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Confirmatory factor analysis of the Drive for Muscularity Scale-S (DMS-S) and Male Body Attitudes Scale-S (MBAS-S) among male university students in Buenos Aires

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ABSTRACT

Several studies have demonstrated that men express body dissatisfaction differently than women. Although specific instruments that address body dissatisfaction in men have been developed, only a few have been validated in Latin-American male populations. The aim of this study was to reassess the factor structure of the Spanish versions of the Drive for Muscularity Scale (DMS-S) and the Male Body Attitudes Scale (MBAS-S) in an Argentinian sample. A cross-sectional study was conducted among 423 male students to examine: the factorial structure (confirmatory factor analysis), the internal consistency reliability, and the concurrent, convergent and discriminant validity of both scales. Results replicated the two factor structures for the DMS-S and MBAS-S. Both scales showed excellent levels of internal consistency, and various measures of construct validity indicated that the DMS-S and MBAS-S were acceptable and valid instruments to assess body dissatisfaction in Argentinian males.

Introduction

Body dissatisfaction is a recognized risk factor for the development of an eating disorder (ED) observed mainly amongst women (Striegel-Moore & Bulik, 2007), and muscle dysmorphia (MD) observed mainly amongst males (Grieve, 2007; Lantz, Rhea, & Cornelius, 2002; Lantz, Rhea, & Mayhew, 2001). Also, elevated levels of body dissatisfaction have been associated with functional impairment and psychological distress in both sexes (Davison & McCabe, 2005). However, traditional instruments that assess body dissatisfaction focus mainly on female concerns and attitudes related to drive for thinness (Parent, 2013). In contrast, men tend to present concerns and social pressure that are oriented toward increasing their muscle mass and body size (Baghurst, Hollander, Nardella, & Haff, 2006; Pope, Gruber, Choi, Olivardia, & Phillips, 1997; Pope, Katz, & Hudson, 1993; Pope, Olivardia, Gruber, & Borowiecki, 1998; Strother, Lemberg, Stanford, & Turberville, 2012).

It has been common practice to modify the available instruments that have been developed specifically for women in order to assess body dissatisfaction in men (Compte & Sepulveda, 2014). However, regardless of the changes that are made, these instruments may still not be sensitive enough to assess men's body dissatisfaction (Cafri & Thompson, 2004) and thus may lead to a misinterpretation of results (Dakanalis & Riva, 2013). Consequently, in recent years instruments that specifically assess attitudes and behaviors related to male body image have been developed. Among these, the Drive for Muscularity Scale (DMS; McCreary & Sasse, 2000) stands out as one of the most appropriate measures for assessing the drive for muscularity and body dissatisfaction in men (Cafri & Thompson, 2004). The DMS consists of 15 items rated on a 6-point Likert-type scale (1 = Strongly disagree; 6 = Strongly agree). Through an exploratory factor analysis (EFA), a subsequent study by McCreary, Sasse, Saucier, and Dorsch (2004) confirmed the two-factor structure validity of the DMS and showed adequate levels of internal consistency for each subscale

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and the final score. The first factor measures muscularity-oriented body image attitudes (DMS MBI), and the second factor assesses muscularity-oriented behaviors (DMS MB). In terms of convergent validity, the scale was positively associated with the frequency of physical training, risk of ED and depression, and negatively with self-esteem (McCreary & Sasse, 2000).

A Spanish validation in high school students (DMS-S; Sepúlveda et al., 2015) confirmed the two-factor structure of the questionnaire and supported the inclusion of item 10 ("I think about taking anabolic steroids"), despite the recommendation for its exclusion by McCreary et al. (2004). Previous research has also found evidence that supports the inclusion of item 10 (Campana, Gomes, Swami, & da Silva, 2013; McPherson, McCarthy, McCreary, & McMillan, 2010). Furthermore, the DMS-S also presents adequate to excellent levels of internal consistency. In terms of discriminant validity, the DMS-S showed low to no correlation with traditional measures of EDs (Sepúlveda et al., 2015). In Latin-American populations, the Brazilian-version's results confirm the original two-factor structure and shows adequate internal consistency coefficients and evidence of construct validity (Campana et al., 2013). However, a three-factor-structure version (attitudes, substance intake, and training adherence) was found in the Mexican validation among undergraduate students (Escoto et al., 2013), although the third factor (training adherence) did not offer acceptable levels of internal consistency.

