effect sizes), and muscularity-oriented disordered eating (medium to large effect sizes).

Furthermore, bivariate correlations between the subscales of the FMS-C and body dissatisfaction, drive for muscularity, eating disorder symptomatology, body image inflexibility, psychosocial impairment, and muscularity-oriented disordered eating also revealed similar results as those for the full FMS-C (see Table 3).

Incremental Validity

Table 4 presents the hierarchical regression models with the FMS-C score entered in the step 2. Specifically, results showed that inclusion of the FMS-C significantly increased the variance explained in both thinness-oriented eating disorder symptomatology ($\Delta R^2 = .03, p < .001$) and muscularity-oriented disordered eating ($\Delta R^2 = .06, p < .001$), above and beyond potential confounds of age, BMI, and thinness-oriented body dissatisfaction.

Discussion

The current study aimed to translate the Female Muscularity Scale into the Chinese (Mandarin) version (FMS-C) and to examine the psychometric properties of the FMS-C. Results showed a 2-factor structure of the FMS-C. The Cronbach's α of FMS-C indicated good internal consistency reliability. The current study found strong evidence of convergent validity via positive relationships between FMS and theoretically related constructs. In addition, hierarchical regressions indicated good incremental validity of the FMS-C above and beyond relevant confounds of eating pathology (e.g., age, BMI, and thinness-oriented body dissatisfaction).

In line with our assumption, exploratory factor analysis (EFA) indicated a 2-factor structure of the FMS-C, and confirmatory factor analysis (CFA) reported good model fit of the two-factor structure (attitude and behavior) for the FMS-C. These findings were also compatible with previous studies [6, 21]. Thus, the factor structure of the FMS remains stable across three countries (i.e., U.S., Brazil, and China). As in He et al. [48], future researchers may consider examining the cross-cultural measurement invariance of the FMS to explore whether the FMS can be used in testing cultural differences of drive for muscularity among women, which can further our understanding of cultural differences in drive for muscularity among women.

Interestingly, the means of each item in FMS-C were all lower than in the USA sample [6], which may be partly due to cultural differences. In China, thinness takes place of previously preferred body ideals like plumpness in that thinness is the key feminine attractiveness ideal [49–51]. Such pursuits of thinness is mainly for weight loss and lower BMI [52], both of which are not related with muscularity. In western countries, women's body ideals, as shown in mass media, has shifted from thin to thin, toned, and more fit which includes drives for muscularity [8, 10]. In this case, the ideal body image of muscularity may have slight differences between Chinese young adult women and American young adult women.

Similar to Campos et al. [21], the FMS-C scores were found to be significantly and positively associated with the DMS scores and the association between FMS-C and convergent measures were stronger than the DMS. Such findings indicated that the FMS-C was more suitable for measuring drive for muscularity in women than the DMS. As indicated in previous literature, the DMS might be only suitable for women with drive for muscularity that is traditionally male [6, 53]. As stated before, women and men have different expectations for drive for muscularity [6, 7, 10]. The ideal body image of women emphasizes thin and body tone, while the ideal body image of men emphasizes bulky muscles [10, 15]. Thus, such results in current sample were consistent with our assumptions that the FMS is more appropriate for measuring drive for muscularity in women.

In addition, the current study found a significant and positive relationship between drive for muscularity and both thinness- and muscularity-oriented eating disorder symptomatology. Such findings are consistent with previous studies [6, 9, 21]. Furthermore, the score of FMS-C contributed a significant amount of variance in both thinness- and muscularity-oriented eating disorder symptomatology above and beyond relevant confounds of age, BMI, and thinness-oriented body dissatisfaction, indicating good incremental validity of FMS-C. Taken together, the current study provides evidence for the FMS-C to be useful instrument for the assessment of drive of muscularity in Chinese young women.

