



REVISTA MEXICANA DE TRASTORNOS ALIMENTARIOS

MEXICAN JOURNAL OF EATING DISORDERS

<http://journals.iztacala.unam.mx/index.php/amta/>



ARTICLE

Eating disorder symptomatology: Comparative study between Mexican and Canadian university women



Teresita de Jesús Saucedo-Molina^{a,*}, Jessica Zaragoza Cortés^a, Lita Villalón^b

^a Área Académica de Nutrición, Instituto de Ciencias de la Salud, Universidad Autónoma del Estado de Hidalgo, Hidalgo, México

^b École des Sciences des Aliments, de Nutrition et d'Études Familiales, Faculté des Sciences de la Santé et des Services Communautaires, Université de Moncton, Moncton, Canada

Received 1 March 2017; revised 24 April 2017; accepted 30 May 2017

Available online 20 June 2017

KEYWORDS

Disordered eating behaviors;
Body thin-ideal internalization;
Body image dissatisfaction;
Body weight;
Mexico–Canada

Abstract The objectives of this study were: (1) to compare Mexican and Canadian university students regarding disordered eating behaviors (DEB), body thin-ideal internalization (BTHIN), and body image dissatisfaction (BID); and (2) to examine the relationship of these three variables to body mass index (BMI) and waist circumference (WC). This cross-cultural study was carried out in a sample of 129 university women students aged from 18 to 25 years ($M = 20.18$, $SD = 1.59$): 52% were Canadian (Moncton University [MU]) and 48% were Mexican (Universidad Autónoma del Estado de Hidalgo [UAEH]). The Brief Questionnaire for Disordered Eating Behaviors and Attitudes Towards Body Figure Questionnaire were applied while the BID was evaluated using a continuum of nine silhouettes. In addition, the weight, height and WC of each participant were recorded. Mexican students had greater values of overweight, obesity, abdominal obesity and DEB, with 4.6 times greater risk than UM students. In contrast, the presence of BTHIN and BID was similar between samples. Considering these findings, women from at least two different ethnic groups are vulnerable to the development of eating disorder symptomatology.

© 2017 Universidad Nacional Autónoma de México, Facultad de Estudios Superiores Iztacala. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

PALABRAS CLAVE

Conductas alimentarias de riesgo;
Interiorización del ideal de delgadez;

Sintomatología de trastornos alimentarios: Estudio comparativo entre mujeres universitarias mexicanas y canadienses

Resumen Los objetivos de este estudio fueron: 1) comparar entre estudiantes universitarias mexicanas vs. canadienses respecto a conductas alimentarias de riesgo (CAR), interiorización de la figura corporal delgada (IFCD) e insatisfacción con la imagen corporal (ISC); y 2) examinar

* Corresponding author.

E-mail address: saucemol@hotmail.com (T. J. Saucedo-Molina).

Peer Review under the responsibility of Universidad Nacional Autónoma de México.

Insatisfacción corporal;
Peso corporal;
México-Canadá

la relación de esas tres variables con el índice de masa corporal (IMC) y la circunferencia de cintura (CC). En este estudio transcultural participaron 129 estudiantes universitarias de 18 a 25 años de edad ($M = 20.18$, $DE = 1.59$): 52% canadienses (Universidad de Moncton [UM]) y 48% mexicanas (Universidad Autónoma del Estado de Hidalgo [UAEH]). Fueron aplicados el Cuestionario Breve para medir Conductas Alimentarias de Riesgo y el Attitudes Towards Body Figure Questionnaire, mientras que la ISC se evaluó mediante un continuo de nueve siluetas. Además se registró el peso, la talla y la CC de cada participante. Las estudiantes mexicanas registraron significativamente mayor presencia de sobrepeso, obesidad, obesidad abdominal y CAR, con 4.6 veces mayor riesgo que las estudiantes de la UM. Por el contrario, la presencia de IFCD y de ISC fue similar entre las muestras. Con base en estos hallazgos se puede concluir que las mujeres de dos grupos étnicos diferentes son vulnerables al desarrollo de sintomatología de trastornos alimentarios.

© 2017 Universidad Nacional Autónoma de México, Facultad de Estudios Superiores Iztacala. Este es un artículo Open Access bajo la licencia CC BY-NC-ND (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Over the years, eating disorders (ED) have received attention as an important mental health problem (Klump, Bulik, Kaye, Treasure, & Tyson, 2009; Vandereycken, 2002). Previously, the stereotypical ED patient was depicted as young, North-European Caucasian, female, well-educated and from the upper socio-economic class of Western cultures (Von Ranson & Wallace, 2014). However, some data have found differences in prevalence of ED and its symptomatology within countries and communities belonging to these Western societies (Soh, Touyz, & Surgeron, 2006).

The comparison of ED symptomatology across cultures is complicated and contradictory. Mautner, Owen, and Furnham (2000) found no cultural differences in college females from Western cultures (USA, Italy and England) in the relationship among body image disturbance. Another cross-cultural study between two Spanish-speaking countries (Spain and Mexico) revealed that there were no significant effects by country in the ED symptomatology and sociocultural influences (Mancilla-Díaz et al., 2010). Other studies have shown statistically significant differences between nationalities in body image, dieting and binge eating behavior (Gómez & Acosta, 2000; Gómez-Peresmitré & Acosta, 2002; Gómez-Peresmitré et al., 2013; Gupta, Chaturvedi, Chandarana, & Johnson, 2001) as well as nationalities and gender (Acosta & Gómez, 2003; Acosta, Llopis, Gómez, & Pineda, 2005; Mancilla-Díaz et al., 2010). The findings of a study comparing Canadian *versus* Indian females indicated that both scored similarly on some of the core features of eating disorder-related pathology, measured by the Drive for thinness and Body dissatisfaction subscales of the Eating Disorder Inventory (Garner, Olmsted, & Polivy, 1983), the nature of the underlying body image disturbance was different between the two groups. The Indian females tended to have a less distorted perception of their "level of fatness" than the Canadian females (Gupta et al., 2001). Furthermore, there are studies that have produced mixed results among Western and non-Western society even using the same methodology (Podar & Allik, 2009; Soh et al., 2006).

