

# Validation of a new screening questionnaire for Disordered Eating Behaviors in Males

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## Research Article

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# Abstract

**Purpose** The aim of this study was to develop an instrument to identify disordered eating behaviors (DEB) in males (hereafter, DEBM-Q).

**Methods** A two-stage project consisting of a diagnostic scale construction ( $N = 9$ ) and a validation study with a cross-sectional sample ( $N = 570$ ) was carried out. Both semi-structured interviews and a cognitive laboratory with nine participants were conducted to obtain DEBM-Q items. DEBM-Q was applied to 570 freshmen male in Mexico City. Psychometric characteristics and internal consistency (Cronbach's alpha) were analyzed. An item-total correlation value greater than 0.30 was determined, and factor loads greater than 0.40 were considered valid. Exploratory factor analysis (EFA,  $n_1 = 297$ ) and confirmatory factor analysis (CFA,  $n_2 = 273$ ) were performed.

**Results** Two fixed factors explaining 55.08% of the total variance were extracted. Factor 1, "Drive for Thinness" (8 items), explained 30.84% of the variance, whereas factor 2, "Drive for Muscularity" (8 items), explained 24.23% of the variance. Cronbach's alpha for the whole questionnaire was 0.84. DEBM-Q was correlated with the Dutch Food Restriction Scale (RS) ( $r = 0.52, p < 0.001$ ), Eating Disorder Examination Questionnaire (EDE-Q) ( $r = 0.46, p < 0.001$ ), Emotional Eating Scale (EES) ( $r = 0.18, p < 0.001$ ), and Negative Affect Subscale (PANAS-X) ( $r = 0.11, p < 0.005$ ).

**Conclusion** DEBM-Q is a valid and practical short screening tool (16 items) allowing early identification of disordered eating in young males, thereby facilitating clinical management.

**Level of evidence V**

## What Is Already Known On This Subject?

Previous instruments mainly focus on assessing drive for muscularity, exercise and substance intake, downplaying the importance of food intake commonly associated with the desire to lose weight or gain muscle.

## What Does This Study Add?

DEBM-Q is one of the first instruments to explore disordered eating behaviors such as food restriction, food groups, binge eating and dietary changes.

## Introduction

Research on eating disorders (ED) in men is still insufficient, and the stigma that this pathology is specific for women remains [1, 2]. Both men and women may present disordered eating behaviors (DEB), such as binge eating, restraint eating, emotional eating, disinhibition or body weight and shape control through inappropriate compensatory behaviors, none of which meet the full criteria for eating disorder. DEB are

considered risk factors for ED [3, 4] and they are more frequent than clinically defined disorders, especially in adolescents and young adults [5]. However, men face neglect tendency in both the diagnosis and treatment of ED and DEB. Research on both ED and DEB in men is proportionally less than in women, and men continue to be excluded from many clinical or screening studies [1, 2, 6–8].

Worldwide, the global prevalence of ED increased from 3.4–7.8% between 2000 and 2018 [9]. Evidence for different countries shows that the prevalence of DEB in male college students ranges from 5.5–18.3% [10–14]. Meanwhile, data for Mexico show that the prevalence of DEB among first-year male college students varies from 1.9–13.0% [5, 15, 16]. Research in Mexico report no significant differences in the prevalence of DEB between male and female undergraduate students, while other studies have found that Mexican undergraduate male students of human nutrition have a higher frequency of DEB compared to male students from other undergraduate courses [17, 18].

Recent studies indicate that body weight and body image concerns are different between men and women [1, 2, 19, 20]. Research on predisposing conditions for DEB suggest that the internalization of the aesthetic ideal of thinness has been identified as the only common predisposing factor for both men and women; however, drive for muscularity, as a risk factor for DEB, has been identified exclusively for men [5, 15, 20, 21].

According to the specialized literature, body image, muscle dysmorphia and exercise should be considered for the study of ED in men [2], as well as the practice of dieting with the purpose to achieving fat-free muscles bodies or improving their appearance.

Results from two meta-analyses have demonstrated that, in men, pressure from mass media has a negative impact on body satisfaction, body esteem, self-esteem, psychological problems (e.g., depression, anxiety), and health risks behaviors (e.g., excessive exercising, steroid abuse) [22]. The male ideal figure has become increasingly muscular in the mass media [23]. This could explain dissatisfaction with body image among men and an emerging trend in bodybuilding or drive for muscularity [24, 25].

The promotion of a male body ideal focused on strength, endurance, and superiority causes men to pay more attention to their body and appearance, rather than on their health. This explains why health risks are increasingly related to muscle dysmorphia, steroid abuse and eating disorders [26].

Muscle dissatisfaction is an increasingly important issue among young men. Evidence suggests that media's pressure toward muscularity correlates with low body image in men [27–29]. Across cultures, young men accept that muscularity is not only socially desirable, but it is also associated with social status or being more sexually attractive [30–32].