Despite its popularity, Tylka, Bergeron, and Schwartz (2005) have questioned the predictive ability of the DMS arguing that the scale disregards the components of body image that are not related to muscularity. Therefore, they suggest that drive for muscularity and attitudes toward body image may represent different constructs in males, as observed in women. In the same way that the subscales "drive for thinness" and "body dissatisfaction" are presented separately in the Eating Disorder Inventory (EDI; Garner, Olmsted, & Polivy, 1983), the authors developed a scale that assesses body image concerns by differentiating muscularity from body fat. The resulting instrument was the Male Body Attitudes Scale (MBAS; Tylka et al., 2005). The results of an EFA and CFA confirmed the existence of three factors: muscularity (MBAS M), low body fat (MBAS LBF) and height (MBAS H). The final MBAS consists of 24 items rated on a 6-point Likert-type scale (1 = Never; 6 = Always), and showed an excellent level of internal consistency for the MBAS M and MBAS LBF subscales, and an adequate level for the MBAS H subscale. Evidence for its construct validity showed negative correlation with self-esteem and body-esteem, as well as positive correlations with EDs (Tylka et al., 2005). Later, similar results were observed amongst male college students (Lamanna, Grieve, Derryberry, Hakman, & McClure, 2010).

However, the subsequent Spanish version (Sepúlveda et al., 2014) arrived at a two-factor solution, resulting in the elimination of the MBAS H subscale. The stability of the third factor was previously questioned, given that it comprises only two items (Blashill & Vander Wal, 2009), and usually a factor with less than three items is considered weak and unstable (Costello & Osborne, 2005). Likewise, a two-factor structure version of the MBAS was found to be appropriate to assess body image concerns in gay men (Blashill & Vander Wal, 2009), and Tylka et al. (2005) have also admitted problems with the third factor (MBAS H) in the original paper. Therefore, the final model of the Spanish version (MBAS-S) is composed of a two-factor structure, with 22 items and has reported excellent levels of internal consistency for the total score, and adequate levels for the MBAS-S M and the MBAS-S LBF. In terms of construct validity, drive for thinness was associated with the MBAS-S LBF, and presented no association with the MBAS-S M. Recently, a 15 item and three-factor structure version of the MBAS was validated in Irish men, with adequate levels of internal consistency and evidence for its construct validity (Ryan, Morrison, Ruddy, & McCutcheon, 2011). In contrast, there is no published validation of the MBAS in the Latin-American population.

Despite the differences between DMS and MBAS, both scales are considered to be reliable measures of body dissatisfaction and disordered eating amongst males (Dakanalis & Riva, 2013; Greenberg & Schoen, 2008; Grieve, Truba, & Bowersox, 2009). However, the assessment of EDs and body dissatisfaction in men is usually carried out through instruments developed and validated on female populations (Dakanalis & Riva, 2013), as argued previously. Consequently, men suffering from ED and body dissatisfaction may be under-diagnosed, undertreated and misunderstood (Strother et al., 2012). In addition to this, there are no previous measures validated in Argentina that assess men's body image concerns, and few have been validated in other Latin-American countries (Campana et al., 2013; Escoto et al., 2013). In consequence, little is known about body image dissatisfaction and disordered eating in Latino men. If we take into consideration that body dissatisfaction has been associated with functional impairment and psychological distress (Davison & McCabe, 2005), the development and validation of specific instruments that address male body dissatisfaction would help researchers and clinicians to understand and treat more accurately men that are suffering from body image-related disorders. Therefore, the main objective of this study was to establish the psychometric properties of the DMS-S and MBAS-S among male college students in Buenos Aires. Concurrent, convergent and discriminant validity, in terms of drive for thinness, were evaluated. According to Tylka et al. (2005), significant differences between variables associated with EDs and the DMS-S and the MBAS-S were to be expected.