The transcultural literature, has proposed that globalization and enhanced individual mobility have raised levels of ED symptoms and increased the risk of developing an ED in several Western countries as well as in socioeconomic groups previously thought to be immune to such pathologies (Katzman & Lee, 1997; Soh et al., 2006). Acculturation has been assumed to be one of the major risk factor for the increase of ED symptomatology (Culbert, Racine, & Klump, 2015). Acculturation has been defined as "the process of psychosocial change that occurs when a groups or individual acquires the cultural values, languages, norms and behaviors of dominant society" (Wildes, Emery, & Simons, 2001, p. 524). It has been linked with international migration, however, it has also been proposed that it is enough to have proximity or contact with the dominant culture mainly through mass media (Gómez & Acosta, 2000), or by being a member of multicultural societies, and thereby acquiring those traditions, customs, habits and values (Marin, 1992). Diverse works have found that higher levels of acculturation are associated with higher levels of antifat attitudes, body dissatisfaction and eating concerns (Ayala, Mickens, Galindo, & Elder, 2007; Chamorro & Flores-Ortiz, 2000; Katsounari, 2009; Pepper & Ruiz, 2007). A recent meta-analysis evidenced a considerable association between ED psychopathology and culture change/acculturation (Doris et al., 2015). In addition, has been said that cultures may be vulnerable to acculturation and to symptomatology of ED when they suffer discrimination, or when they are members of a devalued group or culture (Kempa & Thomas, 2000). Rathner et al. (1995) suggested that over-identification with Western norms and values eating pathology increased.

Several studies have identified more prevalence or positive association between disordered eating behaviors (DEB), body thin ideal internalization, body dissatisfaction and body mass index (BMI) (Argyrides & Kkeli, 2015; Chávez-Hernández, Saucedo-Molina, Peña, & Unikel, 2015; López-Aguilar et al., 2010; Mancilla-Díaz et al., 2010; Saucedo-Molina & Unikel, 2010). Also, it has been reported that adolescents with large waist circumference most often declare to use slimming diets (Piotrowska, Broniecka, Biernat, Wyka, & Bronkowska, 2015). Additionally, binge eating and loss of control over eating (the experience of

being unable to control one's intake of any amount of food), has been associated with excess BMI and adiposity (Stojek et al., 2016; Tanofsky-Kraff et al., 2009).

Canada and Mexico are cultures immerse in the thinness Western culture (Grogan, 2008) in which attractiveness is associated to thinness, beauty, control, power and freedom, as well as with professional, social and even to sexual success (Español & De la Gándara, 2008; Gordon, Castro, Sitnikov, & Holm-Denoma, 2010; LeBlanc, 2014).

The literature has reported that Mexico (Gutiérrez et al., 2012; Olaiz et al., 2006) and Canada (LeBlanc, 2014; McVey, Tweed, & Blackmore, 2004), have increased the prevalence of ED and its symptomatology, mainly DEB (Grogan, 2008; McVey et al., 2004; Unikel-Santoncini et al., 2010), body thin-ideal internalization and body image dissatisfaction (Chaker, Chang, & Hakim-Larson, 2015; Chávez-Hernández et al., 2015; Saucedo-Molina & Unikel, 2010). From reviewing cross-cultural studies among different countries about these component symptoms of ED, we did not found any between Mexican and Canadian women.

Given this lack, the objectives of the current study were: (1) to examine and compare disordered eating behaviors, body thin-ideal internalization (BTHIN), and body image dissatisfaction (BID) in Mexican and Canadian university women; and (2) to identify and describe its relationship with body mass index (BMI) and waist circumference (WC). This study is exploratory rather than involving directional hypotheses.

Method

Participants

A cross-cultural descriptive and comparative field research was carried out in a sample of 129 women volunteers: 52% being Canadians from University of Moncton (UM) and 48% Mexicans from Universidad Autónoma del Estado de Hidalgo (UAEH), ages 18–25 ($M=20.18$, $SD=1.59$) all of them from Health Sciences Faculties/Schools and from urban zone.

Instruments

Brief Questionnaire for Risky Eating Behaviors (BQDEB) was developed and validated in Mexico in adolescents and young women (Unikel-Santoncini, Bojórquez-Chapela, & Carreño-García, 2004). It consists of 10 questions that are scored using a four-point Likert-type scale with four response options from 0 (*never or rarely*) to 3 (*very often/more than twice a week*). A cut-off score of >10 was used to identify women at risk for DEB. The questionnaire showed a high reliability (Cronbach $\alpha=0.83$) and the cut-off score obtained the best results for sensitivity of 0.81 and specificity of 0.78. The questionnaire assesses DEB such as binge eating/purging behaviors, restricting behaviors and compensatory behaviors over the past three months.

Attitudes Towards Body Figure Scale (ATBF) was used to measure the BTHIN. It was validated and developed on the basis of the experience with Mexican students and patients between the ages of 15 and 24 years old with ED (Unikel, Juárez, & Gómez, 2006), showing adequate values of internal consistency ($\alpha=0.93$). The scale consists of 15 items on

a four-point scale (1 = *never* to 4 = *very often*), with a cut-off score ≥ 37 , obtained a sensitivity of 0.80 and specificity of 0.80.