Assessment tools for eating disorders symptoms among males include the Eating Disorder Examination-Questionnaire (EDE-Q; 28-item, 7 item and other versions) and the Eating Disorder Assessment for Men (EDAM, 50-item questionnaire, consisting of 5 subscales) that assess both traditional and muscularity-oriented ED symptoms [33–37]. The self-reported Dutch Restrained Eating Scale (RS) consists of 10

questions on the frequency of restrictive diets; this instrument assesses calorie consumption and predictive validity for the onset of bulimic symptoms [38]. The Eating and Appraisal Due to Emotions and Stress Questionnaire (EADES) assesses eating behavior in relation to emotions, stress and loss-of-control eating [39, 40].

The Negative Affect Scale of PANAS-X questionnaire (*Positive and Negative Affect Scale, PANAS-X*) has been used to measure negative affect, considered as a predisposing factor for DEB in men [41, 42], a mediator of bulimic behavior [43] and a perpetuating factor for ED [44].

In Mexico, different self-administered questionnaires have been widely used in research on ED and DEB, of which the most common is the Brief Questionnaire to measure Risky Eating Behaviors (BQREB), consisting of 10 questions. This tool evaluates concerns on weight gain, binge eating, restrictive and purgative behaviors [45], BQREB was validated in males aged 15 to 23 years, although it was initially developed for female populations [46]. Other instruments used to explore DEB in Mexican men were the Bulimic Investigatory Test, Edinburgh (BITE), Bulimia Test (BULIT), Eating Attitude Test-40 (EAT-40) and Eating Disorder Inventory (EDI) questionnaires [47, 48].

We hypothesized that the aesthetic body ideal among college males, which include fat mass-rejection and drive for muscularity, is associated with disordered eating behaviors.

Bearing in mind that changes in adolescent and young men behavior attributable to the desire for a more muscular body can have negative consequences on health, and that early diagnosis of risk factors could prevent the development of clinical eating disorders or muscle dysmorphia, the purpose of this study was to develop an instrument to identify men at risk of ED based on both their concerns with body image and weight, and their own eating behaviors.

## Methods

### Recruitment

The first stage of the study was to develop a screening tool for DEB in young men. Semi-structured interviews were conducted with nine male students from any undergraduate program, followed by a cognitive laboratory with a second group of nine first-year male students enrolled in undergraduate programs related to health sciences. All the study participants were from a public university in Mexico City. The second stage consisted of a cross-sectional survey applied to 570 first-year male students from the same university in 2017. Students were invited to participate voluntarily, signed an informed consent, and completed the survey in their classrooms.

#### Sample Size Calculation

A representative sample of students based on proportions was calculated. According to the school statistics, published in its website, the total population of freshmen students was 3,609 students, of

which 1,637 (45.3%) were men. Although the final representative sample of men was estimated at 578 participants, at the end we worked with almost 99.0% of the total sample (n = 570).

### Development of DEBM-Q

Several items were generated from the transcripts of recorded interviews. Ideal body concept, eating behaviors, consumption of supplements and other substances, and exercise were explored through semi-structured interviews. The relevance of items was then evaluated through a cognitive laboratory.

Following several in-depth discussions by the panel, a total of 33 items were established based on clarity, relevance and significance for field-testing criteria, using a 4-point Likert-type scale (0 = never or rarely, 1 = sometimes, 2 = once in a week, 3 = more than once in a week) (Table 1).

## Measures and variables

Concurrent validity of the questionnaire was performed using the following instruments:

*Dutch Restrained Eating Scale (RS)* [38]. This questionnaire consists of 10 questions about the frequency of restrictive eating, on a scale from 1 = never to 5 = always. RS has shown adequate internal consistency ( $\alpha = 0.95$ ), test-retest reliability at two weeks (0.82). A single factor was obtained explaining 51.41% of the total variance [49]. For the current sample, Cronbach's alpha was 0.88. Higher scores indicate greater restrained eating.

*Eating Disorders Examination-Questionnaire (EDE-Q)* [50]. This self-report instrument on ED psychopathology is one of the most widely used in male and female samples [34]. EDE-Q was validated in Mexico [36]. This version consists of 7 questions that assess the main behavioral symptoms of eating disorders during the last 28 days. The questions are divided into 3 subscales: restriction, concern about shape and weight, as well as dissatisfaction with shape and weight. All questions are scored on a scale from 0 (never) to 6 (every day). The reliability of the scale in a sample of Mexican students and patients was 0.98 [36]. For the current sample, Cronbach's alpha was 0.78; higher score reflects a greater ED pathology.