Method

Participants

A total of 439 undergraduate male students agreed to participate. Of the total sample, one withdrew his consent before starting the test, two participants withdrew their consent during the evaluation, and data from 13 participants were removed due to the presence of missing values. The final sample was of 423 students. Participants ranged in age from 18 to 73 years ($M = 22.47$, $SD = 5.21$). The body mass index (BMI), based on self-reported height and weight, ranged between 15.57 and 69.20 kg/m^2 ($M = 24.20$, $SD = 3.97$). The majority of participants were students of Social Sciences (38.8%) and Engineering (33.8%), but there were also students of Biomedical Sciences (18%), Arts and Humanities (5.9%) and Natural Sciences (3.4%). Students were mainly born in Argentina (93.6%), freshmen (47.5%) and categorized themselves as heterosexual (94.1%).

Procedure

Three public universities and six private universities chosen at random among all of the universities in Buenos Aires were contacted. The study was presented to the university rectors and deans, prioritizing those that had a higher percentage of males enrolled. Two public universities and four private universities agreed to participate. Once institutional consent was obtained, faculty professors were contacted by email. The participants belonged to courses of professors who agreed to participate in this investigation. Students were informed in their classrooms of the objectives of the study and participants were guaranteed data confidentiality. The duration of response to the battery of questionnaires was approximately 50 min. Approval of the Ethics Committee of the Autonomous University of Madrid (CEI-Reference No. 48-926) was also obtained.

Measures

Each participant completed the DMS-S and MBAS-S. A "back translation procedure" (Balluerka, Gorostiaga, Alonso-Arbiol, & Haranburu, 2007; Muñiz & Bartram, 2007), was carried out during the Spanish adaptation of both scales (Sepúlveda et al., 2014, 2015); other characteristics of the DMS-S and MBAS-S were previously described. Each participant also completed the following measures:

Eating Attitudes Test-26 (EAT-26) – Dietary subscale (Garner, Olmsted, Bohr, & Garfinkel, 1982; Gandarillas, Zorrilla, Sepúlveda, & Muñoz, 2003). The EAT-26 is a scale composed of 26 items and three subscales (dietary, bulimia and food preoccupation, and oral control) that address attitudes and behaviors associated with ED. The EAT-26 Dietary subscale (EAT-26 DS) consists of 13 items rated on a 6-point Likert-type scale (1 = Never; 6 = Always), and assesses the tendency to avoid fattening food and the preoccupation with being thinner. The EAT-26 DS has acceptable levels of internal consistency (Cronbach's $\alpha = .86$), and a high correlation with the total score of EAT-26 ($r = .97$, $p < .001$) in undergraduate women (Garner et al., 1982). Similar results were observed in the Spanish-speaking validation (Gandarillas et al., 2003). In this study the EAT-26 DS was used to assess drive for thinness. The EAT-26 DS also had acceptable internal consistency in the present study (Cronbach's $\alpha = .71$).

Eating Disorder Examination-Questionnaire (EDE-Q; Fairburn & Beglin, 1994; Peláez-Fernández, Labrador, & Raich, 2012). The EDE-Q, derived from the Eating Disorder Examination interview (EDE; Fairburn & Cooper, 1993), is a widely used questionnaire for assessing ED. Of the 36 total items, 22 items assess attitudes related to ED and are divided into four subscales (preoccupation with food, weight and figure, and restraint). The answers are rated on a 7-point Likert-type scale (0 = Never; 6 = Every day) and the overall score is obtained by averaging the four scales. The remaining items assess behaviors associated with ED in terms of presence and frequency (excessive exercise, self-induced vomiting, binge eating, etc.). In Spanish-speaking university male students the EDE-Q presents excellent levels of internal consistency (Cronbach's $\alpha = .91$), and provides evidence of construct validity (Penelo, Villarroel, Portell, & Raich, 2012). In the current sample, the scale had excellent levels of internal consistency (Cronbach's $\alpha = .92$).

Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998). The SIAS is a 19-item scale designed to measure fear in situations of social interaction. Each item is rated on a 5-point Likert-type scale (0 = Not at all; 4 = Extremely). The SIAS has shown high internal consistency, both among college students (Cronbach's $\alpha = .88$), and patients with social phobia (Cronbach's $\alpha = .93$). The Spanish version also demonstrated adequate internal consistency (Cronbach's $\alpha = .89$) among university students (Olivares, García-López, & Hidalgo, 2001), and in the present study internal consistency was also high (Cronbach's $\alpha = .92$).

