

Psychometric properties of the Drive for Muscularity Scale in Mexican males

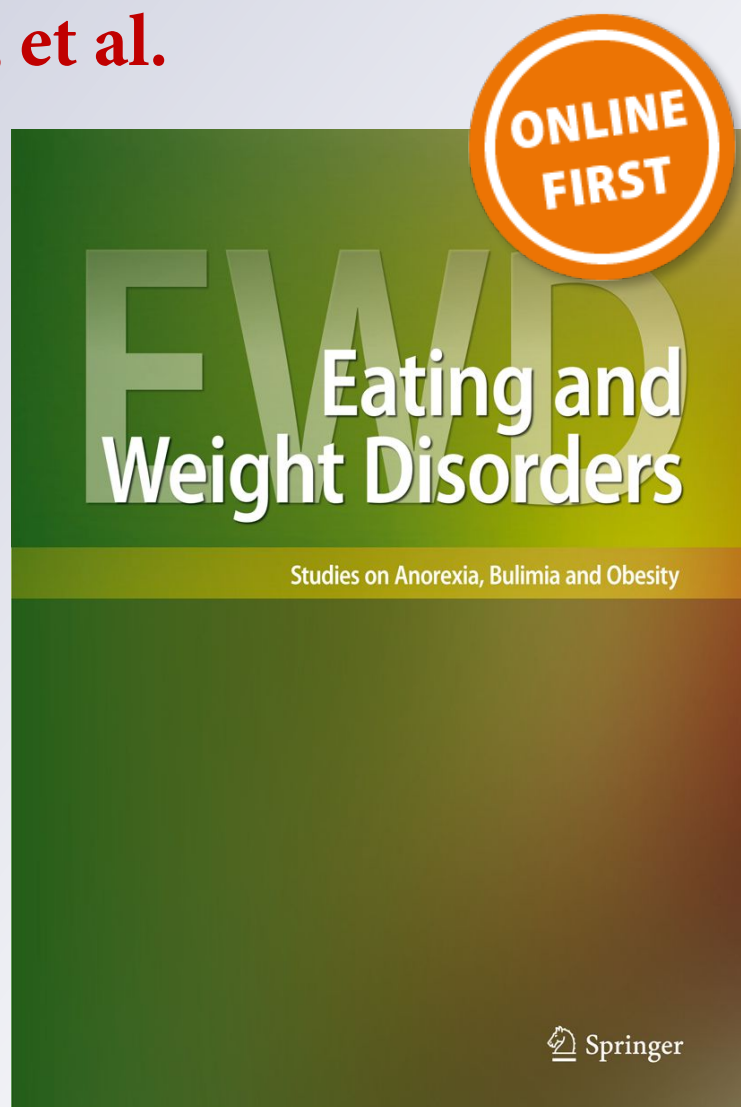
Consuelo Escoto, Georgina Alvarez-Rayón, Juan Manuel Mancilla-Díaz, Esteban Jaime Camacho Ruiz, Karina Franco Paredes, et al.

**Eating and Weight Disorders -
Studies on Anorexia, Bulimia and
Obesity**

Official Journal of the Italian Society for
the Study of Eating Disorders (SISDCA)

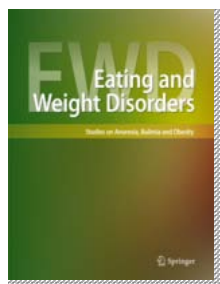
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Volume 18, Issue 1, March 2013

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In this issue (16 articles)

1. Editorial

[**2013: a year of change for Eating and Weight Disorders - Studies on Anorexia, Bulimia, and Obesity**](#)

[Massimo Cuzzolaro](#) Pages 1-2

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2. 

Review

[**Therapeutic options for binge eating disorder**](#)

[Carla E. Ramacciotti](#), [Elisabetta Coli](#)... Pages 3-9

[Look Inside](#) [Get Access](#)

3. 

Original article

[**The Eating Disorders Well Being Questionnaire \(EDwell\): a new measure of quality of life in eating disorders**](#)

[Giovanni Castellini](#), [Giulia Fioravanti](#)... Pages 11-22

[Look Inside](#) [Get Access](#)

4. 

