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RESEARCH

Factors that determine intuitive eating and mindful eating in university students

Factores que determinan el comer intuitivo y la alimentación consciente en estudiantes universitarios

Fatores que determinam a alimentação intuitiva e a alimentação consciente em estudantes universitários

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Resumen

Introducción: Las facetas del estigma -experimentado, internalizado, conciencia del estigma y anticipado- pueden modificar las conductas de alimentación adaptativas -comer intuitivo y alimentación consciente-. **Objetivos:** Verificar si las facetas del estigma, conductas adaptativas de alimentación, índice de masa corporal y percepción del peso corporal son diferentes de acuerdo al sexo; verificar la relación entre las facetas del estigma y conductas adaptativas de alimentación con el índice de masa corporal y percepción del peso corporal; e identificar factores que explican las conductas adaptativas de alimentación. **Metodología:** Estudio correlacional, predictivo, transversal. Participaron 782 estudiantes universitarios en edades de 18 a 25 años, inscritos en el período 2023-2024. Se aplicó una encuesta con diversos cuestionarios y se realizaron mediciones antropométricas, los participantes otorgaron el consentimiento informado. Se utilizó estadística

descriptiva e inferencial. **Resultados:** 67.6 % fueron del sexo femenino. Se encontraron diferencias significativas entre consciencia del estigma, estigma anticipado, alimentación consciente y percepción del peso corporal de acuerdo al sexo. Estigma experimentado, internalizado, anticipado y percepción del peso corporal explicaron la conducta comer intuitivo R2= 0.122, p< 0.001. Estigma internalizado, anticipado y sexo explicaron la conducta alimentación consciente R2= 0.143, p< 0.001. **Conclusiones:** Las facetas del estigma, conductas de alimentación adaptativas y percepción del peso corporal fueron diferentes de acuerdo con el sexo, tienen relación y explican las conductas de alimentación adaptativas. Se recomiendan intervenciones para disminuir el estigma del peso, promover una percepción del peso corporal adecuada y conductas de alimentación adaptativas.

Palabras clave: Conducta alimentaria; Alimentación intuitiva; Comer con atención plena; Prejuicio de peso (DeCS).

Abstract

Introduction: The **s**tigma facets, that is, experienced, internalized, stigma awareness, and anticipation, can change adaptive eating behaviors such as intuitive eating and mindful eating. **Objective:** Verify if the stigma facets, adaptive eating behaviors, body mass index and body weight perception are different according to gender; verify the relationship between stigma facets and adaptive eating behaviors with body mass index and body weight perception; identify factors that explain adaptive eating behaviors. **Methodology:** Correlational, predictive, cross-sectional study. 782 university students between the ages of 18 and 25 participated, enrolled in the period 2023-2024. A survey was applied with various questionnaires and anthropometric measurements were carried out. Descriptive and inferential statistics were used. Approval of Ethics Committee No.19-CEI-004-20180614. **Results:** 67.6% of participants were female. Significant differences were found between stigma awareness, anticipated stigma, mindful eating and body weight perception according to gender. A correlation was identified between stigma facets and adaptive eating behaviors. Experienced stigma, internalized, anticipated stigma and body weight perception explain intuitive eating behavior R2= 0.122, p< 0.001. Internalized, anticipated stigma and gender explain mindful eating behavior R2= 0.143, p< 0.001. **Conclusion:** The stigma facets, adaptive eating behaviors and body weight perception were different according to gender; they are related and explain adaptive eating behaviors. Interventions are recommended to reduce weight stigma, promote accuracy weight perception, and adaptive eating behaviors.

Key words: Feeding behavior; Intuitive eating; Mindful eating; Weight prejudice (DeCS).