Physical Appearance Comparison Scale-4 (PACS; Calado, 2008; Dany & Urdapilleta, 2012; Thompson, Heinberg, & Tantleff, 1991). The original version consisted of 5 items rated on a 5-point Likert-type scale (1 = Never; 5 = Always). Higher scores reflected a greater tendency toward physical comparison. In the Spanish-speaking population, the PACS presented good levels of internal consistency amongst high-school male students (Cronbach's $\alpha = .88$) (Calado, 2008). During the data analysis, internal consistency was calculated resulting in values below the level of acceptance (Cronbach's $\alpha = .54$) (Nunnally, 1978), due to a low correlation between item 4 and the other items. The same inconvenience was previously found in another studies (Dany & Urdapilleta, 2012; Davison & McCabe, 2005, 2006), and in all cases item 4 was excluded. Therefore, a 4-item version (PACS-4) with good levels of internal consistency (Cronbach's $\alpha = .81$), was used in the analysis.

Rosenberg Self-Esteem Scale (RSE; Góngora & Casullo, 2009; Rosenberg, 1965). The RSE is a widely used 10-item measure of global self-esteem and feelings of self-worth. Participants indicate their agreement with each item using a 4-point Likert-type scale (1 = Strongly disagree; 4 = Strongly agree). Higher scores indicate higher self-esteem. The Argentinian version showed adequate internal consistency in both clinical (Cronbach's $\alpha = .78$) and general populations (Cronbach's $\alpha = .70$), and its construct validity is also supported (Góngora & Casullo, 2009). In the present sample good levels of internal consistency were observed (Cronbach's $\alpha = .80$).

Data Analysis

To empirically test the validity of the two-factor structure of the DMS-S and MBAS-S a CFA was performed for each case. Likewise, structural equation modeling (SEM) analyses were performed for each of the proposed models. The estimation method used was a Robust Diagonally Weighted Least Squares (DWLS) to fit the model to the matrix of polychoric correlations, and requires the calculation of the asymptotic covariance matrix. This method is appropriate when the variables are ordinal and not normally distributed (Jöreskog, 1994, 2002). This method provides robust statistical testing for significance and standard errors, as well as for the Satorra–Bentler chi-square (S-B χ^2; Satorra & Bentler, 1994), correcting the effects due to a possible violation of the assumption of normality. Both univariate normality tests as well as the Mardia coefficient presented results that allowed us to reject the null hypothesis of multivariate normality.

To evaluate the model fit, in addition to the statistical significance test of S-B χ^2, a mixed criterion of Hu and Bentler (1999) was used. The following statistics were analyzed: the S-B χ^2/df ratio, Comparative Fit Index (CFI), Normed Fit Index (NFI), Non Normed Fit Index (NNFI) and Root Mean Square Error of Approximation (RMSEA). For the S-B χ^2/df ratio, below 2 is considered a good fit; for the CFI, NFI and NNFI, above .95 is considered a good fit; and in the case of RMSEA, values of <.05 were expected (Schreiber, Nora, Stage, Barlow, & King, 2006).

In each case, the patterns for adjusting variances of the two latent variables were set at 1.0 to set the scale of the unmeasured variables and identify the model. The variances of the error terms were specified as free parameters, as the covariance between the factors. Finally, all loadings on more than one factor were restricted to zero. Analyses were performed using the PRELIS 2 and LISREL 8.71 programs.

To determine the internal consistency of the DMS-S and MBAS-S, Cronbach's alpha for the total score of each scale and its corresponding subscales was calculated. According to Nunnally (1978), Cronbach's alpha values above .70 are considered acceptable. Furthermore, the normal distribution of the variables was studied with a Kolmogorov–Smirnov test. After checking the assumptions of normality, non-parametric tests were applied. According to the recommendations by Cohen (1992), correlations of .10 were considered small, correlations of .30 were considered medium, and correlations of .50 were considered large. The SPSS 20.0 software package was used to perform these analyses.