Body Image Dissatisfaction (BID) was measured by a visual scale for females with nine body images ranging from very thin to very obese, randomly ordered (Gómez, Granados, Jáuregui, Pineda, & Tafoya, 2000). The scale was showed at two points: the first time to select the current body shape and the second for selection of the ideal shape. Zero difference between the actual body shape and the ideal shape is classified as satisfaction; a positive difference indicates dissatisfaction in the sense of wanting to be thinner, and negative difference is classified as dissatisfaction in the sense of wanting to be stouter.

Body mass index (BMI) was calculated by weighing and measuring each subject. To classified participants, values recommended by the World Health Organization ([WHO], 2000) were used. The students were asked to come as early as possible, in fasting state and wearing clothes that were light as leggings, pants and shirts; they were asked to remove their shoes and any accessories that might affect their weight or height (cell phones, belts, keys, tiaras, comb, etc.).

Waist circumference (WC) is an index of the abdominal adiposity. It was measured at the end of a normal expiration to the nearest 0.1 cm at the mid-point between the last floating rib and the top of the iliac crest; the cut-off points for women proposed by the WHO (2000) were used.

Questionnaires were translated to French by a Canadian native; then they were reviewed by bilingual (French/Spanish) experts in the topics. The questionnaires achieved adequate values of internal consistence (BQDEB: $\alpha=0.71$; ATBF: $\alpha=0.94$) for the UM sample, as well as for UAH sample (BQDEB: $\alpha=0.73$; ATBF: $\alpha=0.95$). Finally, an exploratory factor analysis with a varimax rotation was carried out with the Canadian sample. After four iterations, BQDEB attained the same three factors than the Spanish version (Binge eating/purging behaviors, with $\alpha=0.68$; Compensatory behaviors, with $\alpha=0.89$; and Restricting behaviors, with $\alpha=0.75$), explaining 67.5% of the variance. With respect to the ATBF, the same two factors of the Spanish version (Internalization, with $\alpha=0.89$; and Beliefs, with $\alpha=0.91$) were obtained after three iterations; and 63.3% of the variance was explained.

Procedure

Participants completed the questionnaires in the classroom. In order to take the anthropometric measures and to ensure students' privacy, each participant chose in a pre-established schedule the day, time and specific classroom when she would be available to attend individually. Two female trained nutritionists took these measures. All participants signed a consent form. The project was approved by the Comité d'éthique de la recherche avec les êtres humains de la Faculté des études supérieures et de la recherche, Université de Moncton, Canada and by the Comité de Ética del Área Académica de Medicina and by the Comité de Investigación del Instituto de Ciencias de la Salud, UAH, México.

Table 1 Percentage distribution of body mass index and waist circumference by university: UAEH-Mexico vs. UM-Canada.

	UAEH (n = 62)	UM (n = 67)	Total (N = 129)
<i>Body mass index</i>			
Underweight	1.6%	3.0%	2.3%
Normal weight	40.3%	77.3%	59.4%
Overweight	43.5%	13.6%	28.1%
Obesity	14.5%	6.1%	10.2%
$\chi^2 = 20.05$, $df = 3$, $p < 0.001$			
<i>Waist circumference</i>			
Healthy waist circumference (<80 cm)	24.2%	86.6%	56.6%
Abdominal obesity (≥ 80 cm)	32.3%	4.5%	17.8%
Excess of abdominal obesity (≥ 88 cm)	43.5%	9.0%	25.6%
$\chi^2 = 51.14$, $df = 2$, $p < 0.001$			

Notes. UAEH = Universidad Autónoma del Estado de Hidalgo; UM = University of Moncton.

Statistical analysis

The software used was SPSS version 22 for Windows. For comparison between groups, Student *t* test and χ^2 were applied. Spearman's correlation coefficients were used to identify the relationship between DEB, BTHIN and the nutritional status indicators. A multivariate analysis of covariance (MANCOVA) was performed to find out what factors predicted DEB, BTHIN and BID. In these analyses, the regression model was adjusted, independently, by BMI and WC. A Bonferroni *post hoc* was used to account differences. In order to accomplish the risk analysis, odds ratio (OR) was performed with 2×2 contingency tables and statistical significance was determined by χ^2 analysis. The significant levels were set at $p \leq 0.05$.

Results

According to the cut-off score of the BQDEB (>10), in UAEH sample 17.7% reported risk to develop DEB versus 4.5% of UM sample, with statistically significant difference ($\chi^2 = 5.86$, $df = 1$, $p < 0.01$). Taking into account the cut-off score ≥ 37 of the ATBS, the percentage was very similar between the samples: 30.5% in UAEH women and 28.8% in UM women. Risk analysis by university identified only a significant association for risk to develop DEB. Specifically, UAEH students are at 4.6

times higher risk than UM students ($\chi^2 = 5.86$, $df = 1$, $p = 0.02$; 95% CI: 1.22–17.37).

Findings of BMI showed that UAEH participants reached a higher percentage of overweight and obesity than UM students with a statistically significant difference ($\chi^2 = 20.05$, $df = 3$, $p < 0.001$). With respect to WC, UAEH students achieved the highest percentage of abdominal obesity (32.3% and 43.5%, respectively) with statistically significant difference ($\chi^2 = 51.14$, $df = 2$, $p < 0.001$). These findings are displayed in Table 1.

Table 2 shows a very low percentage of UAEH students who are satisfied versus almost three times of the UM students who are satisfied. In both samples, dissatisfaction in the sense of wanting to be thinner was very similar (54.1% UAEH vs. 54.5% UM). However, it is interesting to comment that UAEH women with normal BMI are the most dissatisfied in the sense of wanting to be thinner; meanwhile, UM students with overweight and obesity reported the highest percentages of dissatisfaction in this sense. Other results that must be commented are the high percentage of UAEH participants with overweight and obesity who want to be stouter.