*Eating and Appraisal Due to Emotions and Stress Questionnaire (EADES)* [39]. It consists of 44 items and was validated in Mexican college students [40]. The instrument shows a Cronbach's alpha of 0.92 and has three factors: 1) Self-efficacy in eating behavior related to emotions and stress, Cronbach's alpha of 0.87, 2) Self-confidence in eating behavior related to emotions and stress, Cronbach's alpha of 0.84 and, 3) Evaluation of resources and coping capacity, Cronbach's alpha of 0.91. In the current sample, Cronbach's alpha was 0.90; only Emotional eating subscale was applied. Higher score indicates greater ED pathology.

*Negative Affect Subscale (PANAS-X)* [41]. Since DEB have shown a high comorbidity with mood disorders, a positive association between negative affect and the presence of DEB would be expected. Participants

reported the degree to which they have felt various negative emotional states on a scale from 1 = very slightly or not at all to 5 = extremely. The scale has shown an internal consistency of Cronbach's alpha = 0.95 [41]. Robles and Paez [42] validated a version in Spanish in a Mexican population and found a Cronbach's alpha value = 0.85 for the negative affect subscale. In the current study, Cronbach's alpha was 0.94; higher score indicates greater negative affect.

## Data analysis

Firstly, the psychometric characteristics of the questionnaire were analyzed. Subsequently, an exploratory and a confirmatory oblique rotation factor analysis were performed. To carry out the factor analyzes, the study sample was randomly divided into two groups ( $n_1 = 297$  and  $n_2 = 273$ ). The division of the sample helped proving the internal validity of the DEBM-Q thus demonstrating the correct fit of the models.

Independent sample analysis was performed. Cronbach's alpha was calculated to determine the internal consistency of the best-fit model, where values above 0.70 were considered acceptable. Finally, Pearson correlation was carried out between DEBM-Q and food restriction, EDE-Q, the emotional eating subscale and the negative affect subscale. SPSS 21 (Statistical Package for the Social Science) and Mplus 7 Software were employed to perform the data analyses (Los Angeles, CA: MPLUS, Version 7. Computer Software).

## Results

Questionnaires from 570 male students were analyzed, of which 191(33.7%) were between 18 and 19 years old; 312 (55%) between 20 and 24, and 64 (11.3%) between 25 and 35. Participants were enrolled in undergraduate programs from three academic areas: Biological and Health Sciences ( $n = 245$ ; 43.2%), Social Sciences and Humanities ( $n = 206$ ; 36.3%) and Sciences and Arts for Design ( $n = 116$ ; 20.5%).

### Exploratory (EFA, $n=297$ ) and confirmatory (CFA, $n=273$ ) factor analysis

A principal components analysis (PCA) of 33 items revealed a two-factor structure explaining 55.0% of the total variance. Items with factor loading smaller than 0.4 were excluded, remaining 16 items that explained 54.4% of the variance. The Kaiser-Meyer-Okline (KMO) measure of sampling adequacy was 0.85, exceeding the recommended 0.6, whereas Barlett's Test of Sphericity reached statistical significance ( $p < 0.01$ ), thus supporting the factorability of the correlation matrix. These factors were interpreted to represent drive for thinness (8 item, explaining 30% of total variance) and drive for muscularity (8 items, explaining 24.2% of total variance) (Table 1).

EFA ( $n = 297$ ) showed the following values in the model fit tests: RMSEA (root mean square error approximation) = 0.078, CFI (comparative fit index) = 0.957 and TLI (Tucker-Lewis's index) = 0.942, whereas CFA ( $n = 273$ ) showed values of 0.083, 0.966 and 0.960 for RMSEA, CFI and TLI, respectively.

### Structural validity

The analysis of the psychometric characteristics of DEBM-Q showed an item-total correlation value greater than 0.30, which was considered as acceptable. Sixteen items with an internal consistency value of Cronbach's alpha = 0.84 were kept, whereas 17 items with an item-total correlation value less than 0.30 were eliminated from the scale. The Cronbach's alpha values for the drive for thinness and drive for muscularity subscales were, respectively, 0.89 and 0.85 (Table 1).

### **Convergent validity**

Convergent validity was determined through correlations of DEBM-Q with RS, EDE-Q, EADES and PANAS-X. DEBM-Q showed a strong, positive, and statistically significant correlation with both RS ( $r = 0.52, p < 0.001$ ) and EDE-Q ( $r = 0.46, p < 0.001$ ). The correlation between DEBM-Q and EES was highly statistically significant, although less strong ( $r = 0.18, p < 0.005$ ); a similar result was observed between DEBM-Q and PANAS-X ( $r = 0.109, p < 0.001$ ) (Table 2).

