

# Disordered eating behaviors and psychological correlates among overweight and obese freshmen college students

Claudia Unikel Santoncini,<sup>1</sup> Concepción Díaz de León Vázquez,<sup>2</sup> José Alberto Rivera Márquez<sup>3</sup>

Original article

## ABSTRACT

### Introduction

The beginning of college studies involves important stress, which is related to an increase in the incidence of depression, anxiety, alcohol abuse DEB.

### Objective

To analyze the relationship between DEB and nutritional status measured with BMI, its association with demographic and psychological variables, and the interaction with BMI.

### Method

A sample of 892 college students in their freshman year (502 females and 390 males) ( $X_{\text{age}} = 19.7$ ;  $SD = 2.9$ ) was studied. Weight and height were measured, and validated questionnaires were used.

### Results

The prevalence of DEB was 6.1% in females and 4.1% in males. The prevalence of overweight and obesity in females was 22.6%, and 7.4% and 26.6% and 9.3% in males, respectively. Among women and men with obesity 10.8% and 11.1% showed high-DEB, whilst among overweight women and men 13.2% and 3.8% showed high-DEB, respectively. BMI increases the risk for DEB 1.6 times among women ( $p < 0.05$ ), 1.4 times among men ( $p > 0.05$ ). There was no interaction found between BMI and the other variables.

### Discussion and conclusion

The variables related with body image increase the risk of DEB significantly ( $p < 0.05$ ) in both sexes. Depressive symptoms, low self-esteem increase the risk among women, and socioeconomic status and study area increase the risk of DEB among men. The specific research of DEB among males is highly recommended to avoid the underregistration of cases.

**Key words:** Disordered eating behaviors, body mass index, self-esteem, youth.

## RESUMEN

### Introducción

El comienzo de los estudios universitarios es un estresor importante para los jóvenes que se asocia con un incremento en la incidencia de depresión, ansiedad, abuso de alcohol y CAR.

### Objetivo

Analizar la relación entre CAR e IMC, su asociación con variables demográficas y psicológicas y la interacción con el IMC.

### Método

En una muestra de 892 estudiantes universitarios de nuevo ingreso (502 mujeres y 390 hombres) ( $X_{\text{edad}} = 19.7$ ;  $DE = 2.9$ ) se midió peso y estatura y se utilizaron cuestionarios validados.

### Resultados

La prevalencia de CAR fue de 6.1% en mujeres y de 4.1% en hombres. La prevalencia de sobrepeso y obesidad en mujeres fue de 22.6% y de 7.4%, y en hombres fue de 26.6% y de 9.3%, respectivamente. Las mujeres y los hombres con obesidad 10.8% y 11.1% presentaron CAR de frecuencia alta, y las mujeres y hombres con sobrepeso 13.2% y 3.8%, respectivamente. En las mujeres el IMC aumenta el riesgo de CAR 1.6 veces ( $p < 0.05$ ) y en los hombres 1.4 veces ( $p > 0.05$ ). No se encontró interacción del IMC en la asociación de CAR con el resto de las variables.

### Discusión y conclusión

En ambos sexos, las variables relacionadas con la imagen corporal aumentan el riesgo de CAR significativamente ( $p < 0.05$ ). Los síntomas depresivos, la baja autoestima y el IMC aumentan el riesgo entre las mujeres, y el deseo por la musculatura, nivel socioeconómico y el área de estudio entre los hombres. Se recomienda llevar a cabo una investigación específica sobre CAR en varones, para evitar el subregistro de casos.

**Palabras clave:** Conductas alimentarias de riesgo, índice de masa corporal, autoestima, jóvenes.

<sup>1</sup> Head of Epidemiologic and Psychosocial Research, National Psychiatry Institute Ramón de la Fuente Muñiz, Mexico City.

<sup>2</sup> Biological and Health Sciences, Autonomous Metropolitan University, Xochimilco Campus, Mexico City.

<sup>3</sup> Health Care Department, Autonomous Metropolitan University, Xochimilco Campus, Mexico City.

Correspondence: Claudia Unikel Santoncini. Dirección de Investigaciones Epidemiológicas y Psicosociales, Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz, Calzada México-Xochimilco 101, San Lorenzo Huipulco, 14370, Ciudad de México. Tel: 55 4160 - 5160. E-mail: unikels@imp.edu.mx

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## INTRODUCTION

The incidence of mental health problems may increase within freshmen college students, since they experience the stress of a key decision for their life, a greater degree of independence and autonomy; some of them have left their families to study in another city. This new state can have an influence on their eating habits, school performance, and emotional development.<sup>1-3</sup>

Overweight and obesity are considered health problems because they are linked to chronic degenerative diseases and functionality deterioration.<sup>4</sup> In Mexico, the 2012 National Health and Nutrition Survey (ENSANUT-2012)<sup>5</sup> reports that 23.0% adolescent women (aged 11-19) are overweight and 12.0% are obese, while 19.0% and 14.0% men belonging to the same age group are overweight and obese, respectively. Among women between the ages of 20 and 49, it was found that 35.0% are overweight and that the same proportion is obese. As for men above the age of 20, 42.0% are overweight and 26.0% are obese.