Original Article

[**Psychometric properties of the Drive for Muscularity Scale in Mexican males**](#)

[Consuelo Escoto, Georgina Alvarez-Rayón...](#) Pages 23-28

[Look Inside](#) [Get Access](#)

5. 

Original Article

[Eating Disorders Examination Questionnaire \(EDE-Q\): norms for US college students](#)

[Virginia M. Quick, Carol Byrd-Bredbenner](#) Pages 29-35

[Look Inside](#) [Get Access](#)

6. 

Original Article

[How effective is bibliotherapy-based self-help cognitive behavioral therapy with Internet support in clinical settings? Results from a pilot study](#)

[Louise Högdahl, Andreas Birgegård...](#) Pages 37-44

[Look Inside](#) [Get Access](#)

7. 

Original Article

[Psychoeducation in Binge Eating Disorder and EDNOS: a pilot study on the efficacy of a 10-week and a 1-year continuation treatment](#)

[Matteo Balestrieri, Miriam Isola...](#) Pages 45-51

[Look Inside](#) [Get Access](#)

8. 

Original Article

[Impulsivity and negative mood in adolescents with loss of control eating and ADHD symptoms: an experimental study](#)

[Andrea Sabrina Hartmann](#), [Winfried Rief](#)... Pages 53-60

[Look Inside](#) [Get Access](#)

9. 

Original article

[Associations between different forms of body dissatisfaction and the use of weight-related behaviors among a representative population-based sample of adolescents](#)

[Mathieu Roy](#), [Lise Gauvin](#) Pages 61-73

[Look Inside](#) [Get Access](#)

10. 

Brief Report

[A note on eating disorders and appetite and satiety in the orthodox Jewish meal](#)

[Yigal Shafran](#), [Joel B. Wolowelsky](#) Pages 75-78

[Look Inside](#) [Get Access](#)

11. 

BRIEF REPORT

[What knowledge do patients have about the physical consequences of their eating disorder?](#)

[Walter Vandereycken](#), [Lies Aerts](#), [Eva Dierckx](#) Pages 79-82

[Look Inside](#) [Get Access](#)

12. 

Brief Report

[Lifestyle intervention discloses an association of the Eating Inventory-51 factors with cardiometabolic health risks](#)

[Irena Aldhoon Hainerová, Hana Zamrazilová...](#) Pages 83-86

[Look Inside](#) [Get Access](#)

13. 

Brief Report

[Prevalence of hyperthyrotropinemia in obese children before and after weight loss](#)

[Veysel Nijat Baş, Zehra Aycan...](#) Pages 87-90

[Look Inside](#) [Get Access](#)

14. 

Brief Report

[No evidence for effects of negative emotions on eating behaviour in overweight children](#)

[Reinhold G. Laessle, Simone Schulz](#) Pages 91-93

[Look Inside](#) [Get Access](#)

15. 

Case Report

[Psychotic symptoms in a woman with severe Anorexia Nervosa](#)

[Nadia Delsedime, Barbara Nicotra...](#) Pages 95-98

[Look Inside](#) [Get Access](#)

16. 

Case Report

[Thyroxine, shape, and weight: interaction of Graves' disease and bulimia nervosa](#)

[Martin Teufel, Katrin Elisabeth Giel...](#) Pages 99-101

[Look Inside Get Access](#)

Psychometric properties of the Drive for Muscularity Scale in Mexican males

Consuelo Escoto · Georgina Alvarez-Rayón · Juan Manuel Mancilla-Díaz ·
Esteban Jaime Camacho Ruiz · Karina Franco Paredes · Carlos Saúl Juárez Lugo

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Abstract This study refers to the evaluation of the psychometric properties of the Drive for Muscularity Scale among Mexican population. The exploratory factor analysis was carried out with 369 university males (mean age = 20.93 years). A three-factor structure that explains 45.64 % of the variance was found for the scale: 31.10 % by attitudes ($\alpha = 0.87$), 10.70 % by substance intake ($\alpha = 0.72$) and 3.84 % by training adherence ($\alpha = 0.68$). Only the two first sub-scales and total score ($\alpha = 0.86$) offered acceptable levels of internal consistence. The

confirmatory factor analysis, carried out with 200 males (mean age = 20.79 years), verified both the suitability of this factor structure and the two-factor structure proposed by McCreary et al. (*Psychol Men Masc* 5:49–58, 1). Drive for muscularity is important in comprehending male body image and Drive for Muscularity Scale has demonstrated to be psychometrically suitable to assess this construct in Mexican males.