The correlations in both samples indicated that higher levels of DEB were related to higher levels of BTHIN. This latter variable and the anthropometric indicators showed modest but statistically significant correlations in both samples. In general, was observed that values in the UM students were higher than in UAEH students. Additionally,

Table 2 Percentage distribution of the dissatisfaction/satisfaction with body image by university (UAEH-Mexico vs. UM-Canada), and by body mass index.

University	Body image dissatisfaction	Body mass index				
		Under weight	Normal weight	Over weight	Obesity	Total
UAEH	To be robust	0.0%	8.0%	53.8%	44.4%	32.8%
	Satisfied	100%	20.0%	7.7%	0.0%	13.1%
	To be thinner	0.0%	72.0%	38.5%	55.6%	54.1%
UM	To be robust	0.0%	11.8%	0.0%	0.0%	9.1%
	Satisfied	100%	41.2%	11.1%	0.0%	36.4%
	To be thinner	0.0%	47.2%	88.9%	100%	54.5%

Notes. UAEH = Universidad Autónoma del Estado de Hidalgo; UM = University of Moncton.

Table 3 Correlations between disordered eating behaviors, body thin ideal internalization and anthropometric indicators by university: UAEH-Mexico vs. UM-Canada.

University		BMI	WC	DEB
UAEH (n = 62)	DEB	.26*	NS	
	BTHIN	.30**	.28*	.72**
	BMI		.74**	
UM (n = 67)	DEB	.49**	.43**	
	BTHIN	.32**	.30*	.67**
	BMI		.76**	

Notes. BMI=body mass index; BTHIN=body thin ideal internalization; DEB=disordered eating behaviors; NS=no significant; UAEH=Universidad Autónoma del Estado de Hidalgo; UM=University of Moncton; WC=waist circumference.

* $p < 0.05$.

** $p < 0.01$.

UM students reported a statistically significant association between DEB and WC. These results are showed in Table 3.

Risk analysis in the total sample by BMI identified that overweight/obesity subjects compared to under/normal weight participants were at 7.3 times higher risk to develop DEB ($X^2 = 10.8$, $df = 1$, $p = 0.001$; 95% CI: 1.93–27.85) and 3.4 times more likely to have BTHIN ($X^2 = 8.9$, $df = 1$, $p = 0.003$; 95% CI: 1.5–7.8). With respect to WC, women with abdominal obesity (≥ 80 cm and ≥ 88 cm) compared to healthy WC participants, have 3.8 times greater risk to develop DEB ($X^2 = 5.02$, $df = 1$, $p = 0.02$; 95% CI: 1.11–12.68) as well as 2.4 times more likely to have BTHIN ($X^2 = 4.58$, $df = 1$, $p = 0.03$; 95% CI: 1.07–5.4).

In order to compare the dependent variables (DEB, BTHIN, BID) a MANCOVA analysis was used adjusting by BMI or WC when comparing scores between universities. BMI explained both DEB ($F = 10.86$, $df = 1$, $p < 0.01$, $\eta^2 = 0.09$) and BTHIN ($F = 11.88$, $df = 1$, $p = 0.05$, $\eta^2 = 0.09$), meanwhile WC explicated the three dependent variables: DEB ($F = 5.35$, $df = 1$, $p < 0.05$, $\eta^2 = 0.04$); BTHIN ($F = 7.69$, $df = 1$, $p < 0.01$, $\eta^2 = 0.06$); and BID ($F = 4.03$, $df = 1$, $p < 0.05$, $\eta^2 = 0.03$). University of origin explained only BID in both situations. With respect to DEB, Bonferroni *post hoc* test with BMI categories, showed statistically significant differences only between normal weight and overweight subjects ($p < 0.01$). By university of origin, *t* Student test confirm a statistically significant difference in the BID ($F = 23.04$, $df = 126$, $p < 0.01$).

Discussion

This research includes the first exploratory study of ED variables comparing female Mexican and Canadian university students, providing a novel approach to the topic and the possibility to support the general rule that Western participants, regardless of their socioeconomic level, language and nationality, score high in ED symptomatology.

DEB was significantly greater in Mexican females probably because they suffer more body image discrimination (Kempa & Thomas, 2000) since they are a long way from the Caucasian model promoted by Western culture. Findings also suggest that UAEH students could be more vulnerable to the mainstream thin ideal by the globalization as Gómez and Acosta (2000) has proposed, and are under more

cultural pressure to conform to mainstream USA culture in which there is a strong emphasis on thinness (Ayala et al., 2007; Doris et al., 2015; Katsounari, 2009; Pepper & Ruiz, 2007) and accordingly they report more behaviors and attitudes concerning eating (Culbert et al., 2015).

The authors also suggest that this finding may be associated with the acculturative stress. According to Gowen, Hayward, Killen, Robinson, and Taylor (1999), acculturative stress occurs when an individual tries to fit into a culture that is different from their culture of origin, which can lead to maladaptive coping behaviors such unhealthy weight regulation. Previous studies have reported that higher levels of acculturative stress are associated with higher levels of eating disorder symptoms (Gordon et al., 2010; Perez, Voelz, Pettit, & Joiner, 2002; Reddy & Crowther, 2007). Kroon, Tartakovsky, Stachon, Pettit, and Perez (2014) studied the relationship between acculturative stress and ED symptoms among different ethnic groups, finding that acculturative stress significantly predicts bulimic symptoms in Latina women. Thus, future research must test these possibilities to clarify the nature of the relationships between acculturative stress and eating disorder symptoms among Mexican and Canadian women.