Nowadays the desire for a thin body shape is widely generalized among the population, especially women, as well as that of a mesomorphic body type among men. Overweight and obese people are faced with the stigma related to body shape and body weight, which comes from the belief that obese people are different in behavioral and terms, that they have little willpower, and that they are unattractive.<sup>6</sup> They tend to be victims of negative comments that affect their self-esteem and that are linked to the acquisition of Disordered Eating Behaviors (DEB). These behaviors are put into practice with the intention of losing body weight, but, paradoxically, they put subjects in a situation of greater weight gain.<sup>7</sup>

Body mass index (BMI) has been linked to DEB on overweight and obese men and women.<sup>8</sup> DEB are characteristic behaviors of Eating Disorders (ED) that are displayed with less frequency and intensity. Among them are binge eating and restrictive and purgative behaviors, and along with overweight and obesity they have been considered as risk factors for the development of ED.<sup>9</sup>

In Mexico, Palma et al.<sup>10</sup> found that 6.6% and 6.3% young people between the ages of 10 and 19, with overweight and obesity, respectively, display some DEB, in contrast with the 2.6% youth with normal weight ( $p < 0.0001$ ). It was found on the same sample that there was a higher risk of displaying DEB among young people with a higher socioeconomic status. (OR: 2.05, 95% CI: 1.52 - 2.75).

Studies performed in college populations in Mexico have shown the presence of DEB in percentages that fluctuate from 7.9%<sup>11</sup> to 18.9%<sup>12</sup> among women and from 4.2%<sup>11</sup> to 13.0%<sup>13</sup> among men. In other countries of Latin America, percentages range from 8.3%,<sup>14</sup> in a study performed on female college students in Brazil, to 44.1% on female medical students in Colombia.<sup>15</sup> In men, percentages range

from 1.9% on Venezuelan students to 9.6% on Colombian students.<sup>15</sup> In a study in which 935 female Brazilian freshmen college students took part, it was found that students with a normal BMI displayed higher DEB prevalences when compared with those with underweight and overweight or obesity: 10.0%, 2.9%, and 3.9%, respectively.<sup>14</sup>

Nowadays, the ideal of physical attractiveness on men is a mesomorphic body, in which it is possible to observe a noticeable musculature with an absence of body fat. Exposure to this kind of images on the media has increased, which puts male bodies in the condition of being objectified in the same way as has occurred with female bodies; this is, as objects to be seen and examined always from the perspective of their appearance. When subjects internalize a position as observers regarding their own bodies, a form of self-consciousness characterized by self-monitoring emerges. This can cause shame and anxiety in relation to the body and, as a consequence, the appearance of an ED.<sup>17</sup> From the perspective of Cafri et al., there is a link between the desire for reaching a mesomorphic body build and the development of DEB, which is why they have proposed the study of drive for muscularity (DM) as a factor that increases the frequency of DEB among men.

Other factors linked to the development of ED are Internalization of the Aesthetic Ideal of Thinness (IAIT), Body Dissatisfaction (BD), self-esteem and Depressive Symptoms (DS). It has been found that, among college students, psychiatric comorbidity is increased in the presence of DEB.<sup>19</sup> Depressive symptoms are some of the risk factors with the greatest capability for predicting ED, according to data reported by Jacobi et al.<sup>20</sup> The presence of IAIT and BD has also been reported on longitudinal studies as risk factors for ED,<sup>21</sup> as well as the presence of low self-esteem before the appearance of this type of psychopathology.<sup>22</sup>

This work has various objectives; analyzing separately for men and women: 1) the relationship between DEB and BMI, 2) the interaction of BMI in association with DEB with demographic and psychological variables and 3) the association of DEB with all study variables.

## METHOD

### Sample

All freshmen students from the Autonomous Metropolitan University, Xochimilco Unit (UAM-X), in Mexico City, entering the 2012 Fall term, were invited to answer a survey. Prior to the application of the survey, subjects were asked for their written consent, indicating the voluntary nature of their participation and the confidentiality of the information. The inclusion criteria were being a freshman student of the UAM-X during said term and accepting a voluntary participation; the exclusion criteria was not accepting to

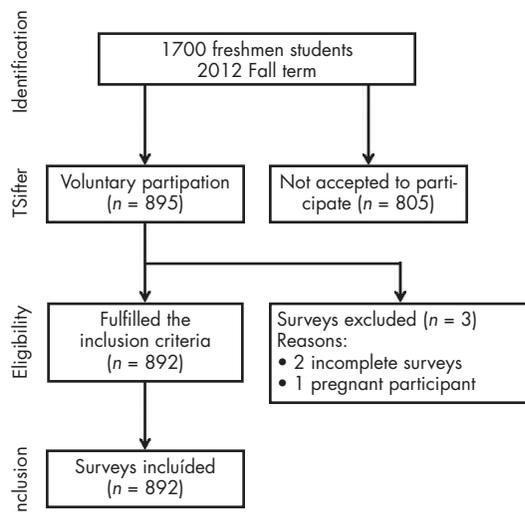
participate in the study, not finishing the survey, and, in the case of women, being pregnant. In figure 1, the inclusion of subjects in the sample is shown; it was constituted by 892 students (502 women and 390 men) which corresponded to a response rate of 51.8% of the freshmen population during the observation period.