Keywords Drive for muscularity · Body image · Males · Psychometrics · Confirmatory factor analysis

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Introduction

The researchers agree on the need to deepen into the comprehension of masculine body dissatisfaction, and more specifically, into the factors associated with the drive to increase muscularity [1–3]; however, in order to study this phenomenon it is necessary to have evaluation tools, with proven validity and reliability. Although there are several procedures and instruments to assess masculine body image [4], one of the most utilized self-report questionnaires in this respect [5–11] is the Drive for Muscularity Scale (DMS; 12). DMS evaluates the attitudes and behaviors linked to the drive to increase body mass, on the basis of 15 items at a Likert-type scale of six options ranging from 1 (*always*) to 6 (*never*). The items are inversely codified and high scores indicate a higher drive for muscularity. DMS has two sub-scales, attitudinal and behavioral, which possess a suitable internal consistence and convergent validity with the intention of gaining muscle mass [1, 12]. However, it is worth mentioning that some authors [13] have pointed out certain limitations of the scale, among which distinguishable are (1) the scarce

representativeness of the selected items to build it; (2) the heterogeneity of the sample of participants with which the validity of the construct was studied; and (3) the high inter-correlation between the attitudinal and behavioral subscales.

Therefore, with the purpose of contributing to the empirical foundations of the psychometric properties of DMS and to cover the need to have assessment instruments that allow giving an account of the drive for muscularity in Mexican males, the aim of this study was to obtain a Spanish language version of the DMS, analyze its factorial structure and internal consistence, and also obtain its suitability by means of a confirmatory factor analysis.

Methods

Preliminary study

Subjects

Sample included 15 university males, from 19 to 22 years of age ($M = 20.20$, $SD = 1.01$).

Measurements

Drive to increase muscularity The DMS assesses the degree of concern of the people to increase their muscularity [12]. This questionnaire consists of 15 items and is scored on a 6-point Likert-type response format (1 = always; 6 = never). The items are inversely codified and high scores indicate a higher drive for muscularity, i.e., more concern by muscularity. The DMS has a satisfactory internal consistency and convergent validity with the desire of increase muscle mass.

Procedures

To obtain the Spanish version of DMS, equivalent in meaning to the original scale, a back-translation process was used, in which two bilingual expert translators took part. Moreover, the scale translated to Spanish was revised by three experts in the field, so as to guarantee that the utilized words were appropriate to the Mexican socio-cultural context. Later, the Spanish version of DMS underwent a piloting with 15 university males, with prior informed consent. Then, individually, they were asked to give their opinion of the scale and more specifically about the comprehension of each of the 15 items.

Main study

Subjects

A total of 569 university males took part, aged from 17 to 26 years ($M = 20.89$, $SD = 2.00$), from three universities located in the northern metropolitan area of Mexico City. This sample was divided at random into two sub-samples, one for each of the stages of the present study. Thus, in the first stage, 369 participants were included, with a mean age of 20.93 years ($SD = 2.00$), and for the second stage, remainder 200 participants, with a mean age of 20.79 years ($SD = 2.01$) were included.

Measurements

Participants answered DMS, which was described formerly.

Procedures

After obtaining their informed consent, the students answered the DMS in their classroom, as a part of a series of tests, under the supervision of the researchers.

Statistics

In the first stage, directed toward the analysis of the factor structure of the Spanish version of DMS, for the statistical analysis (among these, the exploratory factor analysis, EFAs) following the recommendation by Osborne and Costello [14] as for the extraction and rotation method to be used, we utilized the Statistical Package for the Social Sciences (SPSS for Windows, version 17.0). While for the second stage, whose aim was to evaluate both the obtained factor structure and the original [12], the statistical analysis were also carried out with SPSS, except from the confirmatory factor analysis (CFAs), for which the Structural Equation Modeling Software EQS version 6.1 was used, examining the following measurements: χ^2 , Goodness of Fit Index (GFI), adjusted goodness of fit index (AGFI), residual mean square root (RMSR), comparative fit index (CFI), normed fit index (NFI), non-normed fit index (NNFI), and the root mean square error of approximation (RMSEA).