**Table 1.** *Factor matrix following oblique rotation for DEBM-Q questionnaire in college males*

		Factor Loadings	
Items		1	2
		Drive for thinness	Drive for muscularity
1	I was worried about getting fat <i>(Me ha preocupado engordar)</i>	.673	
2	I've been on diets to try to lose weight <i>(He hecho dietas para tratar de bajar de peso)</i>	.751	
3	I have modified my diet to lose weight <i>(He modificado mi alimentación para bajar de peso)</i>	.840	
4	I have modified my diet to burn fat <i>(He modificado mi alimentación para quemar grasa)</i>	.817	
5	I have stopped eating some foods to lose weight <i>(He dejado de comer algunos alimentos para bajar de peso)</i>	.822	
6	I have stopped eating some foods to burn fat <i>(He dejado de comer algunos alimentos para quemar grasa)</i>	.612	
7	I have exercised to burn fat <i>(He hecho ejercicio para quemar grasa)</i>	.723	
8	I've been on a diet to burn fat <i>(He hecho dieta para quemar grasa)</i>	.793	
9	I have modified my diet to increase muscle <i>(He modificado mi alimentación para ganar musculatura)</i>		.852
10	I have stopped eating some foods to gain weight <i>(He dejado de comer algunos alimentos para subir de peso)</i>		.433
11	I have stopped eating some foods to gain muscle <i>(He dejado de comer algunos alimentos para ganar musculatura)</i>		.646
12	I have exercised to gain muscle <i>(He hecho ejercicio para ganar musculatura)</i>		.708

Note. Bold values show on-factor loadings. Spanish items in italics and parentheses.

		Factor Loadings	
13	I have used supplements (powders, capsules, etc., in any presentation) to gain weight <i>(He usado suplementos [polvos, capsulas, etc., en cualquier presentación] para subir de peso)</i>		.660
14	I have used supplements (powders, capsules, etc., in any presentation) to gain muscle <i>(He usado suplementos [polvos, capsulas, etc., en cualquier presentación] para ganar musculatura)</i>		.704
15	I have been dieting to gain weight <i>(He hecho dieta para subir de peso)</i>		.747
16	I have been dieting to gain muscle <i>(He hecho dieta para ganar musculatura)</i>		.861
<b>Percentage of explained variance</b>		<b>30.84</b>	<b>24.23</b>
<b>Reliability by factor</b>		<b>.89</b>	<b>.85</b>
<b>Total reliability</b>		<b>.84</b>	
Note. Bold values show on-factor loadings. Spanish items in italics and parentheses.			

### Scoring DEBM-Q

A total rating for the two factors was computed by adding the scores of the items from a specific domain (drive for thinness and drive for muscularity). The score range for each item was between 0 and 3. The cut-off point was determined by calculating the mean of the responses plus 1 SD.

**Table 2.** Correlation test between DEBM-Q total score and selected instruments (N= 570)

	Disordered eating behaviors in males measured by DEBM-Q	
	Pearson (r)	p
Restrictive eating total score (RS)	0.52	0.001
Eating Disorders Examination-Q total score (EDE-Q)	0.46	0.001
Emotional Eating subscale (EES-EADES)	0.18	0.001
Negative affect subscale (PANAS-X)	0.11	0.005

## Discussion

The objective of the study was fully achieved, considering that DEBM-Q was developed, and this instrument found to have adequate internal and external validity.

After exploratory analysis two factors were obtained "*Drive for thinness*" and "*Drive for muscularity*." The apparent difference between these factors may be attributable to the simultaneous existence of different aesthetic ideals among men. Some men drive for a slimmer body associated with new lifestyles, while others are interested in muscularity. According to Valenzuela-Gutierrez and Melendez-Torres [51], the masculine body ideal no longer requires extreme strength. Participants 18 to 24 years old from our study reported preferring healthier rather than extremely strong bodies. Currently, the muscularity ideal is based on toned, lean and tall bodies, as large bodies are rather associated with obesity. In the USA, Klimek et al. [52] reported that the desire for thinness and the desire for muscle were independently positively related to muscle dysmorphia symptoms and disordered eating.

In the final version of DEBM-Q, satisfactory internal consistency value was obtained for the total instrument, as well as for the two subscales: drive for thinness and drive for muscularity. Convergent analysis with other instruments, testing for external validity, indicated that DEBM-Q positively correlated with other instruments commonly used to estimate disordered eating in males, such as RS and [38], EDEQ-7 [36], EES [40], and PANAS-X [41]. The highest positive and statistically significant correlation found in this study was between DEBM-Q and RS, suggesting that even though men do not usually identify themselves with "dieting" or "being on a diet", they may experience restrictive eating behaviors. Although these behaviors do not meet the criteria for the clinical diagnosis of eating disorders, they may put male population's health at risk [8]. The correlation of DEBM-Q scale with EDEQ-7 questionnaire [35, 36] is also relevant because this instrument is considered internationally one of the most reliable for measuring DEB. Its psychometric characteristics have been previously analyzed in Mexican and Chilean male populations [53, 54]

The positive correlation with EES suggests a link between DEB and inappropriate management of some emotions in males, such as anxiety, anger, or depression [55]. Furthermore, this finding added to the evidence for a relationship between emotional eating and the DEB items associated with binge eating [56, 57].