### Instruments

The survey included questions about demographic data: age, sex, and major. The Mexican Association of Marketing Research and Public Opinion Agencies (AMAI) Index was employed, AMAI Index-Regulation 10x6 (hereafter, AMAI index) in order to estimate the Socioeconomic Status (SES).<sup>23</sup> The AMAI index is comprised of five categories, where "A/B" represent the highest SES and "E" the lowest category for this variable. In order to obtain the DEB, the Brief Questionnaire for measuring Disordered Eating Behaviors (CBCAR)<sup>24</sup> was applied using two cut-off points: 1. Moderate risk, between 7 and 10 points and 2 high risk, > 10 points. This questionnaire has sensitivity and specificity values of 0.81 and 0.78, respectively, with a positive predictive value of 0.38 and a negative predictive value of 0.96.

The Attitudes Towards Body Figure Questionnaire,<sup>25</sup> which measures the IAIT, was included, considering a score of 37 points or higher, with sensitivity and specificity values of 0.80 for both, with a positive predictive value of 0.43 and a negative predictive value of 0.96.

The Self-esteem Questionnaire by Pope, McHale, and Craighead,<sup>26</sup> modified by Unkiel and Gómez Peresmitré,<sup>27</sup> was also employed, where the highest scores indicate less self-esteem. This questionnaire is divided into two subscales of five and four items, with a Cronbach's alpha reliability coefficient of 0.86 and 0.67, respectively, which explain 59.6% of the total variance.



**Figure 1.** Flow chart for sample selection.

Depressive symptomatology (DS) was evaluated with the revised version of the Center of Epidemiological Studies Depression Scale CESD-R,<sup>28</sup> which consists of 35 test items with four answer options for registering the presence of DS during the last two weeks (scarcely 0-1 days, some 1-2 days, occasionally 3-4 days, most days 5-7 days, nearly every day 10-14 days). Validation among Mexican adolescents showed adequate psychometric characteristics ( $\alpha = 0.93$ ) and a structure in six factors (total variance = 54.6%).<sup>29</sup>

McCreary's Drive for Muscularity Questionnaire (DM),<sup>30</sup> validated on Mexican population by Escoto et al.,<sup>31</sup> consists of 15 questions with six Likert-type answer options. This scale has a total Cronbach's alpha of 0.86; it is divided into three factors that account for 45.64% of the total variance, with internal consistency values of 0.88, 0.77, and 0.68.

Additionally, the body figures analogue scale developed by Stunkard, Sorensen, and Shulsinger,<sup>32</sup> modified by Acosta and Gómez,<sup>33</sup> was employed for measuring CI, which shows a test-retest reliability of 0.89 and a significant correlation of 0.62 with respect to the body dissatisfaction subscale from the Eating Disorders Inventory.

Likewise, questions about the time in minutes dedicated to performing physical activities were included, using the Physical Activity Guidelines for Americans (2008)<sup>34</sup> as a comparison parameter, and subjects were asked the major they were enrolled into in order to make the same study area categories proposed by the university: Design Arts and Sciences (DAS), Social Sciences and Humanities (SSH), and Biological and Health Sciences (BHS).

Lastly, anthropometric measurements of weight in kilograms and height in meters were obtained in order to calculate BMI ( $\text{kg}/\text{m}^2$ ), which was classified in accordance with the criteria proposed by the World Health Organization:<sup>4</sup> malnutrition  $\leq 18.4$ , normal from 18.5 to 24.9, overweight from 25 to 29.9, and obesity  $\geq 30$ .<sup>35</sup> Height was measured with four Seca stadiometers model 206, with the subject's back against the wall, with the gaze fixed on a horizontal plane, and feet slightly separated, forming a "V" shape. As for weight, it was measured with four Seca scales model 813, with the subject standing straight and facing forward, barefoot, not wearing a jacket or sweater, and not carrying objects that would modify their weight (keys, bags, etc.).<sup>36</sup>

### Procedure

It is a study with an analytical cross-sectional design in which College students were administered a survey in their classrooms, with prior verbal consent from their professors. All students enrolled in first trimester were invited to participate voluntarily. Students aged 18 or more were given a written consent, while those aged 17 or younger were given an assent form, along with an informative letter for their parents.