Limitation and Future Directions

The current study is not without limitations, and several future research directions exist. First, our sample used in this study was homogeneous, consisting of college female students. Future studies should use more representative samples and/or examine different age groups to widen the potential utility of the FMS-C to probe drive for muscularity in diverse groups of Chinese women. Second, the test-retest reliability of the measures was not assessed, which should be added to test the stability of FMS-C in the future research. This is important for researchers and clinicians interested in the influence of drive for muscularity across time in women. Third, this study did not measure exercise engagement, which has been done in previous studies [4, 6]. Exercise engagement or exercise amount is a good indicator of behaviors in drive for muscularity. Also, exercise engagement can be used to corroborate participants' self-reported data in the behavior subscale for drive for muscularity. Future research should adopt a more comprehensive assessment of health behaviors including physical activity to more precisely define the role of drive for muscularity on health outcomes in women.

Conclusion

The current study aimed to translate the FMS into Chinese (Mandarin) (FMS-C) and examine its psychometric properties among Chinese young women. The FMS-C revealed a two-factor structure and was confirmed to have good reliability and convergent and incremental validity. Altogether, FMS-C can be a useful tool to measure both the attitude and behavior components of muscularity and muscle tone concerns among Chinese young women.

Declarations

Conflict of interest:

All authors declare that they have no conflict of interest.

Funding:

The study was supported by the Presidential Fund of the Chinese University of Hong Kong, Shenzhen to Jinbo He (Grant Number: PF.01.001428).

Ethical approval:

All procedures performed in this study involving human participants were in accordance with the ethical standards of the research committee of the Chinese University of Hong Kong, Shenzhen.

Informed consent:

Informed consent was obtained from all the surveyed participants.

Availability of Data and material:

The dataset used during the current study is available from the corresponding authors on reasonable request.

What Is Already Known On This Subject?

Ample evidence shows that drive for muscularity is associated with disordered eating and body image concerns for both men and women. Even though the DMS has been developed for assessing drive for muscularity, the development of the DMS was based on men, and the DMS was also mainly used among male populations. Considering sex differences in drive for muscularity, the FMS was developed for assessing drive for muscularity specifically for women. Currently, there is no such a measure available in Chinese for assessing women's drive for muscularity.

What This Study Adds?

The FMS was translated into Chinese based on standard procedures (i.e., FMS-C). The FMS-C showed good psychometric properties among Chinese young women, including a 2-factor structure, good internal consistency, and good convergent and incremental validity. The FMS-C can be a useful tool to measure drive for muscularity in Chinese young women.

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Tables

Table 1.

Factor Loadings of the FMS-C Based on EFA.

Item	Factor 1	Factor 2
8. I think I would look more attractive if I were more toned.	.95	-.08
9. I exercise to try and look fit and sculpted	.89	.03
10. I exercise so that people notice I am sculpted	.82	-.08
6. I work out to improve the shape of my body	.68	.00
7. I exercise to sculpt more defined muscles	.51	.17
3. I wish my body was tighter	-.16	.85
2. I wish my abs were more defined	-.06	.82
1. I wish I were more toned	.02	.77
5. I go to the gym to look stronger	.22	.63
4. I wish I were more sculpted	.22	.63

Note: $n=258$. Factor 1 = Behavior subscale. Factor 2 = Attitude subscale.

Table 2.

Descriptive statistics and standardized factor loadings of the two-dimensional structure of the FMS-C

Item	<i>M (SD)</i>	Factor 1	Factor 2
		Attitude	Behavior
1. I wish I were more toned.	2.67 (1.27)	.85	
2. I wish my abs were more defined.	2.82 (1.35)	.88	
3. I wish my body was tighter.	3.07 (1.33)	.84	
4. I wish I were more sculpted.	2.39 (1.33)	.90	
5. I think I would look more attractive if I were more toned.	2.37 (1.34)	.90	
6. I go to the gym to look stronger.	1.55 (0.97)		.84
7. I work out to improve the shape of my body.	2.12 (1.22)		.80
8. I exercise to sculpt more defined muscles.	1.75 (1.06)		.96
9. I exercise to try and look fit and sculpted.	1.82 (1.08)		.94
10. I exercise so that people notice I am sculpted.	1.52 (0.95)		.86

Note: $n = 259$. Cronbach's α : Factor 1 (Attitudes) = .92; Factor 2 (Behaviors) = .90; total = .93.