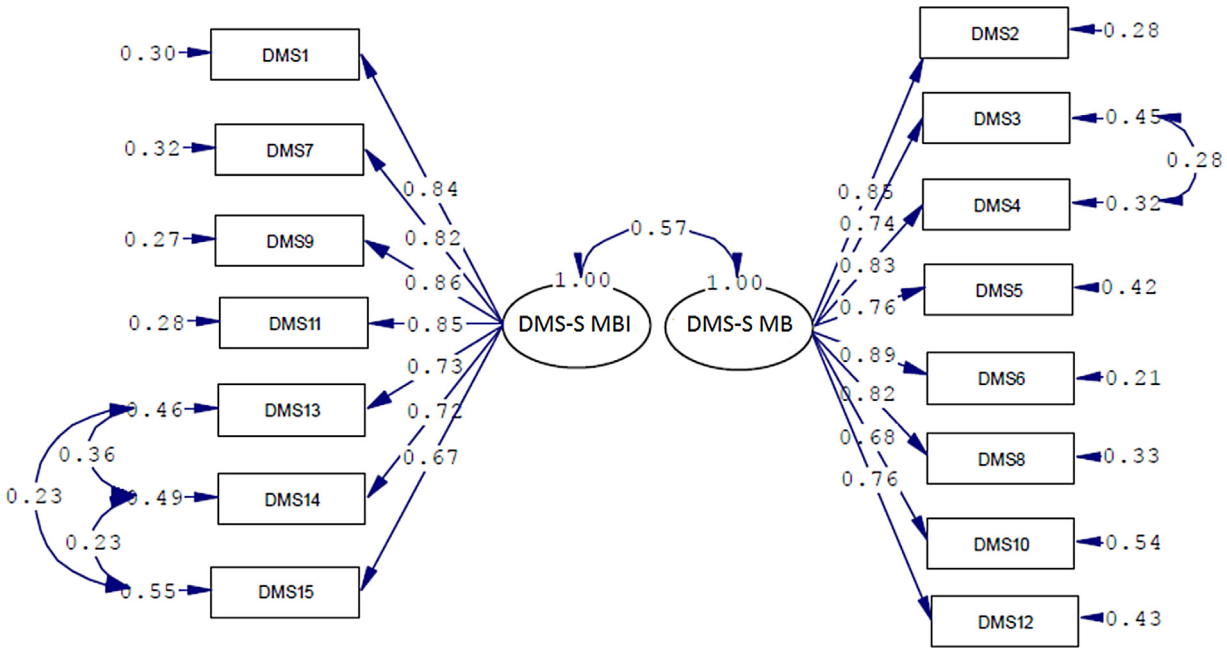

Fig. 1. Confirmatory factor analysis of the two-factor structure of the DMS-S.

Results

Factorial Structure of the DMS-S

SEM analysis for the proposed model was conducted. The model was re-specified allowing for covariance between the residual values in the following paired items: 13–14, 13–15, 14–15 and 3–4 so as to improve its fit. These pairs of items can share some degree of variance beyond the associated variance factors (items written similarly in terms of their content) (Fig. 1).

Goodness-of-fit assessment indicated that the two-factor model provided an acceptable fit. The rate of global or absolute fit that was used to test the null hypothesis (i.e., the model perfectly fits the data of the population) was the S-B χ^2. When analyzing the values obtained by the model, the null hypothesis would have to be rejected ($p < .01$), this is due to sample size. However, from a more pragmatic and less restrictive perspective, rather than examining the level of statistical significance, emphasis should be placed on the ratio of S-B χ^2/df, through which the model reaches an acceptable value of approximately 2 (not more than 2). Likewise, the CFI, NFI and NNFI indexes show a good fit. Likewise, suitable results were also obtained with the RMSEA index and confidence interval at 90%. As for residuals, 23% of them were located outside the desired range (−2.2) although its distribution was not normal (Table 1).

The results clearly suggest that the model provides a good fit to the data. All model parameters were statistically significant ($p < 001$). Factor loadings ranged from .67 to .89, which means that two dimensions are enough to reproduce the original covariance matrix. Individual reliabilities for each indicator (R^2) fell within a range between .45 and .79. Furthermore, for these coefficients, only 13.3% were below .50, thus the proportion of variance of the observed variables that are explained by the latent factors was appropriate. Significant positive covariance between the two factors or latent variables was also observed.

Internal Consistency, Construct Validity, and Final Scores of the DMS-S

Good levels of internal consistency were observed for the DMS-S total score (Cronbach's $\alpha = .89$) and the DMS-S MB (Cronbach's $\alpha = .86$), while the DMS-S MBI presented excellent levels of internal consistency (Cronbach's $\alpha = .91$). In terms of convergent and concurrent validity (see Table 2), a moderate positive correlation between the total scores of the DMS-S and EDE-Q was observed. Also, the DMS-S presented statistically significant relationships with variables associated with body dissatisfaction. The PACS-4, physical exercise, and the use of dietary supplements presented statistical significance and the highest levels of association with the DMS-S. As for self-esteem, RSE presented no to weak association with the DMS-S total score and both subscales. A similar association was observed between the SIAS and the DMS-S. In terms of discriminant validity, the DMS-S total score showed low levels of association with drive for thinness (EAT-26 DS).