Facilitators and anthropometrists were students majoring on Human Nutrition and Psychology from the same

**Table 1.**

	Women (n = 502)				Men (n = 390)			
	Mean	SD	min	max	Mean	SD	min	max
Weight*(kg)	58.40	10.90	35.50	103.40	70.70	13.10	44.10	120.10
Height*(m)	1.57	0.06	1.31	1.77	1.70	0.06	1.53	1.92
BMI*	23.50	3.90	16.60	39.00	24.10	4.00	16.00	40.50

\*  $p > 0.05$ .

university who received anthropometric training and standardization prior to field work.

### Statistical analysis

All data was analyzed by gender. On the descriptive analysis of the population simple frequencies and  $\chi^2$  were obtained, since all variables were categorical. Due to the presence of three categories in the output variable (DEB): no risk (DEB-NR), moderate risk (DEB-MR), and high risk (DEB-HR); bivariate analysis was performed using a 2 x 3 contingency table. In order to measure the interaction of BMI in the relationship between DEB and the rest of the variables, an interaction term for BMI was included on different models, one for each variable. Lastly, through a logistic regression model which integrated all variables, the relationship between DEB and its co-variables was estimated. A  $p < 0.05$  value was considered as statistically significant and confidence intervals (CI) were estimated to 95.0%. The statistical package STATA 11 was employed for data processing.<sup>37</sup>

## RESULTS

### Participants

The sample consisted of 892 freshmen students of the UAM-X, of which 56.2% (502) were women and 43.7% (390) were men. There were no statistically significant differences regarding body weight, height, or BMI by gender (table 1). Average age was  $19.3 \pm 2.4$  years for women and  $20.4 \pm 3.3$  years for men ( $p < 0.05$ ). Nearly three fourths of the women and over half the men are gathered in the age group of 19 years or less ( $p < 0.05$ ) (table 2).

### Descriptive analysis

In relation to the SES, a higher proportion of men were classified in the highest stratum (30.0%) when compared to women (22.9%) ( $p < 0.05$ ). Likewise, a higher percentage of women was observed in the lowest SES categories when compared to men (23.3% vs. 17.6%) ( $p < 0.05$ ). Half the women are enrolled in the majors from the Biological and Health Sciences, in comparison with men (51.2% and

41.7%), while a higher number of men are enrolled in the area of Social Sciences and Humanities (table 2). Regarding the distribution of BMI, 30.0% women and 35.0% men had overweight and obesity ( $p > 0.05$ ). The desire for a thin body shape and IAIT were present, respectively, in 69.0% and 11.0% women.

In both men and women, DM was present in 13%, while low self-esteem was observed in 19% women and 18% men. Both conditions showed no statistically significant differences between genders ( $p > 0.005$ ) (table 2).

### Bivariate analysis

Over 20% overweight women displayed DEB-MR and 13.2% DEB-HR, whereas, for women with obesity, prevalences were of 37.8% and 10.8%, respectively ( $p < 0.05$ ). In overweight men, prevalences of DEB-MR and DEB-HR were of 18.2% and 3.8%, respectively. Frequencies of DEB-MR and DEB-HR in men with obesity were, respectively, of 33.3% and 11.1% ( $p < 0.05$ ). In the normal weight category, 17.5% women and 11.9% men displayed DEB-MR. It was estimated that 6.9% women with malnutrition displayed DEB-MR (table 3). It was estimated that IAIT increases risk of DEB 7.4 times in women and 5.1 times in men. Likewise, it was observed that DM increases risk of DEB 4.4 times in men and 1.1 in women.

Results show that low self-esteem increases risk of DEB 2 times, while depressive symptoms increase it 2.3 times exclusively in the female group. As for body dissatisfaction, it was found that only men and women who desire a thinner body shape have risk of DEB (3.6 times and 2.7 times, respectively). BMI increases the risk of DEB 1.6 times in women ( $p < 0.05$ ) (table 4).

### Multivariate analysis

When the interaction of BMI in the relationship between DEB and each of the variables was analyzed, no statistically significant values were found. Thence, BMI was included in the regression model as an independent or explanatory variable. The SES D+/D category has a protective effect for DEB only in the male group. Likewise, it can be seen exclusively among men that study areas associated with a higher risk for DEB are SSH and BHS (table 4).