Both samples showed important BTHIN values. In the case of Mexican women, this is probably due to the attempt to achieve the ideal of a blonde, white girl, with long and full-bodied hair, who is tall, thin and perfect, in order to be beautiful and successful (Gordon et al., 2010; Von Ranso & Wallace, 2014), whereas in Canadians, the reason is merely to maintain this ideal figure. Given these findings, we propose that the culture change/acculturation promoted by globalization (Doris et al., 2015) has extended this ideal model even in developing countries such as Mexico (Littlewood, 1995), although this is difficult to achieve among the Mexican population.

Dissatisfaction in the sense of wanting to be thinner was very similar in both samples. This data supports the idea that cultural pressures on physical appearance and body image, impact young females worldwide as a result of globalized culture in all social and racial contexts (Gómez-Peresmitré & Acosta, 2002; Soh et al., 2006). Only 36.4% of UM women and 13.1% of UAEH women were satisfied with their body image, although 77.3% and 40.3% of respondents, reported normal weight. This finding is similar to other studies in which Hispanic, Latina and Mexican American females reported higher levels of dissatisfaction compared with White females (Chamorro & Flores-Ortiz, 2000; Gómez & Acosta, 2000; Gordon et al., 2010; Grogan, 2008).

In the UAEH sample, the percentages of dissatisfaction in the sense of wanting to be stouter were unexpected. A total of 53.8% of overweight and 44.4% of obese respondents want to be stouter. These data suggest that Mexican women may respond in this way to counter the negative effects of the weight stigma, defined as negative attitudes and beliefs directed toward individuals with overweight or obesity usually expressed through stereotypes, prejudicial attitudes, and discriminatory behaviors. If they admit that their body appearance is undesirable and unacceptable (overweight/obesity), they would be internalizing feelings of shame and inferiority together with negative qualities (e.g. laziness, lack of intelligence and self-discipline) (Puhl & Heuer, 2009). Moreover, available evidence indicates that

once weight stigma is internalized stronger associations emerge with psychological correlates such as non-adherence with medication, problems of self-esteem, perceived stress, antisocial behavior, substance use and poor exercise behavior (Papadopoulos & Brennan, 2015).

It should be noted that both samples are drawn from Health Sciences Faculties/Schools. These students often have to meet all kinds of family demands together with intellectual, work and physical prototypes that have been associated with ED or their symptomatology (McVey et al., 2004) regardless of ethnicity, race, socioeconomic level or nationality, and particularly in women (Chaker et al., 2015; Gupta et al., 2001; LeBlanc, 2014). It has been identified that schools may be stressful environments that contribute to the emergence of ED or their symptomatology (Levine, Smolak, Moodey, Shuman, & Hessen, 1994). It has also been proposed that students are more exposed to media messages that influence their eating behaviors and beliefs (Barriguete-Meléndez et al., 2009). Another explanation may be associated with the consequences of the weight stigma (Papadopoulos & Brennan, 2015; Puhl & Heuer, 2009). All these could explain the high female percentages with normal BMI who reported high levels of BID.

We confirmed a higher risk of developing DEB and BTHIN in overweight/obese subjects (7.3-times higher risk to develop DEB and 3.4-times more likely to have BTHIN). While higher levels of DEB and BTHIN significantly correlated with BMI, higher levels of BTHIN correlated with higher DEB. These results are in line with existing research on nonclinical (Argyrides & Kkeli, 2015; Chávez-Hernández et al., 2015; López-Aguilar et al., 2010; Saucedo-Molina & Unikel, 2010), and clinical populations (Podar & Allik, 2009), which found the same associations.

Agreeing with other research (Piotrowska et al., 2015; Stojek et al., 2016; Tanofsky-Kraff et al., 2009), our findings confirm that large waist circumference as measure of abdominal adiposity is associated at higher risk of DEB and BTHIN. In addition, WC explained BID in both samples.

The current study has limitations. First, the cross-sectional study design means that causal relationships cannot be established. Second, the findings cannot be generalized because the study was not carried out with probabilistic samples from each country. Third, we did not use a specific instrument to evaluate either acculturation or acculturative stress. However, we know that both countries belong to Western societies and share a common experience, a colonial history and border with one of the most powerful countries in the world, the United States of America (USA), which has frequently been cited as having one of the highest prevalences of ED and its symptomatology (Smink, van Hoeken, & Hoek, 2012). The equivalence of translations and the adaptation to the original instruments was modestly tested. However, we should point out that this study represents our first incursion of Canadian female students, meaning that, there are no more psychometric data on regarding this population. Stemming from these findings, we suggest several directions for future research.

There are a number of clinical implications. Canadian women tended to have a less distorted perception of their "level of fatness" than Mexican women. Although Canadian and Mexican students may be equally predisposed to BTHIN, the factors that trigger DEB and BID that culminates in a

clinical eating disorder may be different between the samples from the two countries. In light of these findings, it is clear that women from at least two different ethnic groups are vulnerable to the development of ED symptomatology. Clinicians should be sensitive to, and assess for, cultural variables that may put ethnic and racial minority women at particular risk for eating disorders and as Gordon et al. (2010) have proposed, "it may be beneficial to use interventions that couple standard psychoeducation about the health risks of internalizing the overly thin ideal with discussions about the potential value of maintaining some values of one's culture of origin" (p. 142). Although it is impossible to reach firm conclusions about the relevance of these findings prevention programs and therapy for ED and its symptomatology should take these cross-cultural differences into account.

Ethical disclosures

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this study.

Confidentiality of data. The authors declare that no patient data appear in this article.

Right to privacy and informed consent. The authors have obtained the written informed consent of the patients or subjects mentioned in the article. The corresponding author is in possession of this document.

Sponsors

Jessica Zaragoza Cortes was a Master's student grant holder by the Consejo Nacional de Ciencia y Tecnología (CONACYT, México) and beneficiary of the program "Stays abroad". The research stay of PhD. Saucedo-Molina in the University of Moncton was carried out thanks to the resources provided by Consorcio de Universidades Mexicanas (CUMEX).