A positive correlation with PANAS-X also proved the external validity of DEBM-Q. According to Stice's [43] Double Path Model, negative affect, which encompasses a group of emotions including anxiety, depression, guilt, shame, worry and anger, was associated with bulimic behaviors. This author proposed that bulimic behaviors have two possible predictor variables: negative affect and body dissatisfaction. A systematic review by Veale et al. [58] reported that body dysmorphic disorders were associated with depressive symptoms, anxiety, and poor quality of life. Likewise, men's desire to build muscle is a risk factor for both legal or illegal substance use and dietary restriction of specific food groups and macronutrients [59, 60].

Strength and limits. DEBM-Q is an instrument of practical use, since it is brief, simple to answer (Likert scale) and easy to score. The main limitations of this study are attributable to the use of self-reported questionnaires and having recruited a convenience sample, which despite being representative of male university students was obtained entirely from a single university setting.

In conclusion, DEBM-Q demonstrated both internal and external validity, and due to its original nature, it is therefore necessary to continue studying its psychometric characteristics in different male populations, estimating cut-off points to improve the detection of cases at risk of ED. In the interest of improving the detection capacity of DEBM-Q the authors of this paper suggest: 1) adding the items “Sometimes I have eaten too much” (*En ocasiones he comido demasiado*) and “I have lost control over what I eat (I have the feeling of losing control while eating)” (*He perdido el control sobre lo que como [tengo la sensación de no poder parar de comer]*) for the clinical record of binge eating and 2) performing an analysis of psychometric properties on DEBM-Q in women for its possible use in open college populations.

## Declarations

### Conflict of interest

The authors declares that they have no conflict of interest.

### Ethical approval

This study is a part of the project “Prevention of Eating Disorders in University Students of the Metropolitan Autonomous University, Xochimilco Campus”, approved by the University Review Board of Biological and Health Sciences, who cleared the ethical considerations. Consent of participants was asked previously to the survey. Students participated on a voluntary basis and were assured of data confidentiality. This study has been carried out in accordance with The Code of Ethics of the World Medical Association, Declaration of Helsinki.

## References

1. Murray SB, Nagata JM, Griffiths S, Calzo JP, Brown TA, Mitchison D, Mond JM (2017) The enigma of male eating disorders: A critical review and synthesis. *Clin Psychol Rev* 57:1 <https://doi.org/10.1016/j.cpr.2017.08.001>
2. Strother E, Lemberg R, Chariese-Stanford S, Turberville D (2012) Eating disorders in men: underdiagnosed, undertreated, and misunderstood. *Eat Disord* 20(5):346-355. <https://doi.org/10.1080/10640266.2012.715512>
3. Stice E, Ng J, Shaw H (2010) Risk factors and prodromal eating pathology. *J Child Psychol Psychiatry* 51(4):518–525. <https://doi.org/10.1111/j.1469-7610.2010.02212.x>
4. American Psychiatric Association (2013) *Diagnostic and statistical manual of mental disorders*, 5<sup>th</sup> ed. American Psychiatric Pub, Washington, DC.