**Table 2.** General characteristics of the population by gender

	Women % (n)	Men % (n)	Total % (n)	p
Age				
19 and less	71.3 (356)	53.6 (208)	63.5 (564)	<b>&lt; 0.0001</b>
20 and more	28.6 (143)	46.3 (180)	36.4 (323)	
Socioeconomic status				
A/B	22.9 (115)	30.0 (117)	26.3 (232)	<b>0.0420</b>
C+	30.8 (155)	31.7 (124)	31.2 (279)	
C	30.8 (115)	20.5 (80)	21.8 (195)	
D+/D	23.3 (117)	17.6 (69)	20.8 (186)	
Study area				
Design Arts and Sciences	13.4 (67)	19.4 (75)	16.0 (142)	<b>0.0080</b>
Social Sciences and Humanities	35.3 (176)	38.8 (150)	36.8 (326)	
Biological and Health Sciences	51.2 (255)	41.7 (161)	47.0 (416)	
Body mass index				
Malnutrition	5.8 (29)	3.8 (15)	4.9 (44)	0.2070
Normal	64.2 (320)	60.2 (235)	62.4 (555)	
Overweight	22.6 (113)	26.6 (104)	24.3 (217)	
Obesity	7.4 (37)	9.2 (36)	8.2 (73)	
Disordered eating behaviors				
No risk	74.3 (373)	80.7 (315)	77.1 (688)	0.0680
Moderate risk	19.5 (98)	15.1 (59)	17.6 (157)	
High risk	6.8 (31)	4.1 (16)	5.2 (47)	
Body dissatisfaction				
No dissatisfaction	21.1 (106)	29.4 (115)	24.8 (221)	<b>&lt; 0.0001</b>
Dissatisfaction: desires fatter figure	9.3 (47)	31.2 (122)	18.9 (169)	
Dissatisfaction: desires thinner figure	69.4 (348)	39.2 (153)	56.2 (501)	
Internalization of the aesthetic ideal of thinness				
Yes	11.3 (57)	6.9 (27)	9.4 (84)	<b>0.0250</b>
No	88.6 (445)	93.0 (363)	90.5 (808)	
Drive for muscularity				
Yes	13.3 (67)	13.8 (54)	13.5 (121)	0.8290
No	86.6 (435)	86.6 (336)	86.4 (771)	
Low self-esteem				
Yes	19.5 (98)	18.4 (72)	19.0 (170)	0.6890
No	80.4 (404)	81.5 (318)	80.0 (722)	

## DISCUSSION AND CONCLUSION

As main results, it was found that DEB are present both among men and women, without statistically significant differences. This differs from the prevalent idea about DEB and ED being privative conditions or a problem faced mainly by women, which forces us to reconsider said idea, but also to target effort to informing and preventing ED among populations from both genders. According to this, an underregistration of ED cases among men can be inferred, attributable to them not resorting to treatment as frequently as women do; this could be because they are not considered male ailments, because symptoms do not evolve until requiring specialized treatment, or because they are not identified as health problems.

Results showed that there is a risk of developing DEB in women when IAIT has been internalized; a muscled body is desired, depressive symptoms appear, a thinner body

shape is desired, and a higher BMI is presented. As for men, variables that showed risk were IAIT, DM, desire for a thinner body shape, and majoring in the BHS and SSH study areas.<sup>19,20,38</sup>

Despite the absence of national data concerning DEB in the same age group population, we consider that, in order to have an idea of the problem inside the country, a comparison with data from the 2012 ENSANUT<sup>5</sup> gives forth relevant information. The results of this study showed that there is a higher frequency of DEB within the students of the sample when compared with an open Mexican adolescent population (0.8% in men and 1.9% in women). This implies a greater ED risk among College students that in an open population, even if, in this sample, the percentages found in women were lower than those found in other studies performed in Mexico.<sup>11,12</sup>

BMI has been previously linked to the frequency of DEB in different Mexican investigations.<sup>8,39-41</sup> In this study, there

**Table 3.** Disordered eating behaviors by gender, according to BMI

BMI	Disordered eating behaviors							
	Women				Men			
	No risk % (n)	Moderate risk % (n)	High risk % (n)	p	No risk %(n)	Moderate risk % (n)	High risk % (n)	p
Malnutrition	93.1 (27)	6.9 (2)	0.0 (0)	< 0.0010	100.0 (15)	0.0 (0)	0.0 (0)	< 0.0001
Normal	78.7 (252)	17.5 (56)	3.7 (12)		84.6 (199)	11.9 (28)	3.4 (8)	
Overweight	64.6 (73)	22.1 (25)	13.2 (18)		77.8 (81)	18.2 (19)	3.8 (4)	
Obesity	51.3 (19)	37.8 (14)	10.8 (4)		55.5 (20)	33.3 (12)	11.1 (5)	

was a lower prevalence of overweight and obesity among the young people participating when compared with national data reported by the 2012 ENSANUT,<sup>5</sup> but there was a similar percentage of DEB.

A positive relationship was found between BMI and the frequency of DEB, and the absence of interaction of BMI in the relationship between BMI and the rest of the variables. Such finding coincide with what was reported by Unikel et al.,<sup>39</sup> who also reported an increase in the frequency of DEB when BMI increases on women between the ages of 15 and 19, as well as the lack of interaction between variables like criticism and BMI on the frequency of DEB. This increase in the frequency of DEN linked to the increase of BMI was also reported by Lora-Cortez and Saucedo-Molina<sup>40</sup> in a sample of women between the ages of 25 and 45.

Each of the variables has an individual impact on DEB, independent from BMI. However, among women, this last variable increases the risk of DEB on its own. It can be

thought that women are less satisfied with a bigger body than men and that pressure for thinness is greater on them,<sup>42</sup> thus, it is expected that, the greater the BMI is, not only will there be more dissatisfaction with the weight and body shape, but also more DEB.