Abstrato

Introdução: As facetas do estigma, ou seja, a experiência, a internalização, a consciência do estigma e a antecipação, podem mudar os comportamentos alimentares adaptativos, como a alimentação intuitiva e a alimentação consciente. **Objetivo:** Verificar se as facetas do estigma, comportamentos alimentares adaptativos, índice de massa corporal e percepção do peso corporal são diferentes conforme o sexo; verificar a relação entre as facetas do estigma e os comportamentos alimentares adaptativos com o índice de massa corporal e a percepção do peso corporal; identificar fatores que explicam os comportamentos alimentares adaptativos.

Metodologia: Estudo correlacional, preditivo, transversal. Participaram 782 estudantes universitários com idades entre 18 e 25 anos, matriculados no período 2023-2024. Foi aplicado um levantamento com diversos questionários e realizadas medidas antropométricas. Foram utilizadas estatísticas descritivas e inferenciais. Aprovação do Comitê de Ética nº 19-CEI-004-20180614. **Resultados:** 67,6% dos participantes do sexo feminino. Encontraram-se diferenças significativas entre consciência do estigma, estigma antecipado, alimentação consciente e percepção do peso corporal de acordo com o sexo. A correlação entre facetas do estigma e comportamentos alimentares adaptativos foi encontrada. Estigma experimentado, internalizado, antecipado e percepção do peso corporal explicam a alimentação intuitiva $R2 = 0,122$, $p< 0,001$. Estigma internalizado, antecipado e sexo explicam alimentação consciente $R2 = 0,143$, $p< 0,001$. **Conclusões:** As facetas do estigma, comportamentos alimentares adaptativos e percepção do peso corporal são diferentes conforme o sexo, estão relacionados e explicam os comportamentos alimentares adaptativos. Intervenções são recomendadas para diminuir o estigma do peso, promover a percepção adequada do peso corporal e comportamentos alimentares adaptativos.

Palavras-chave: Comportamento alimentar; Comer intuitivo; Comer com Atenção Plena; Preconceito de peso (DeCS).

Introduction

It is estimated that approximately 56 % of adults with overweight and obesity (OW-OB) have experienced weight stigma [(1)], and between 20 % and 45 % of women and 6 % to 28 % of men have been stigmatized because of their body weight in the United States [(2)]. In Mexico there are no reports on weight stigma; however, the National Survey on Discrimination (ENADIS, 2022) pointed out an increase in weight discrimination which is a behavior related to stigma, which in 2017 it was presented as 27.5 % but in 2022 it increased to 29.1 % [(3)].

Weight stigma is defined as the social devaluation due to body weight [(4)]. It can present itself in different forms, such as: a) experienced stigma, i.e. the experience of stigmatizing situations on a daily basis; additionally, b) internalized stigma occurs when the person internalizes and accepts the assigned devaluation which generates an awareness of stigma by knowing being stigmatized that leads to, c) to anticipated stigma that corresponds to the growing expectation of being stigmatized [(5)]. It has been identified that weight stigma can modify eating behaviors that limit or prevent the

adoption of healthy habits [6,7]. In addition, stigma occurs more frequently in women [8], in people with higher body mass index (BMI) [7] and in people who overestimate their body weight [9].

Moreover, among feeding behaviors are adaptive behaviors, such as intuitive eating, i.e. the ability to determine what, when and how much to eat, by identifying hunger and satiety signals; another adaptive behavior is mindful eating, which corresponds to paying attention to the moment of eating to develop awareness of the body's sensory and emotional responses to food [10-12]. Likewise, it has been documented that intuitive eating is related to experienced [13,14] and internalized stigma [15,16] and with respect to anticipated stigma no studies were identified that have analyzed these two variables.

Intuitive eating is related to personal characteristics such as gender, for instance, women have lower scores compared to men in Caucasian population [17]; also people with lower BMI have a higher intuitive eating score [18] and it has been pointed out that self-perception of body weight (BWP) could influence eating behaviors; however, no studies were located that addressed the effect of BWP on intuitive eating.

Moreover, it has been documented that mindful eating is different according to gender since women develop mechanisms of acceptance and attention to the present moment [19]; in contrast, a systematic review points out contradictory evidence on the relationship between mindful eating and BMI [20]; regarding BWP, no studies were identified that addressed its relationship with mindful eating.