5. Diaz de Leon Vazquez C, Rivera-Marquez JA, Bojorquez-Chapela I, Uniquel-Santoncini C (2017) Variables associated with disordered eating behaviors among freshman students from Mexico City. *Salud Pub Mex* 59(3):258-265. <https://doi.org/10.21149/8000>
6. Mitchison D, Mond J, Slewa-Younan S, Hay P (2013) Sex differences in health-related quality of life impairment associated with eating disorder features: a general population study. *Int J Eat Disord* 46:375-380. <https://doi.org/10.1002/eat.22097>
7. Mitchison D, Hay P, Slewa-Younan S, Mond J (2014) The changing demographic profile of eating disorder behaviors in the community. *BMC Public Health* 14:943. <https://doi.org/10.1186/1471-2458-14-943>
8. Murray SB, Griffiths S, Nagata JM (2018) Community-based eating disorders research in males: a call to action. *J Adolesc Health* 62:649-650. <https://doi.org/10.1016/j.jadohealth.2018.03.008>
9. Galmiche M, Dechelotte P, Lambert G, Tavalacci MP (2019) Prevalence of eating disorders over the 2000-2018 period: a systematic literature review. *Am J Clin Nutr* 109(5):1402-1413. <https://doi.org/10.1093/ajcn/nqy342>. PMID: 31051507
10. Forney KJ, Ward RM (2013) Examining the moderating role of social norms between body dissatisfaction and disordered eating in college students. *Eat Behav* 14(1):73–78. <https://doi.org/10.1016/j.eatbeh.2012.10.017>
11. Limbers CA, Cohen LA, Gray BA (2018) Eating disorders in adolescent and young adult males: Prevalence, diagnosis, and treatment strategies. *Adolesc Health Med Ther* 9:111–116. <https://doi.org/10.2147/AHMT.S147480>
12. Lipson SK, Sonnevile KR (2017) Eating disorder symptoms among undergraduate and graduate students at 12 U.S. colleges and universities. *Eat Behav* 24:81-88. <https://doi.org/10.1016/j.eatbeh.2016.12.003>
13. Saenz-Duran S, Gonzalez-Martinez F, Diaz-Cardenas S (2011) Eating habits and disorders associated to socio-demographic, physical and behavioural factors in university students, Cartagena Colombia. *Rev Clin Med Fam* 4(3):193-204. <https://doi.org/10.4321/S1699-695X2011000300003>
14. Yu Z, Tan M (2016) Disordered Eating Behaviors and Food Addiction among Nutrition Major College Students. *Nutrients* 8(11):673. <https://doi.org/10.3390/nu8110673>
15. Diaz de Leon-Vazquez C (2013) Risky eating behaviors, internalization of the aesthetic ideal of thinness and body dissatisfaction in university students from Mexico City (Master's thesis). Mexico: National Autonomous University of Mexico.
16. Diaz de Leon-Vazquez C, Villalobos-Hernandez A, Rivera-Marquez JA, Unikel-Santoncini C (2018) Effect of parental on disordered eating behaviors in male and female university students in Mexico City. *Eat Weight Disord* 24(5):853-860. <https://doi.org/10.5093/pi2018a17>
17. Cruz-Bojorquez RM, Avila-Escalante ML, Cortes-Sobrino MC, Vazquez-Arevalo R, Mancilla-Diaz JM (2008) Dietary restriction and risky behaviors for eating disorders in Nutrition students. *Psicologia y Salud* 18(2):189-198.

18. Diaz-Gutierrez MC, Bilbao-Morcille GM, Unikel-Santoncini C, Muñoz-Espinosa A, Escalante-Izeta EI, Parra-Carriedo A (2019) Relationship between nutritional status, body dissatisfaction and risky eating behaviors in Nutrition students. *Rev Mex Trastor Aliment* 10(1):53-65.  
<https://doi.org/10.22201/fesi.2007153e.2019.1.490>
19. Compte E, Sepulveda AR (2014) Muscle dysmorphia: Historical review and updates in its diagnostic, assessment, and treatment. *Behav Psychol* 22(2): 307-326.
20. Compte E, Sepulveda AR, Torrente F (2018) Approximations to an integrated model of eating disorders and muscle dysmorphia among university male students in Argentina. *Men Mas* 23(2):1-18. <https://doi.org/10.1177/1097184X17753039>
21. Sepulveda AR, Rica R, Moreno A, Roman FJ, Compte EJ (2019) Assessing the male body image: Spanish validation of two instruments. *Psychiatry Res* 272:483-490.  
<https://doi.org/10.1016/j.psychres.2018.12.125>
22. Barlett CP, Vowels CL, Saucier DA (2008) Meta-Analyses of the effects of media images on men's body-image concerns. *J Soc Clin Psychol* 27(3): 279-310.  
<https://doi.org/10.1521/jscp.2008.27.3.279>
23. Sepúlveda AR, Calado J (2012) Westernization: The role of mass media on body image and eating disorders. In: Jauregui-Lobera I (ed) *Relevant topics in eating disorders*. InTech Sons Ltd, Croacia, pp. 47-64
24. Durkee PK, Polo P, Muñoz-Reyes JA, Rodriguez-Ruiz C, Losada-Perez M, Fernandez-Martinez AB, Pita M (2019) Men's bodily attractiveness: muscles as fitness indicators. *Evol Psychol* 17(2):1-10.  
<https://doi.org/10.1177/1474704919852918>
25. Sell A, Lukazsweski AW, Townsley M (2017) Cues of upper body strength account for most of the variance in men's bodily attractiveness. *Proceedings. Biol Sci* 284(1869):20171819.  
<http://doi.org/10.1098/rspb.2017.1819>
26. Bonnacaze AK, O'Connor T, Aloï JA (2020) Characteristics and attitudes of men using anabolic androgenic steroids (AAS): A survey of 2385 men. *Am J Mens Health* 14(6).  
<https://doi.org/10.1177/1557988320966536>
27. Allen A, Mulgrew KE (2019) Differential media effects on male body satisfaction and mood. *Aust J Psychol* 72: 3–10. <http://doi.org/10.1111/ajpy.12254>
28. Lee HR, Lee HE, Choi J, Kim JH, Han HL (2014) Social media use, body image, and psychological well-being: A cross-cultural comparison of Korea and the United States. *J Health Commun* 19:1343–1358. <https://dx.doi.org/10.1080/10810730.2014.904022>
29. Neff KD, Long P, Knox MC, Davidson O, Kuchar A, Costigan A, Breines JG (2018) The forest and the trees: Examining the association of self-compassion and its positive and negative components with psychological functioning. *Self-Identity* 17:627–645.  
<https://doi.org/10.1080/15298868.2018.1436587>
30. Gattario KH, Frisen A, Fuller-Tyszkiewicz M, Ricciardelli LA, Diedrichs PC, Yager Z, Smolak L (2015) How is men's conformity to masculine norms related to their body image? *Masculinity and*