An important finding has to do with a change observed in the ideal of feminine beauty, in which, aside from the body being thin, it is required that it be toned, which explains the result obtained regarding DM in the women of the sample.

Among men, a link between DEB and study area could be seen, being SSH and BHS the areas with higher risk. This link has been located previously on studies performed in athlete populations, were students from a major from the health area were reported as having higher risk.<sup>43</sup> In Mexico, it has been found that male Nutrition students show a greater DEB prevalence than female students from the same major.<sup>13</sup> Blanco-Fernández<sup>44</sup> found a link between the choice of

**Table 4.** Regression analysis, by gender

Variable	Women				Men			
	Risk	p	CI 95%		Risk	p	CI 95%	
			Min	Max			Min	Max
Internalization of the aesthetic ideal of thinness	7.40	<b>&lt;0.0001</b>	3.8593	14.5009	5.1	<b>&lt;0.0001</b>	2.1071	12.6992
Drive for muscularity	1.10	0.643	0.5916	2.3389	4.4	<b>&lt;0.0001</b>	2.1893	9.1674
Self-esteem	2.00	<b>0.017</b>	1.1336	3.5851	1.9	0.063	0.9641	3.8234
Depressive symptoms	2.30	<b>0.006</b>	1.2771	4.2924	1.8	0.162	0.7853	4.2891
Body dissatisfaction:								
Desires fatter figure	<0.01	0.980	-	-	0.6	0.427	0.2660	1.7512
Desires thinner figure	3.60	<b>0.002</b>	1.5840	8.5321	2.7	<b>0.009</b>	1.2982	6.0209
BMI	1.60	<b>0.006</b>	1.1546	2.3069	1.4	0.124	0.9105	2.1880
Age	0.79	0.402	0.4704	1.3527	1.7	0.065	0.9653	3.2816
Socioeconomic status*								
C+	0.90	0.921	0.5195	1.8075	0.5	0.138	0.2879	1.1887
C	1.20	0.517	0.6418	2.4151	0.6	0.280	0.2829	1.4410
D+/D	0.60	0.227	0.3039	1.3262	0.3	<b>0.028</b>	0.1233	0.8845
Study area**								
SSH	0.50	0.052	0.2516	1.0056	2.9	<b>0.037</b>	1.0693	8.0679
BHS	0.50	0.071	0.2800	1.0559	3.8	<b>0.010</b>	1.3825	10.6762

SSH = Social Sciences and Humanities; BHS = Biological and Health Sciences; C+ = middle high socioeconomic status; C = middle socioeconomic status; D+/D = middle low and low socioeconomic status. \*Reference group = A/B highest socioeconomic status. \*\*Reference group = Design Arts and Sciences.

major and ED, suggesting as explanation that subjects who choose majors related to health, communication, or sports, give much importance to body aesthetics, the impact of media, and education.

Some of the limitations of the study are that, due to it being a cross-sectional study, there can be no proof of causality in the relationships between variables, and even if the sample is representative of the freshmen College students from UAM, it can only be generalized to this student population in Mexico. Self-report questionnaires imply a bias in the investigation to the memory failure and social desirability. On the other hand, the measurement of DEB and IAIT in men can be underregistered since the questionnaire employed was developed in a sample of women.

In spite of the aforementioned limitations, the objectives of this study were achieved: analyzing the relationship between DEB and BMI on a sample of College students; determining the link between DEB and demographic (SES, age, and study area) and psychological variables (IAIT, BD, self-esteem, and DM); and knowing the interaction of BMI with said links. Furthermore, this investigation offers important data that helps broaden the knowledge about DEB in the Mexican College population and allows to have a better understanding of the needs that have to be attended regarding this problem on higher education students.

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### Conflict of interest

Authors hereby declare to have no conflict of interest whatsoever.