Table 3.

Bivariate correlations between FMS and other constructs

	M (SD)	FMS	FMS-A	FMS-B	DMS	DMS-A	DMS-B	EDI-BD	EDE-QS	BI-AAQ	BMI	CIA	MOTE
FMS	21.83 (8.42)	1											
FMS-A	13.32 (5.33)	.91***	1										
FMS-B	8.51 (4.16)	.85***	.57***	1									
DMS	19.72 (5.87)	.46***	.35***	.49***	1								
DMS-A	9.64 (4.27)	.40***	.32***	.393***	.91***	1							
DMS-B	10.10 (2.68)	.37***	.25***	.43***	.76***	.42***	1						
EDI-BD	35.76 (10.29)	.28***	.36***	.11*	.04	-.05	.18***	1					
EDE-QS	7.57 (5.87)	.33***	.36***	.22***	.15**	-.01	.34***	.62***	1				
BI-AAQ	10.63 (6.29)	.30***	.34***	.16***	.15**	.05	.26***	.51***	.70***	1			
BMI	20.49 (2.95)	.11*	.13**	.07	-.03	-.12**	.12**	.53***	.35***	.28***	1		
CIA	7.40 (6.93)	.21***	.25***	.11*	.13**	.08	.20***	.36***	.51***	.65***	.20***	1	
MOTE	8.62 (7.46)	.34***	.34***	.25***	.22***	.07	.39***	.31***	.62***	.59***	.12**	.50***	1

Note: FMS = Female Muscularity Scale; FMS-A = Attitude subscale of Female Muscularity Scale, FMS-B = Behavior subscale of Female Muscularity Scale; DMS = Drive for Muscularity Scale; DMS-A = Attitude subscale of Drive for Muscularity Scale, DMS-B = Behavior subscale of Drive for Muscularity Scale; EDI-BD = the body dissatisfaction subscale of the Eating Disorder Inventory; EDE-QS = the Eating Disorder Examination-Questionnaire Short; BI-AAQ = Body Image-Acceptance and Action Questionnaire; CIA = the Clinical Impairment Assessment 3.0; MOET = the Muscularity-Oriented Eating Test.

*** $p < .001$, ** $p < .01$, * $p < .05$.

Table 4.

Incremental contribution of the Female Muscularity Scale (FMS) to relevant criterion variables.

	<i>F</i>	Total <i>R</i> ²	ΔR^2	β
Criterion: Thinness-oriented eating disorder symptoms (EDE-QS)				
Step 1	100.29 ^{***}	.38 ^{***}	-	
Age				.02
BMI				.03
Thinness-oriented body dissatisfaction (EDI-BD)				.60 ^{***}
Step 2	85.19 ^{***}	.41 ^{***}	.03 ^{***}	
Age				.03
BMI				.03
Thinness-oriented body dissatisfaction (EDI-BD)				.55 ^{***}
Drive for muscularity (FMS)				.18 ^{***}

Criterion: Muscularity-oriented disordered eating (MOET)				
Step 1	18.33 ^{***}	.10 ^{***}	-	
Age				.02
BMI				-.07
Thinness-oriented body dissatisfaction (EDI-BD)				.35 ^{***}
Step 2	23.92 ^{***}	.16 ^{***}	.06 ^{***}	
Age				.02
BMI				-.05
Thinness-oriented body dissatisfaction (EDI-BD)				.27 ^{***}
Drive for muscularity (FMS)				.26 ^{***}

Notes: EDE-QS = the Eating Disorder Examination-Questionnaire Short; EDI-BD = the body dissatisfaction subscale of the Eating Disorder Inventory; FMS = Female Muscularity Scale; MOET = the Muscularity-Oriented Eating Test. * $p < .05$, ** $p < .05$, *** $p < .001$.

Figures

Parallel Analysis Scree Plots

Figure 1

Parallel analysis (n=258).