Conflict of interest

The authors declare no conflict of interest.

Acknowledgements

To Amanda Peña Irecta (RIP) for her professional collaboration in data collection. We express our gratitude to all participants in this research.

References

- Acosta, M. V., & Gómez, G. (2003). *Insatisfacción corporal y seguimiento de dieta: una comparación transcultural entre adolescentes de España y México*. *International Journal of Clinical and Health Psychology*, 3(1), 9–21.
- Acosta, M. V., Llopis, J. M., Gómez, G., & Pineda, G. (2005). *Evaluación de la conducta alimentaria de riesgo: Estudio transcultural entre adolescentes de España y México*. *International Journal of Psychiatry and Psychology Therapy*, 5(3), 223–232.

- Argyrides, M., & Kkeli, N. (2015). Predictive factors of disordered eating and body image satisfaction in Cyprus. *International Journal of Eating Disorders*, 48(4), 431–435. <http://dx.doi.org/10.1002/eat.22310>
- Ayala, G. X., Mickens, L., Galindo, P., & Elder, J. P. (2007). Acculturation and body image perception among Latino youth. *Ethnicity and Health*, 12(1), 21–41. <http://dx.doi.org/10.1080/13557850600824294>
- Barriguete-Meléndez, J. A., Unikel-Santoncini, C., Aguilar-Salinas, C., Córdoba-Villalobos, J. A., Shamah, T., Barquera, S., et al. (2009). Prevalence of abnormal eating behaviors in adolescents in Mexico (Mexican National Health and Nutrition Survey 2006). *Salud Pública de México*, 5(4), 638–644. <http://dx.doi.org/10.1590/S0036-36342009001000019>
- Chaker, Z., Chang, F. M., & Hakim-Larson, J. (2015). Body satisfaction, thin-ideal internalization, and perceived pressure to be thin among Canadian women: The role of acculturation and religiosity. *Body Image*, 14, 85–93. <http://dx.doi.org/10.1016/j.bodyim.2015.04.003>
- Chamorro, E., & Flores-Ortiz, Y. (2000). Acculturation and disordered eating patterns among Mexican American women. *International Journal of Eating Disorders*, 28(1), 125–129. [http://dx.doi.org/10.1002/\(SICI\)1098-108X\(200007\)28:1<125::AID-EAT16>3.0.CO;2-9](http://dx.doi.org/10.1002/(SICI)1098-108X(200007)28:1<125::AID-EAT16>3.0.CO;2-9)
- Chávez-Hernández, I. M., Saucedo-Molina, T. J., Peña, A., & Unikel, C. (2015). Eating disorders associated risk factors: Trends from 2007–2010. *Revista de Investigación Clínica*, 67(1), 54–63.
- Culbert, K. M., Racine, S. E., & Klump, K. L. (2015). Research review: What we have learned about the causes of eating disorders – A synthesis of sociocultural, psychological, and biological research. *Journal of Child Psychology and Psychiatry*, 56(11), 1141–1164. <http://dx.doi.org/10.1111/jcpp.12441>
- Doris, E., Shekrladze, I., Javakhishvili, N., Jones, R., Treasure, J., & Tchanturia, K. (2015). Is cultural change associated with eating disorders? A systematic review of the literature. *Eating and Weight Disorders*, 20(2), 149–160. <http://dx.doi.org/10.1007/s40519-015-0189-9>
- Español, N., & De la Gándara, J. J. (2008). Trastornos de la conducta alimentaria: Una visión transcultural en la postmodernidad. *Cuadernos de Medicina Psicosomática y Psiquiatría de Enlace*, 86, 29–36.
- Garner, D. M., Olmsted, M. P., & Polivy, J. (1983). Development and validation of a multidimensional eating disorder inventory for anorexia nervosa and bulimia. *International Journal of Eating Disorders*, 2(2), 15–34. [http://dx.doi.org/10.1002/1098-108X\(198321\)2:2<15::AID-EAT2260020203>3.0.CO;2-6](http://dx.doi.org/10.1002/1098-108X(198321)2:2<15::AID-EAT2260020203>3.0.CO;2-6)
- Gómez, G., & Acosta, M. V. (2000). Imagen corporal como factor de riesgo en los trastornos de la alimentación: Una comparación transcultural entre México y España. *Clínica y Salud*, 11(1), 35–58.
- Gómez, G., Granados, A., Jáuregui, J., Pineda, G., & Tafoya, S. A. (2000). Un instrumento para medir imagen corporal: Versión computarizada y de papel y lápiz. *Revista Mexicana de Psicología*, 17(1), 89–99.
- Gómez-Peresmitré, G., & Acosta, M. V. (2002). Valoración de la delgadez: Un estudio transcultural México/España. *Psicothema*, 14(2), 221–226.
- Gómez-Peresmitré, G., Acosta, V., Gorischnik, R., Cuevas, C., Pineda, G., Platas, R. S., et al. (2013). Un estudio preliminar de los factores predictores de la conducta de atracón en tres culturas: México, Argentina y España. *Revista Mexicana de Trastornos Alimentarios*, 4(2), 68–78.