Likewise, scientific evidence regarding the relationship between facets of weight stigma, particularly anticipated stigma and stigma awareness, as well as adaptive eating behaviors (intuitive eating and mindful eating) is still scarce; therefore, it is considered that studying these variables generates knowledge that would allow the nursing professional to consider these variables in the

care of people with weight stigma to influence the acquisition of adaptive behaviors that contribute to health.

In accordance with that mentioned, the present study was conducted with the following objectives: 1) Verify if the facets of stigma (experienced, internalized, stigma awareness and anticipated stigma), adaptive behaviors (intuitive eating and mindful eating), BMI and BWP are different according to gender, and 2) Verify if there is a relationship between the facets of stigma (experienced, internalized, stigma awareness and anticipated stigma) and adaptive behaviors (intuitive eating and mindful eating) with BMI and BWP, 3) Identify the factors that explain adaptive eating behaviors (intuitive eating and mindful eating).

Methodology

Correlational, predictive, cross-sectional study. The study population was 7,222 university students in the health area of a public university located in Mexico City. The sample was determined in G*Power, confidence level 95 %, power 90, design effect 0.4, for multiple regression models with which a sample of 782 participants was reached. Sampling was applied through time, that is, students enrolled in the period from August 2023 to June 2024 between 18 and 25 years of age were invited to participate. Participants who reported a diagnosis of hyper- or hypothyroidism, depression and pregnancy were excluded, and incomplete questionnaires were eliminated.

A survey that contained the following was applied: a) Weight Perceived Stigma Questionnaire, validated to Spanish [21] with 10 questions with dichotomous response (Yes= 1 and No= 0), a high score indicates greater stigma experienced; reliability in this study of α= 0. 803, b) Modified Stigma Internalization Scale with 11 questions, Likert-type response, items 1 and 9 have inverse scores, high scores indicate greater internalization of stigma, validated to Spanish [22] obtained a reliability of α= 0.903, c) Weight Self Stigma Questionnaire with 12 Likert-type response questions, a higher score indicates greater anticipated stigma, validated to Spanish [23], reliability in the present study

of α= 0. 916, d) Stigma Awareness Questionnaire with 10 Likert-type response questions, items 1, 2, 4, 5, 6, 7, and 9 have reverse scoring, a higher score indicates higher level of stigma awareness, validated to Spanish [24] and obtained reliability α= 0. 782, e) Confidence in Hunger and Satiety Signals Scale with 7 items with Likert-type response, a higher score indicates greater intuitive eating, validated to Spanish [25] with reliability in this study of α= 0. 883, f) Mindful Eating Questionnaire with 28 questions with Likert-type answers, high scores indicate greater mindful eating, validated in Spanish [26] obtaining reliability α= 0.800, g) The perception of body weight was evaluated with the figures of Stunkard and Sørense [27], it has nine silhouettes according to BMI, 1 underweight; 2 to 5 normal weight; 6 and 7 Overweight (O), 8 and 9 Obesity (OB), test-retest reliability (r= 0.74).

Furthermore, sociodemographic information was requested and anthropometric measurements of weight and height were taken to estimate the BMI, classified according to the WHO as: underweight: BMI< 18.5, 2 kg/m^2, normal weight BMI 18.5-24.9 kg/m^2, overweight: BMI 25-29.9 kg/m^2 and obesity BMI> 30 kg/m^2. The project was approved by the ethics committee registered with the National Bioethics Commission No.19-CEI-004-20180614.

For information acquisition, modules were installed at the campus entrances. Upon arrival of the students, they were invited to participate; the objectives of the study and the procedures to be performed were explained; it was ensured that participation was voluntary, clarifying that if they did not wish to participate this would not affect their relationship with the academic personnel or with the educational institution. If they met the inclusion criteria, informed consent was requested and then the survey was handed out. Anthropometric measurements were taken in a private space, weight was measured with the SECA 813 scale and height with the SECA 213 stadiometer; the measurements were taken by nursing personnel.