Ethics

The protocol of this study was approved by the Review Boards of the Faculty of Higher Studies Iztacala, National Autonomous University of Mexico.

Results

Preliminary study

The participants supplied information on the comprehension of the items and the necessary changes were made. In this respect, in the translated version, the item 4 had been translated as “consumo batidos proteicos o para ganar peso¹”, however, since 8 of the 15 participants asked what *batido*² meant, the item was rephrased as “consumo bebidas proteicas o para ganar peso³”. Likewise, item 14 that had been translated as “pienso que mi pecho no es suficientemente musculoso⁴”, but as 10 out of the 15 students stated a confusion between *chest* and *breast* the item was changed to “pienso que mis pectorales no son lo suficientemente musculosos⁵”.

First stage

Factor structure Initially, the correlations between the 15 items of DMS were examined and the highest coefficient was 0.73 (determinant of the correlation matrix = 0.004). The suitability index of the Kaiser–Meyer–Olkin (KMO) sample was 0.86, above the recommended 0.70 [15], and Bartlett’s Spherical Test was significant ($\chi^2 = 1998.17$, $df = 105$, $p < 0.0001$). An exploratory factor analysis was carried out (EFA with axis factorization as extraction method) and three factors with eigenvalue above the unit were extracted, which explained 45.64 % of the variance: 31.10, 10.70, and 3.84 %, respectively. After rotation (direct oblimin), the three-factor structure was maintained. According to the criterion of minimal weight load of 0.40 proposed by Stevens [16], six out of the 15 items weighted in more than a factor (see Table 1). Hence, in Factor 1, the same seven items as in the Attitude sub-scale, proposed by McCreary et al. [1], were retained; in Factor 2, four items were retained, and it was called Supplement Consumption; finally, Factor 3 also contained four items, and it was called Training Adherence. We found low to moderate correlations between the factors: Factor 1 with 2 ($r = 0.34$) and with 3 ($r = 0.44$); Factor 2 with 3 ($r = 0.52$). Finally, with exploratory purposes, we replicate the previous analysis (with the same extraction and rotation methods), forcing the structure to two factors. The analysis showed that two factors explained 44.97 % of the variance: 34.09 % by Factor 1, and 10.88 % by Factor 2. Only four out of the 15 items loaded in both factors and none showed important

non-specificity (see Table 1). As it was expected, this last analysis entirely verified the grouping of the two sub-scales proposed by McCreary et al. [1], with a moderate correlation between them ($r = 0.46$).

Internal consistence the homogeneity analysis of the scale revealed that the coefficients of total item-score correlation in DMS fluctuated between 0.45 and 0.75, substantially higher than the minimal criterion of 0.30 proposed by Ferketich [17]; The Cronbach’s alpha coefficients were calculated. For the total score it was 0.86 (95 % CI = 0.84–0.88), and for the two original sub-scales it was: Attitudes ($\alpha = 0.87$; 95 % CI = 0.85–0.88) and Behaviors ($\alpha = 0.79$; 95 % CI = 0.74–0.81); while for the three sub-scales derived in this study the coefficients were: Attitudes ($\alpha = 0.87$; 95 % CI = 0.85–0.88); Supplement Consumption = 0.72 (95 % CI = 0.67–0.76), and Training Adherence = 0.68 (95 % CI = 0.63–0.73).