- muscularity across Western countries. *Psychol Men Masc* 16:337–347.  
<http://dx.doi.org/10.1037/a0038494>
31. Heath B, Tod DA, Kannis-Dymand L, Lovell GP (2016) The relationship between objectification theory and muscle dysmorphia characteristics in men. *Psychol Men Masc* 17:297–308.  
<http://doi.org/10.1037/men0000022>
  32. Yeung NCY, Massar K, Jonas K (2021) Who pushes you to be bigger? Psychosocial correlates of muscle dissatisfaction among Chinese male college students in Hong Kong. *Psychol Men Masc*. 22(1):177–188. <https://doi.org/10.1037/men0000283>
  33. Berg K, Peterson CB, Frazier P, Crow SJ (2012) Psychometric evaluation of the eating disorder examination and Eating Disorder Examination-Questionnaire: A systematic review of the literature. *Int J Eat Disord* 45:428–438. <https://doi.org/10.1002/eat.20931>
  34. Elder KA, Grilo CM (2007) The Spanish language version of the Eating Disorders Examination Questionnaire: comparison with the Spanish language version of the eating examination and test-retest reliability. *Behav Res Ther* 45(6):1369-1377. <https://doi.org/10.1016/j.brat.2006.08.012>
  35. Grilo CM, Henderson KE, Bell RL, Crosby RD (2013) Eating Disorder Examination-Questionnaire factor structure and construct validity in bariatric surgery candidates. *Obes Surg* 23(5):657-662.  
<https://doi.org/10.1007/s11695-012-0840-8>
  36. Unikel-Santoncini C, Bojorquez-Chapela I, Diaz de Leon-Vazquez C, Vazquez-Velazquez V, Rivera-Marquez JA, Galvan-Sanchez G (2018) Validation of Eating Disorders Examination Questionnaire in Mexican women. *Int J Eat Disord* 51(2):146-154. <https://doi.org/10.1002/eat.22819>
  37. Stanford SC, Lemberg R (2012) Measuring eating disorders in men: development of the Eating Disorder Assessment for Men (EDAM). *Eat Disord* 20(5):427-436. <https://doi.org/10.1080/10640266.2012.715522>. PMID: 22985239
  38. Van Strien T, Frijters JER, Van-Staveren WA, Defares PB, Deurenberg P (1986) The predictive validity of the Dutch Restrained Eating Scale. *Int J Eat Disord* 5(4):747-755. [https://doi.org/10.1002/1098-108X\(198605\)5:4%3c747::AID-EAT2260050413%3e3.0.CO;2-6](https://doi.org/10.1002/1098-108X(198605)5:4%3c747::AID-EAT2260050413%3e3.0.CO;2-6)
  39. Ozier AD, Kendrick OW, Knol LL, Leeper JD, Perko M, Burnham J (2007) The eating and appraisal due to emotions and stress (EADES) Questionnaire: Development and validation. *J Am Diet Assoc* 107(4):619-628. <https://doi.org/10.1016/j.jada.2007.01.004>
  40. Lazarevich I, Irigoyen-Camacho ME, Velazquez-Alva MC, Salinas-Avila J (2015) Psychometric characteristics of the Eating and Appraisal Due to Emotions and Stress Questionnaire and obesity in Mexican university students. *Nutr Hosp* 31(6):2437-2444.  
<https://dx.doi.org/10.33305/nh.2015.31.6.8960>
  41. Watson D, Clark LA (1992) Affects separable and inseparable: On the hierarchical arrangement of the negative affects. *J Pers Soc Psychol* 62(3):489-505. <https://doi.org/10.1037/0022-3514.62.3.489>
  42. Robles R, Paez F (2003) Estudio sobre la traducción al español y las propiedades psicométricas de las escalas de afecto positivo y negativo (PANAS). *Salud Ment* 26(1):69-75.