- Gordon, K. H., Castro, Y., Sitnikov, L., & Holm-Denoma, J. M. (2010). Cultural body shape ideals and eating disorder symptoms among White Latina, and Black college women. *Cultural Diversity and Ethnic Minority Psychology*, 16(2), 135–143. <http://dx.doi.org/10.1037/a0018671>
- Gowen, L. K., Hayward, C., Killen, J. D., Robinson, T. N., & Taylor, C. B. (1999). Acculturation and eating disorder symptoms in adolescent girls. *Journal of Research on Adolescence*, 9(1), 67–83.
- Grogan, S. (2008). Age, social class, ethnicity and sexuality. In S. Grogan (Ed.), *Body image: Understanding body dissatisfaction in men, women, and children* (pp. 136–190). New York: Routledge.
- Gupta, M. A., Chaturvedi, S. K., Chandarana, P. C., & Johnson, A. M. (2001). Weight-related body image concerns among 18–24-year-old women in Canada and India: An empirical comparative study. *Journal of Psychosomatic Research*, 50(4), 193–198. [http://dx.doi.org/10.1016/S0022-3999\(00\)00221-X](http://dx.doi.org/10.1016/S0022-3999(00)00221-X)
- Gutiérrez, J. P., Rivera-Dommarco, J., Shamah-Levy, T., Villalpando-Hernández, S., Franco, A., Cuevas-Nasu, L., et al. (2012). *Encuesta Nacional de Salud y Nutrición 2012: Resultados nacionales*. Cuernavaca, México: Instituto Nacional de Salud Pública. Available from: <http://ensanut.insp.mx/informes/ENSANUT2012ResultadosNacionales.pdf>
- Katsounari, I. (2009). Self-esteem, depression, and eating disordered attitudes: A cross-cultural comparison between Cypriot and British young women. *European Eating Disorders Review*, 17, 455–461. <http://dx.doi.org/10.1002/erv.946>
- Katzman, A. M., & Lee, S. (1997). Beyond body image: The integration of feminist and transcultural theories in the understanding of self starvation. *International Journal of Eating Disorders*, 22(4), 385–394. [http://dx.doi.org/10.1002/\(SICI\)1098-108X\(199712\)22:4<385::AID-EAT3>3.0.CO;2-I](http://dx.doi.org/10.1002/(SICI)1098-108X(199712)22:4<385::AID-EAT3>3.0.CO;2-I)
- Kempa, M. L., & Thomas, A. J. (2000). Culturally sensitive assessment and treatment of eating disorders. *Eating Disorders*, 8(1), 17–30. <http://dx.doi.org/10.1080/10640260008251209>
- Klump, K. L., Bulik, C. M., Kaye, W. H., Treasure, J., & Tyson, E. (2009). Academy for Eating Disorders position paper: Eating disorders are serious mental illnesses. *International Journal of Eating Disorders*, 42(2), 97–103. <http://dx.doi.org/10.1002/eat.20589>
- Kroon, A. M., Tartakovsky, M., Stachon, C., Pettit, J. W., & Perez, M. (2014). The relationship between acculturative stress and eating disorder symptoms: Is it unique from general life stress? *Journal of Behavioral Medicine*, 37(3), 445–457. <http://dx.doi.org/10.1007/s10865-013-9498-5>
- LeBlanc, H. (2014). *Eating disorders among girls and women in Canada: Report of the standing committee on the status of women*. 41st Parliament (Second Session). Canada: House of Commons. Available from: <https://medic.ca/sites/default/files/Status%20of%20Women%20Report%20Eating%20Disorders.pdf>
- Levine, M. P., Smolak, L., Moodey, A. F., Shuman, M. D., & Hesse, L. D. (1994). Normative developmental challenges and dieting and eating disturbances in middle school girls. *International Journal of Eating Disorders*, 15(1), 11–20. [http://dx.doi.org/10.1002/1098-108X\(199401\)15:1<11::AID-EAT2260150103>3.0.CO;2-Q](http://dx.doi.org/10.1002/1098-108X(199401)15:1<11::AID-EAT2260150103>3.0.CO;2-Q)
- Littlewood, R. (1995). Psychopathology and personal agency: Modernity, culture change and eating disorders in South Asian societies. *British Journal of Medical Psychology*, 68, 45–63.
- López-Aguilar, X., Mancilla-Díaz, J. M., Vázquez-Arévalo, R., Ocampo, M. T., Franco-Paredes, K., & Alvarez-Rayón, G. L. (2010). Factores predictores del atracón alimentario en una muestra comunitaria de mujeres mexicanas. *Journal of Behavior Health and Social Issues*, 2(1), 25–38. <http://dx.doi.org/10.5460/jbhsi.v2.i1.04>
- Mancilla-Díaz, J. M., Lameiras-Fernández, M., Vázquez-Arévalo, R., Alvarez-Rayón, G., Franco-Paredes, K., López-Aguilar, X., et al. (2010). Influencias socioculturales y conductas alimentarias no saludables en hombres y mujeres de España y México. *Revista Mexicana de Trastornos Alimentarios*, 1(1), 36–47.