### REFERENCES

- Hershner SD, Chervin RD. Causes and consequences of sleepiness among college students. *Nat Sci Sleep* 2014; 6:73-84.
- Nyer M, Farabaugh A, Fehlin K, Soskin D et al. Relationship between sleep disturbance and depression, anxiety, and functioning in college students. *Depress Anxiety* 2013;30:doi:10.1002/da.22064.
- Rivera-Márquez JA, Díaz de León-Vázquez C, Oropeza-Aguirre MF, Unikel-Santoncini C. Conductas alimentarias de riesgo en estudiantes de la Universidad Autónoma Metropolitana: diagnósticos preliminares. En: Lara-Flores NL, Eibenschutz-Hartman C, Tamez-González S, Ehrenfeld-Lenkiewicz N (eds.). *La salud y su atención: Problemas actuales, miradas diversas*. México, D.F., UAM, 2013:177-198. ISBN: 978-607-28-0128-8.
- Organización Mundial de la Salud (OMS). Serie de Informes Técnicos, No 916. *Dieta, nutrición y prevención de enfermedades crónicas. Informe de un grupo de estudio de la OMS*. Ginebra: 2002.
- Gutiérrez JP, Rivera-Dommarco J, Shamah-Levy T, Villalpando-Hernández S et al. Encuesta Nacional de Salud y Nutrición 2012. Resultados nacionales. Cuernavaca, México: Instituto Nacional de Salud Pública; 2012.
- Saguy AC, Riley KW. *J Health Politics, Policy Law*. 2005; 30(5): 869-923. doi: 10.1215/03616878-30-5-869.
- Newmark-Sztainer D, Wall M, Haines J, Story M, Eisenberg ME. Why does dieting predict weight gain in adolescents? Findings from project EAT-II: A 5-year longitudinal study. *J Am Diet Assoc* 2007;107:448-455.
- Unikel-Santoncini C, Saucedo-Molina T, Villatoro J, Fleiz C. Conductas alimentarias de riesgo y distribución del índice de masa corporal en estudiantes de 13 a 18 años. *Salud Ment* 2002;25:49-57.
- Stice E. Risk factors for eating pathology: recent advances and future directions. En: *Eating disorders: innovative directions in research and practice*. Washington: American Psychological Association; 2001; pp.51-73.
- Palma-Coca O, Hernández-Serrato MI, Villalobos-Hernández A, Unikel-Santoncini C et al. Association of socioeconomic status, problem behaviors, and disordered eating in Mexican adolescents: Results of the Mexican national health and Nutrition Survey 2006. *J Adolesc Health* 2011;49:400-406.
- Saucedo-Molina TJ, Unikel-Santoncini C. Conductas alimentarias de riesgo, interiorización del ideal estético de delgadez e índice de masa corporal en estudiantes hidalguenses de preparatoria y licenciatura de una institución privada. *Salud ment* 2010;33:11-19.
- Álvarez-Rayón G, Franco-Paredes K, Vázquez-Arévalo R, Escarria-Rodríguez AR et al. Sintomatología de trastorno alimentario: comparación entre hombres y mujeres estudiantes. *Psicología Salud* 2003;13:245-255.
- Cruz-Bojórquez RM, Ávila Escalante ML, Cortés-Sobrino MC, Vázquez-Arévalo R et al. Restricción alimentaria y conductas de riesgo de trastornos alimentarios en estudiantes de nutrición. *Psicología Salud* 2008;18:189-198.
- Costa LCF, Guedes de Vasconcelos FA, Glazer-Peres K. Influence of Biological, Social and Psychological Factors on Abnormal Eating Attitudes among Female University Students in Brazil. *J Health Popul Nutr* 2010;28:173-181.
- Fandiño A, Giraldo SC, Martínez C, Aux CP et al. Factores asociados con los trastornos de la conducta alimentaria en estudiantes universitarios de Cali, Colombia. *Colombia Médica* 2007;38(4):344-351.
- Lugli-Rivero Z, Vivas-Peñalver E. Conductas y actitudes sugestivas de trastornos del comportamiento alimentario en estudiantes universitarios venezolanos. *Revista Facultad Medicina (Caracas)* 2006;29(2):168-173.
- Tiggemann M. Objectification theory: Of relevance for eating disorder researchers and clinicians? *Clin Psychologist* 2013;17:35-45.
- Cafri G, Thompson KJ, Ricciardelli L, McCabe M et al. Pursuit of the muscular ideal: Physical and psychological consequences and putative risk factors. *Clin Psychol Rev* 2005;25:215-239.
- Eisenberg D, Nicklett EJ, Roeder K, Kirz NE. Eating disorder symptoms among college students: Prevalence, persistence, correlates, and treatment-seeking. *J Am Coll Health* 2011;59:700-707.
- Jacobi C, Fittig E, Bryson SW, Wilfley D et al. Who is really at risk? Identifying risk factors for subthreshold and full syndrome eating disorders in a high-risk sample. *Psychol Med* 2011;41:1939-1949.
- Stice E, Ng J, Shaw H. Risk factors and prodromal eating pathology. *J Child Psychol Psychiat* 2010;51:518-525.
- Jacobi C, Hayward C, de Zwaan, Kraemer HC et al. Coming to terms with risk factors for eating disorders: application of risk terminology and suggestions for a general taxonomy. *Psychol Bull* 2004;13:19-65.
- López-Romo H. Asociación Mexicana de Agencias de Investigación de Mercado y Opinión Pública A.C. AMAI [sede web]. Índice AMAI. Regla AMAI 10x6. Los niveles socioeconómicos y la distribución del gasto. Instituto de Investigaciones Sociales SC. 2009. Available at: [www.amai.org/NSE/NivelSocioeconomicoAMAI.pdf](http://www.amai.org/NSE/NivelSocioeconomicoAMAI.pdf).
- Unikel-Santoncini C, Bojórquez-Chapela I, Carreño-García S. Validación de un cuestionario breve para medir conductas alimentarias de riesgo. *Salud Púb Méx* 2004;46:509-515.
- Unikel C, Juárez F, Gómez Peresmitré G. Psychometric properties of the attitudes towards body figure questionnaire in female students and patients with eating disorders. *Eur Eat Disorder Rev* 2006;14:430-435.