43. Stice E (2001) A prospective test of the dual-pathway model of bulimic pathology: Mediating effects of dieting and negative affect. *J Psychosom Res* 110(1):124-135. <https://doi.org/10.1037//0021-843x.110.1.124>
44. Stice E (2002) Risk and maintenance factors for eating pathology: A meta-analytic review. *Psychol Bull* 128(5):825-848. <https://doi.apa.org/doi/10.1037/0033-2909.128.5.825>
45. Unikel-Santoncini C, Gomez-Peresmitre G (2004) Construct validity of an instrument for the detection of risk factors in eating disorders in Mexican women. *Salud Ment* 27(1):38-49.
46. Saucedo-Molina TJ, Unikel-Santoncini C (2010) Disordered eating, internalization of the body thin-ideal and body mass index in high school and college students from a private institution in Hidalgo, Mexico. *Salud Ment* 33(1):11-19.
47. Vazquez-Arevalo R, Lopez-Aguilar X, Alvarez-Rayon GL, Franco-Paredes K, Mancilla-Diaz JM (2004) Presence of eating disorders in Mexican men and women: Some associated factors. *Behav Psychol* 12(3):415-427.
48. Franco-Paredes K, Martinez-Moreno AG, Diaz-Resendiz FJ, Lopez-Espinoza A, Aguilera-Cervantes V, Valdes-Miramontes E (2010) Risky behaviors and eating disorders symptomatology among undergraduate students from South of Jalisco, Mexico. *Rev Mex Trastor Aliment* 1(2):90-101.
49. Stice E, Fisher M, Martinez E (2004) Eating disorder diagnostic scale: additional evidence of reliability and validity. *Psychol Assess* 16(1):60-71. <https://doi: 10.1037/1040-3590.16.1.60>. PMID: 15023093
50. Fairburn C, Beglin S (1994) Assessment of eating disorders: Interview or self-report questionnaire? *Int J Eat Disord* 16(4):262-370. [https://doi.org/10.1002/1098-108X\(199412\)16:4<363::AID-EAT2260160405>3.0.CO;2-%23](https://doi.org/10.1002/1098-108X(199412)16:4<363::AID-EAT2260160405>3.0.CO;2-%23)
51. Valenzuela-Gutierrez ME, Melendez-Torres JM (2018) Conceptions and values of the body in young adults of Northwestern Mexico. *Rev Mex Trastor Aliment* 9(1):45-56. [http:// doi: 10.22201/fesi.20071523e.2018.1.456](http://doi: 10.22201/fesi.20071523e.2018.1.456)
52. Klimek P, Murray SB, Brown T, Gonzales IV, Blashill AJ (2018) Thinness and muscularity internalization: Associations with disordered eating and muscle dysmorphia in men. *Int J Eat Disord* 51:352- 357. <https://doi.org/10.1002/eat.22844>
53. Penelo E, Negrete A, Portell M, Raich RM (2013) Psychometric properties of the eating disorder examination questionnaire (EDE-Q) and norms for rural and urban adolescent males and females in Mexico. *PLoS One* 8(12):83245 <https://doi.org/10.1371/journal.pone.0083245>
54. Compte EJ, Nagata JM, Sepulveda AR, Schweiger S, Sbdar LS, Silva BC, Murray SB (2019) Confirmatory factor analysis and measurement invariance of the eating disorders examination-questionnaire across four male samples in Argentina. *Int J Eat Disord* 52:740-752. <https://doi.org/10.1002/eat.23075>
55. Braden A, Musher-Eizenman D, Watford T, Emley E (2018) Eating when depressed, anxious, bored, or happy: Are emotional eating types associated with unique psychological and physical health correlates? *Appetite* 125:410-417. <https://doi: 10.1016/j.appet.2018.02.022>

56. Nicholls W, Devonport TJ, Blake M (2016) The association between emotions and eating behaviour in an obese population with binge eating disorder. *Obes Rev* 17(1):30–42.  
<https://doi.org/10.1111/obr.12329>
57. Van Strien T (2018) Causes of Emotional Eating and Matched Treatment of Obesity. *Curr Diabetes Rev* 18(6):35. <https://doi.org/10.1007/s11892-018-1000-x>
58. Veale D, Gledhill LJ, Christodoulou P, Hodsoll J (2016) Body dysmorphic disorder in different settings: A systematic review and estimated weighted prevalence. *Body Image* 18:168–186.  
<http://dx.doi.org/10.1016/j.bodyim.2016.07.003>
59. Escoto C, Alvarez-Rayon G, Mancilla-Diaz JM, Camacho-Ruiz E, Franco-Paredes K, Juarez-Lugo CS (2013) Psychometric properties of the Drive for Muscularity Scale in Mexican males. *Eat Weight Disord* 18(1):20-28. <https://doi.org/10.1007/s40519-013-0010-6>
60. Lavender JM, Brown TA, Murray SB (2017) Men, muscles, and eating disorders: an overview of traditional and muscularity-oriented disordered eating. *Curr Psychiatry Rep* 19(6):32.  
<https://doi:10.1007/s11920-017-0787-5>