Second stage

In the second sub-sample, the internal consistence of the scale was 0.88 (95 % CI = 0.85–0.90), and for the three sub-scales derived it was: Attitudes = 0.88 (95 % CI = 0.85–0.90), Supplement consumption = 0.77 (95 % CI = 0.72–0.82), and Training adherence = 0.68 (95 % CI = 0.60–0.74). After submitting these data to FCA, it was observed they adjusted to the hypothesized three-factor structure that came from the exploratory factor analysis: $\chi^2(70) = 89.58$, $p = 0.06$; $\chi^2/df = 1.28$; GFI = 0.94, AGFI = 0.90, CFI = 0.98, NFI = 0.93, NNFI = 0.98 and RMSEA = 0.04; with relative independence between factors ($r = 0.32$). Alternatively, the two-factor structure of DMS, identified by McCreary et al. [3], was also verified: $\chi^2(75) = 94.67$, $p = 0.06$; $\chi^2/df = 1.26$; GFI = 0.94; AGFI = 0.91; CFI = 0.98, NFI = 0.93; NNFI = 0.98 and RMSEA = 0.04), and with a higher relative independence between the factors ($r = 0.22$). Therefore, according to the obtained fit indexes and based on the recommended values [18, 19], we found both models to be suitable.

Discussion

The objective of the present study was to translate and adapt the Drive for Muscularity Scale for the Mexican population, and also to perform a first evaluation of its psychometric properties in a sample of university males, specifically its internal consistence and factor structure. This goal is highly relevant if we consider that in views of understanding and identifying the cognitions and dysfunctional behaviors related to the alterations of the masculine body image, it is necessary to rely on appropriate psychometric instruments.

¹ TN: I drink weight-gain or protein shakes.

² TN: Shake.

³ TN: I drink weight-gain or protein beverages.

⁴ TN: I think that my chest is not muscular enough.

⁵ TN: I think my pectorals are not muscular enough.

Table 1 Descriptive information and factor loadings (structure matrix)

Item	<i>M</i>	SD	Three factors			Two factors	
			1	2	3	1	2
1 I wish that I were more muscular	3.19	1.41	0.62	0.28	-0.44	0.63	0.42
2 I lift weights to build more muscle	2.46	1.35	0.34	0.36	-0.68	0.45	0.55
3 I use protein or energy supplements	1.45	0.99	0.17	0.69	-0.39	0.31	0.67
4 I drink weight-gain or protein shakes	1.27	0.71	0.21	0.85	-0.43	0.43	0.75
5 I try to consume as many calories as I can in a day	1.39	0.81	0.31	0.56	-0.46	0.37	0.61
6 I feel guilty if I miss a weight training session	1.39	0.93	0.32	0.38	-0.65	0.28	0.57
7 I think I would feel more confident if I had more muscle mass	1.90	1.29	0.67	0.31	-0.46	0.79	0.31
8 Other people think I work out with weights too often	1.62	1.19	0.22	0.34	-0.59	0.17	0.60
9 I think I would look better if I gained 10 pounds in bulk	1.64	1.24	0.42	0.32	-0.16	0.57	0.28
10 I think about taking anabolic steroids	1.16	0.68	0.27	0.47	-0.25	0.38	0.58
11 I think that I would feel stronger if I gained a little more muscle mass	2.07	1.43	0.69	0.33	-0.40	0.66	0.44
12 I think that my weight training schedule interferes with other aspects of my life	1.44	1.02	0.35	0.42	-0.44	0.16	0.50
13 I think that my arms are not muscular enough	2.53	1.56	0.82	0.26	-0.30	0.76	0.38
14 I think that my chest is not muscular enough	2.33	1.48	0.81	0.23	-0.27	0.82	0.36
15 I think that my legs are not muscular enough	2.16	1.11	0.74	0.19	-0.27	0.78	0.31
Full Scale	1.86	0.70					
Muscularity behaviors	1.52	0.62					
Muscularity attitudes	2.26	1.03					
Substance consumption	1.32	0.60					
Training adherence	1.73	0.81					

A bold factor loading reflects loading on the relevant factor

The adaption of DMS only supposed linguistic changes in two items. Especially in item 4, since the shake (*batido*) term is not commonly used in Mexico, so it was replaced with *drinks*; as well in item 14, substituting chest (*pecho*) with *pectorals* (*pectorales*), achieving a greater accuracy as for the part of the body that is referred; a similar operation to, and in congruence with, that performed by McCreary and Sasse [12].