Factorial Structure of the MBAS-S

A SEM analysis for the proposed model was conducted. The model was re-specified allowing for covariance between the residuals values in the following paired items: 3–9 and 2–12 to improve its fit. These pairs of items can share some degree of variance beyond the variance-associated factors (items written similarly in terms of content) (Fig. 2).

Goodness-of-fit assessment indicated that the two-factor model provided an acceptable fit. When analyzing the values obtained by the model, the null hypothesis was rejected ($p < .01$) and the ratio of S-B χ^2/df presented a value greater than 2. Regarding the CFI and NNFI indexes, these indexes presented an acceptable fit. The results obtained with the RMSEA and confidence intervals at 90% are also moderate. As for the model residuals, fewer than 45% of them are located outside the desired range (−2.2) although its distribution is not normal (Table 1).

All model parameters were statistically significant ($p < .001$). Factor loadings ranged from −.38 to .93, which means that two dimensions are enough to reproduce the original covariance matrix. The individual reliabilities for each indicator (R^2) fall within a range between .14 and .86. Furthermore, fewer than 17% of these coefficients are below .50, thus the proportion of variance of the observed variables that are explained by the latent factors is reasonable.

Table 1
Fit index values for the tested models.

	χ^2/df	p-Values χ^2	RMSEA	CI (RMSEA)	NFI	NNFI	CFI
DMS-S	2.04	.01	.049	(.039; .059)	.99	.99	.99
MBAS-S	4.09	.01	.085	(.078; .093)	.96	.96	.97

Table 2
Means, standard deviations, and intercorrelations of variables (N = 423).

Measures	M (SD)	1	2	3	4	5	6	7	8	9	10	11	12	13
1. DMS-S MBI	2.62 (1.21)	–												
2. DMS-S MB	1.57 (0.77)	.44**	–											
3. DMS-S	2.05 (0.83)	.92**	.71**	–										
4. MBAS-S M	2.52 (1.02)	.85**	.36**	.77**	–									
5. MBAS-S LBF	2.36 (1.03)	.23**	.04	.19**	.28**	–								
6. MBAS-S	2.41 (0.82)	.71**	.28**	.63**	.82**	.74**	–							
7. EAT-26 DS	2.41 (3.43)	.14**	.20**	.19**	.14**	.43**	.33**	–						
8. EDEQ	0.62 (0.69)	.43**	.19**	.40**	.43**	.74**	.75**	.45**	–					
9. SIAS	18.44 (11.89)	.31**	.04	.24**	.33**	.25**	.36**	.09	.39**	–				
10. PACS	8.19 (3.30)	.48**	.27**	.47**	.43**	.24**	.46**	.18**	.51**	.36**	–			
11. RSE	33.13 (4.23)	−.18**	.02	−.12*	−.21**	−.19**	−.27**	−.17**	−.22**	−.44**	−.19**	–		
12. Physical exercise	1.26 (1.71)	.25**	.47**	.36**	.18**	.24**	.27**	.26**	.33**	.10*	.20**	−.06	–	
13. Dietary supplements	0.30 (1.72)	.15**	.38**	.28**	.16**	−.05	.11*	.15**	.07	−.00	.11*	.02	.29**	–

Note: DMS-S MBI, Drive for Muscularity muscularity-oriented body image subscale; DMS-S MB, Drive for Muscularity behaviors subscale; DMS-S, Drive for Muscularity total score; MBAS-S M, Male Body Attitudes Scale muscularity subscale; MBAS-S LBF, Male Body Attitudes Scale low body fat subscale; MBAS-S, Male Body Attitudes Scale total score; EAT-26 DS, Eating Attitudes Test dieting subscale; EDEQ, Eating Disorder Examination Questionnaire total score; SIAS, Social Interaction Anxiety Scale; PACS-4, Physical Appearance Comparison Scale; RSE, Rosenberg Self-Esteem Scale; physical exercise and dietary supplement use are assessed in terms of weekly frequency.