26. Pope AW, McHale SM, Craighead WE. Self-esteem enhancement with children and adolescents. USA: Allyn & Bacon Eds; 1998.
27. Unikel-Santoncini C, Gómez-Peresmitré G. Validez de constructo de un instrumento para la detección de factores de riesgo en los trastornos de la conducta alimentaria en mujeres mexicanas. *Salud Ment* 2004;27:38-49.
28. Eaton W, Muntaner C, Smith C. Revision of the Center of Epidemiological Studies Depression (CES-D) Scale. Baltimore: Johns Hopkins University Prevention Center; 1998.
29. González-Forteza C, Jiménez-Tapia JA, Ramos-Lira L, Wagner FA. Aplicación de la Escala de Depresión del Center of Epidemiological Studies en adolescentes de la Ciudad de México. *Salud Publica Mex* 2008;50:292-299.
30. McCreary D, Sasse D. An exploration of the drive for muscularity in adolescent boys and girls. *J Am Coll Health* 2000;48:297-304.
31. Escoto C, Álvarez-Rayón G, Mancilla-Díaz JM, Camacho Ruiz E et al. Psychometric properties of the Drive for Muscularity Scale in Mexican males. *Eat Weight Disord* 2013; doi 10.1007/s40519-013-0010-6.
32. Stunkard AJ, Sorensen T, Schulsinger F. Use of the Danish adoption register for the study of obesity and thinness. En: Kety S (ed.). *The genetics of neurological and psychiatric disorders*. New York: Raven Press; 1983.
33. Acosta-García MV, Gómez-Peresmitré G. Insatisfacción corporal y seguimiento de dieta: una comparación transcultural entre adolescentes de España y México. *Int J Clin Health Psychol* 2003;3:9-21.
34. Physical Activity Guidelines for Americans. U.S. Department of Health and Human Services [sede web]. [Updated: October 16, 2008] Available at: [www.health.gov/paguidelines/guidelines/Chapter3](http://www.health.gov/paguidelines/guidelines/Chapter3) y [www.health.gov/paguidelines/guidelines/Chapter4](http://www.health.gov/paguidelines/guidelines/Chapter4)
35. Organización Mundial de la Salud (OMS). WHO [sede web]. Fecha de actualización: 22 de agosto 2013; (Access date: August 22, 2013). Global data base on body mass index. BMI classification. Available at: [http://apps.who.int/bmi/index.jsp?introPage=intro\\_3.htm](http://apps.who.int/bmi/index.jsp?introPage=intro_3.htm).
36. Shamah-Levy T, Villalpando- Hernández S, Rivera-Dommarco J. *Manual de Procedimientos para Proyectos de Nutrición*. Cuernavaca, México: Instituto Nacional de Salud Pública; 2006.
37. StataCorp. *Stata Statistical Software: Release 10*. College Station, TX: StataCorp LP; 2007.
38. Thompson KJ, Stice E. Thin-ideal internalization: mounting evidence of a new risk factor for body-image disturbance and eating pathology. *Current Directions Psychol Sci* 2001;10:181-183.
39. Unikel-Santoncini C, Martín-Martín V, Juárez-García F, González-Forteza C et al. Disordered eating behavior and body weight and shape: Relatives' criticism in overweight and obese 15- to 19-year-old females. *J Health Psychol* 2013;18:75-85.
40. Altamirano-Martínez MB, Bizmanos-Lamotte B, Unikel-Santoncini C. Continuo de conductas alimentarias de riesgo en adolescentes de México. *Rev Panam Salud Pub* 2011;30:401-407.
41. Lora-Cortez CI, Saucedo-Molina TJ. Conductas alimentarias de riesgo e imagen corporal de acuerdo al índice de masa corporal en una muestra de mujeres adultas de la Ciudad de México. *Salud Ment* 2006;29:60-67.
42. Vaquero-Cristóbal R, Alacid F, Muyor JM, López-Miñarro PA. Imagen corporal; revisión bibliográfica. *Nutr Hosp* 2013;28:27-35.
43. Vásquez R, Ángel Arango LA, García Valencia J, Martínez Gil LM et al. Trastornos de la conducta alimentaria en deportistas. *Rev Col Psiquiatría* 2003;26:115-126.
44. Blanco Fernández MA. "Los trastornos de la ingesta hoy" estudio de una muestra de estudiantes universitarios . I Congreso Virtual de Psiquiatría 1 de febrero-15 de marzo 2000 [quoted: June 1, 2015]; Conferencia 24-CI-H: [14 pantallas]. Available at: [http://www.psiquiatria.com/congreso/mesas/mesa24/conferencias/24\\_ci\\_h.htm](http://www.psiquiatria.com/congreso/mesas/mesa24/conferencias/24_ci_h.htm)