In contrast to other studies as for the existence of a two-factor structure of DMS: attitudes to muscularity and behaviors oriented to gain muscle mass [1, 20] in the present study we identified a three-factor structure for the scale: attitudes (7 items), supplement consumption (4 items) and training adherence (4 items). Our first factor has exactly the same items as the attitudinal scale proposed by McCreary et al. and later it was verified by McPherson et al. Yet, it was not so in the case of the items contained in the Behavioral sub-scale of these authors, since in the case of the present study they were divided into two factors: supplement consumption and training adherence. Besides, it is important to point out that by examining these factor structures of DMS, on the basis of the confirmatory factor analysis, both models displayed a suitable fit. However, we believe that the structure identified in this study allows characterizing two aspects in a better manner: Training adherence and supplement consumption, as both belong to

the behavioral domain they might turn out useful to differentiate two dimensions relevant for the study of drive for muscularity. This finding has important implications for the study of the drive for muscularity, since it allows a detailed analysis of the behavioral component: Training adherence and consumption of supplements. People who are high in the drive for muscularity strength train to increase the percentage of lean muscle and they adopted a diet characterized by the consumption of supplements designed specifically to increase physical bulk.

In the present study, despite that three of the seven items grouped in the Attitude Factor (1, 7, and 11), and two of the four retained in Supplement Consumption Factor (4 and 5) also presented a moderate load, in Training Adherence Factor showed certain specificity as for their belonging factor. Conversely, out of the four items retained in Training Adherence Factor, item 12 virtually showed null specificity, so in future researches, special attention should be placed to this; it is probable that this pattern is a consequence that in real terms these three dimensions are associated with one another, however—as it was stated here—not to the extent of overlapping. It is more important to pinpoint that in similar to the study by McPherson et al. [20], here, item 10, referring to the intention of taking anabolic steroids, was clearly grouped, contrary to that observed in the study by McCreary et al. [1].

With regard to the internal consistence of DMS, it showed stability between the two stages of the study; moreover, both the scale consistence and that of two of its three factors ranged from acceptable to suitable, with alpha coefficients over the minimal value of 0.70 proposed by Cicchetti [21]; it was not so, however, in the case corresponding to Training Adherence Factor, which was 0.68 in both stages, and thereby non-acceptable. Nevertheless, we have to consider that as this factor specifically evaluates the degree of commitment of a person to their training routine, one might suppose that the internal consistence will increase to the extent that it is evaluated in participants who develop a sport activity or physical training, as it has been observed in previous studies, such as the one by McPherson et al. [20] with males who had a sport activity, or the one by Wojtowicz and von Ranson [22] with bodybuilders, in which the internal consistence of the behavioral sub-scale (0.85 and 0.87, respectively) has turned out substantially larger than the one reported by McCreary et al. [1], which was 0.81, or those by Wojtowicz and von Ranson for non-bodybuilders (0.73).

Separately, as we analyzed the average score in the 15 items of DMS, we noticed that most of the answers were located in never or almost never. This result is congruent if we consider that DMS was developed to evaluate the drive for muscularity, which is more common among those males involved in sport activities and particularly among bodybuilders [23, 24]; nonetheless, this study only included university students and, therefore, it was focused on the psychometric properties of DMS in a community sample. However, the mean score in the scale ($M = 1.87$) was similar to the one obtained by McPhearson et al. [20] of 1.97, yet substantially lower than that registered by Wojtowicz and von Ranson [22] in bodybuilders ($M = 3.38$).

Overall, when the findings are analyzed, it becomes evident that the DMS has acceptable degree of internal consistency and construct validity. This study supports the ongoing use of the DMS as a measure of desire to become more muscular.

This research has some limitations. Firstly, it only included university students, so it is necessary to broaden the research to a community-based sample, besides, it is important to comprise a geographically heterogeneous sample in order to address the differences in race and culture. Additionally, this study did not include men from across the spectrum of body composition, making these results less generalizable. Future research needs to give consideration to the drive for muscularity in a more varied range of populations in which it is essential to have a muscled body, for instance bodybuilding people. Finally, it is necessary to run a test–retest reliability analysis and the concurrent validity of the Spanish version of DMS, as well as criteria, construct, content and face validity.

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Conflict of interest The authors declare that they have no conflict of interest.

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