- Marin, G. (1992). Issues in the measurement of acculturation among Hispanics. In K. F. Geisinger (Ed.), *Psychological testing of Hispanics* (pp. 235–251). Washington, DC: American Psychological Association.
- Mautner, R. D., Owen, S. V., & Furnham, A. (2000). Cross-cultural explanations of body image disturbance in Western cultural samples. *International Journal of Eating Disorders*, 28(2), 165–172. [http://dx.doi.org/10.1002/1098-108X\(200009\)28:2<165::AID-EAT5>3.0.CO;2-G](http://dx.doi.org/10.1002/1098-108X(200009)28:2<165::AID-EAT5>3.0.CO;2-G)
- McVey, G., Tweed, S., & Blackmore, E. (2004). Dieting among pre-adolescents and young adolescents females. *Canadian Medical Association Journal*, 170(10), 1559–1561. <http://dx.doi.org/10.1503/cmaj.1031247>
- Olaiz, G., Rivera, J., Shamah, T., Rojas, R., Villalpando, S., Hernández, M., et al. (2006). *Encuesta Nacional de Salud y Nutrición 2006*. Cuernavaca, México: Instituto Nacional de Salud Pública. Available from: https://www.insp.mx/images/stories/Produccion/pdf/100722_cp3.pdf
- Papadopoulos, S., & Brennan, L. (2015). Correlates of weight stigma in adults with overweight and obesity: A systematic literature review. *Obesity*, 23(9), 1743–1760. <http://dx.doi.org/10.1002/oby.21187>
- Pepper, A. C., & Ruiz, S. Y. (2007). Acculturation's influence on antifat attitudes, body image, and eating behaviors. *Eating Disorders*, 15(5), 427–447. <http://dx.doi.org/10.1080/10640260701667912>
- Perez, M., Voelz, Z. R., Pettit, J. W., & Joiner, T. E. (2002). The role of acculturative stress and body dissatisfaction in predicting bulimic symptomatology across ethnic groups. *International Journal of Eating Disorders*, 31(4), 442–454. <http://dx.doi.org/10.1002/eat.10006>
- Piotrowska, E., Broniecka, A., Biernat, J., Wyka, J., & Bronkowska, M. (2015). Influence of non-dietary factors on the prevalence of abdominal obesity as a major component of the metabolic syndrome among 17-18-year-old youth. *Roczniki Panstwowego Zakladu Higieny's*, 66(1), 85–92.
- Podar, I., & Allik, J. (2009). A cross-cultural comparison of the Eating Disorder Inventory. *International Journal of Eating Disorders*, 42(4), 346–355. <http://dx.doi.org/10.1002/eat.20616>
- Puhl, R. M., & Heuer, C. A. (2009). The stigma of obesity: A review and update. *Obesity*, 17(5), 941–964. <http://dx.doi.org/10.1038/oby.2008.636>
- Rathner, G., Túry, F., Szabó, P., Geyer, M., Rumfold, G., Forgács, A., et al. (1995). Prevalence of eating disorders and minor psychiatric morbidity in Central Europe before the political changes in 1989: A cross-cultural study. *Psychological Medicine*, 25(5), 1027–1035. <http://dx.doi.org/10.1017/S0033291700037521>
- Reddy, S. D., & Crowther, J. H. (2007). Teasing, acculturation, and cultural conflict: Psychosocial correlates of body image and eating attitudes among South Asian women. *Cultural Diversity & Ethnic Minority Psychology*, 13(1), 45–53. <http://dx.doi.org/10.1037/1099-9809.13.1.45>
- Saucedo-Molina, T. J., & Unikel, C. (2010). 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 Mental*, 33(1), 11–19.
- Smink, F. R. E., van Hoeken, D., & Hoek, H. W. (2012). Epidemiology of eating disorders: Incidence, prevalence and mortality rates. *Current Psychiatry Reports*, 14(4), 406–414. <http://dx.doi.org/10.1007/s11920-012-0282-y>
- Soh, N. L., Touyz, S. W., & Surgenor, L. J. (2006). Eating and body image disturbances across cultures: A review. *European Eating Disorders Review*, 14(1), 54–65. <http://dx.doi.org/10.1002/erv.678>
- Stojek, M. M. K., Tanofsky-Kraff, M., Shomaker, L. B., Kelly, N. R., Thompson, K. A., Mehari, R. D., et al. (2016). Associations of adolescent emotional and loss of control eating with 1-year changes in disordered eating, weight, and adiposity. *International Journal of Eating Disorders*, <http://dx.doi.org/10.1002/eat.22636> (e-pub)
- Tanofsky-Kraff, M., Yanovski, S. Z., Schvey, N. A., Olsen, C. H., Gustafson, J., & Yanovski, J. A. (2009). A prospective study of loss of control eating for body weight gain in children at high risk for adult obesity. *International Journal of Eating Disorders*, 42(1), 26–30. <http://dx.doi.org/10.1002/eat.20580>
- Unikel, C., Juárez, F., & Gómez, G. (2006). Psychometric properties of the Attitudes Towards Body Figure questionnaire in Mexican female students and patients with eating disorders. *European Eating Disorders Review*, 14(6), 430–435. <http://dx.doi.org/10.1002/erv.757>
- Unikel-Santoncini, C., Bojórquez-Chapela, I., & Carreño-García, S. (2004). Validación de un cuestionario breve para medir conductas alimentarias de riesgo. *Salud Pública de México*, 46(6), 509–515.
- Unikel-Santoncini, C., Nuño-Gutiérrez, B., Celis-de la Rosa, A., Saucedo-Molina, T. J., Trujillo, E. M., García-Castro, F., et al. (2010). Conductas alimentarias de riesgo: Prevalencia en estudiantes mexicanas de 15 a 19 años. *Revista de Investigación Clínica*, 62(5), 424–432.
- Vandereycken, W. (2002). History of anorexia nervosa and bulimia nervosa. In C. G. Fairburn, & K. D. Brownell (Eds.), *Eating disorders and obesity: A comprehensive handbook* (pp. 151–154). New York: Guilford Press.
- Von Ranson, K. M., & Wallace, L. M. (2014). Eating disorders. In E. J. Mash, & R. A. Barkley (Eds.), *Child psychopathology* (pp. 801–843). New York: Guilford Press.
- Wildes, J. E., Emery, R. E., & Simons, A. D. (2001). The roles of ethnicity and culture in the development of eating disturbance and body dissatisfaction: A meta-analytic review. *Clinical Psychology Review*, 21(4), 521–551. [http://dx.doi.org/10.1016/S0272-7358\(99\)00071-9](http://dx.doi.org/10.1016/S0272-7358(99)00071-9)
- World Health Organization. (2000). *Obesity: Preventing and managing the global epidemic. Report of a WHO Consultation (WHO Technical Report Series, 894)*. Geneva. Available from: <http://apps.who.int/iris/handle/10665/42330>