* $p < .05$.

** $p < .01$.

Internal Consistency, Construct Validity, and Final Scores of the MBAS-S

Excellent levels of internal consistency were observed for the MBAS-S total score (Cronbach's α = .91), the MBAS-S M (Cronbach's α = .91), and MBAS-S LBF (Cronbach's α = .91). In terms of convergent and concurrent validity (see Table 2), the MBAS-S presented a strong positive association with the EDE-Q. Furthermore, the total score of the MBAS-S presented significant associations with all the variables evaluated, with moderate to strong associations. According to expectations, the MBAS-S LBF provided the highest levels of association with measures that assessed preoccupation with body fat (EAT-26 DS), and EDs (EDE-Q). In terms of discriminant validity, MBAS-S M showed low levels of association with measures that assessed the drive for thinness (EAT-26 DS).

Discussion

The main aim of this study was to reassess the factor structure of the DMS-S (Sepúlveda et al., 2015) and the MBAS-S (Sepúlveda et al., 2014) using CFA on a representative sample of adult male university students in Buenos Aires. In both cases, the factor structures were confirmed, and good to excellent levels of internal consistency

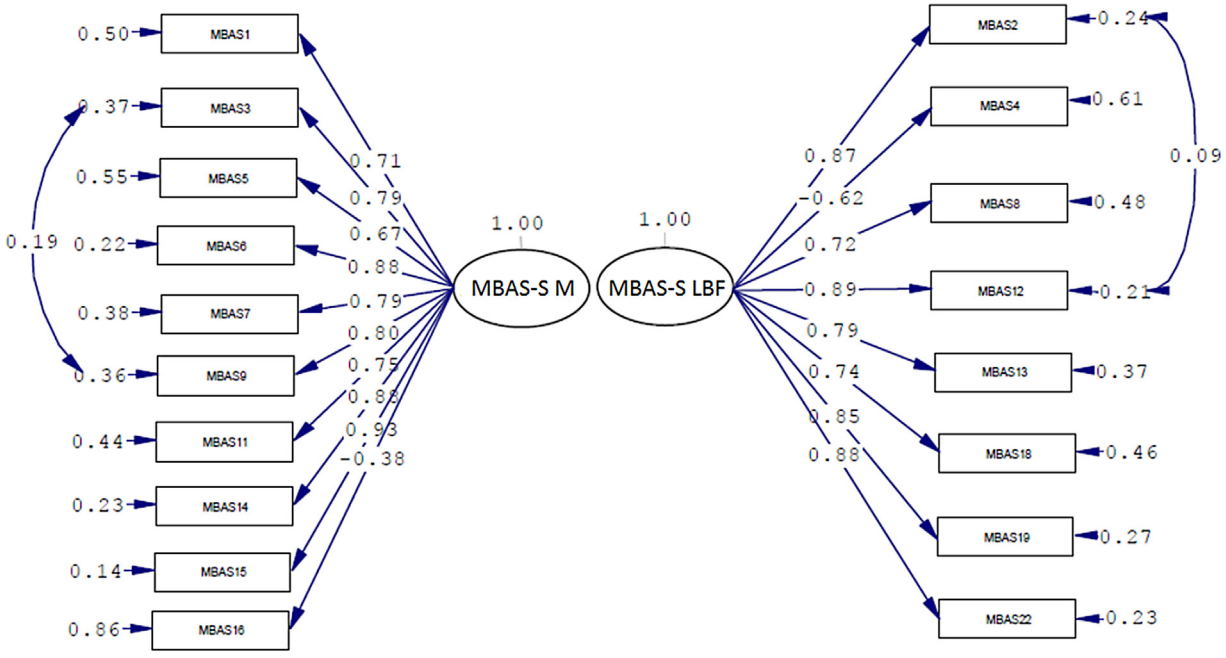

Fig. 2. Confirmatory factor analysis of the two-factor structure of the MBAS-S.

were observed. Also, this study provides evidence for the construct validity of the DMS-S and MBAS-S.

More specifically, the results of the DMS-S show that the two-factor model is appropriate as it presents fit values that are consistent with standards of acceptance. It also presents very good to excellent levels of internal consistency. Although the Spanish version sample was younger (Sepúlveda et al., 2015), almost no differences were observed with the present study. Similar findings were also observed in the Brazilian version, although Brazilian men tend to slightly score lower in the DMS MBI, and higher in the MBAS MB (Campana et al., 2013). However, similar samples in North America tend to score higher in the DMS across different studies (Daniel & Bridges, 2010; Davis, Karvinen, & McCreary, 2005; Karazsia & Crowther, 2008; McCreary et al., 2004; McCreary, Saucier, & Courtenay 2005; Tylka et al., 2005).

Regarding the MBAS-S, the test results appear to be moderately representative of the theoretical perspective. The two-factor, 22-items version used (Sepúlveda et al., 2014) is consistent with previous recommendations on the original factor structure (Blashill & Vander Wal, 2009), and shows excellent levels of internal consistency. In this case, the current sample presented higher scores than the original Spanish sample (Sepúlveda et al., 2014) on the MBAS-S LBF, but no differences were observed among the MBAS-S M scores. Because of the aforementioned similarities between the current sample and the Spanish sample (Sepúlveda et al., 2015) on the DMS-S scores, it is no surprise that they also show similar results in the MBAS M, since they all assess the desire to become more muscular. Previously, Tylka et al. (2005) suggested that the DMS could be used in combination with the MBAS LBF and MBAS H, replacing the MBAS M, in order to obtain a broader vision of men's body image concerns.

The data presented in this study provide sufficient evidence to support the construct validity of the DMS-S and MBAS-S. In terms of men's body dissatisfaction, the two scales have good levels of association in their total scores, with the highest levels of association found between the DMS-S MBI and MBAS-S M subscales. Furthermore, these subscales are also similarly associated with variables related to EDs (SIAS, PACS-4, RSE, physical exercise and dietary supplements intake), which suggests that they both may represent the same construct related to male's body image. Regarding the convergent and concurrent validity, DMS-S and MBAS-S have very good levels of association with variables related to body dissatisfaction (Cafri, Olivardia, & Thompson, 2008; Klein & Walsh, 2004; Murray, Rieger, Touyz, & De la Garza, 2010). Disordered eating, physical comparison and physical exercise stand out as characteristics associated with male body dissatisfaction, since they all show significant correlations with all the subscales of the DMS-S and MBAS-S. Regarding discriminant and divergent validity, differences in the strength of the associations between variables associated with body dissatisfaction and measures designed to assess aspects of body image related (MBAS-S M and DMS-S) and unrelated to muscularity (MBAS-S LBF) were expected. In this regard, measures for drive for muscularity (DMS-S MBI and MBAS-S M) presented weak associations with measures that assessed drive for thinness (EAT-26 DS). Conversely, the MBAS-S LBF showed good levels of association with the EAT-26 DS. A similar difference was observed in the associations of the EDE-Q and measures that assessed aspects related and not related to muscularity. Consequently, similar to the idea presented by Tylka et al. (2005), attitudes toward body image and drive for muscularity appeared to represent two conceptually different constructs of male body image. In the same way, drive for thinness and body satisfaction appeared to also represent two conceptually different constructs while addressing ED in women (Garner, 1991). Similar associations were previously found in the Spanish versions (Sepúlveda et al., 2014, 2015).

Despite its contributions, this study is not without limitations. First, the sample consisted only of male university students, and therefore it would be important to assess the psychometric properties of the DMS-S and MBAS-S in other samples, such as gym users or non-college community samples. Similarly, the stability over time of the present instruments remains to be determined. However, this study has used a large and representative sample size from the different universities in the city of Buenos Aires, and it has been the first study to establish the psychometric properties of instruments that evaluate body dissatisfaction in Argentinian men. The study covers a wide range of dimensions that complement or extend the vision of the possible negative effects of male body dissatisfaction in young adult populations.

Few studies have validated instruments that specifically assess male body image amongst Latin American populations (Campana et al., 2013; Carvalho et al., 2013; Escoto et al., 2013). To our knowledge, this is the first study of its nature that has been carried out in Argentina. Therefore, we expect that the availability of these scales will allow for more systematic investigations on Argentinian men's body image concerns. Likewise, as the present validations used the Spanish versions of the DMS and MBAS, the availability of these scales raises the possibility of conducting systematic cross-cultural research between Argentinian and Spanish samples.

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