Statistical analysis was performed with the Statistical Package for the Social Sciences (SPSS) v25, using descriptive statistics, frequencies and percentages, measures of central tendency and dispersion. The normality of the variables was verified by means of the Kolmogorov-Smirnov test with Lilliefors correction, mean difference test, correlation and multiple regression model with extraction method were performed. For model 1, the following variables were included: facets of stigma (experienced, internalized, awareness of stigma and anticipated stigma), BMI, BWP and gender; model 2 was with the variables that showed significance in the initial model. Bootstrap was used with 2000 repetitions and 95 % confidence interval.

Results

The mean age of the participants was 20.1 years (SD = 1.9), 67.6 % were female, 32.2 % belonged to the nursing career, 63.7 % were without OW-OB and 84.9 % were perceived without OW-OB, (Table 1).

Table 1. Distribution of participants by race, nutritional condition and body weight perception according to gender and general population, 2024 (n = 782)

Variable	Man		Woman		General	
	n	%	n	%	n	%
Career						
Nursing	77	30.4	175	33.0	252	32.2
Medicine	48	19.0	92	17.4	140	17.9
Nutrition	24	9.5	39	7.4	63	8.1
Psychology	68	26.9	150	28.4	218	27.9
Dentistry	36	14.2	73	13.8	109	13.9
Nutritional condition						
Without OW-OB	149	58.9	349	66.0	498	63.7
With OW-OB	104	41.1	180	34.0	284	36.3
Body weight perception						
Without OW-OB	196	77.5	468	88.5	664	84.9
With OW-OB	57	22.5	61	11.5	118	15.1
	M	SD	M	SD	M	SD
Height (m)	1.72	0.07	1.59	0.06	1.63	0.09
Weight (kg)	73.0	14.0	61.0	11.2	64.9	13.4
BMI (kg/m2)	24.5	4.0	24.1	4.2	24.2	4.1
BWP	4.3	1.4	4.07	1.2	4.1	1.3

Source: Own-development. Note: OW-OB = overweight and obesity, M = mean, SD = standard deviation, m = meters, kg = kilograms, BMI = Body Mass Index, BWP = Body Weight Perception

Table 2 shows the results of the t-test for difference of means according to gender; to verify objective 1, a significant statistical difference was found between gender and anticipated stigma t= -2.210, p= 0.027, stigma awareness t= -3.143, p= 0.002, mindful eating t= 3.310, p= 0.001 and BWP t= 3.023, p= 0.003.

Table 2. Mean difference for facets of stigma, adaptive behaviors, BMI, and BWP according to gender, 2024 (n = 782)

Variable	Man		Woman		t	gl	CI		*p*
	M	*SD*	M	*SD*			Lower	Upper	
Experienced stigma	1.2	1.9	1.4	2.0	-1.282	780	-0.502	0.105	0.200
Internalized stigma	31.8	15.8	33.8	15.9	-1.684	780	-4.418	0.337	0.092
Anticipated stigma	11.6	5.1	12.5	5.4	-2.210	780	-1.697	-0.100	0.027*
Stigma awareness	28.4	5.4	29.7	5.6	-3.143	780	-2.154	-0.498	0.002*
Intuitive eating	20.4	4.8	20.4	4.5	0.153	780	-0.636	0.743	0.879
Mindful eating	42.1	7.3	40.2	7.2	3.310	780	0.748	2.928	0.001*
BMI	24.6	4.0	24.1	4.2	1.410	780	-0.175	1.069	0.159
BWP	4.4	1.4	4.1	1.3	3.023	456	0.112	0.527	0.003*

Source: Own-development. Note: t= t-value, gl= Degrees of Freedom, CI= Confidence Interval, *p*= Significance value, BMI= Body Mass Index, BWP= Body Weight Perception
Student's t-test, * p< 0.05

By Pearson correlation, objective 2 was verified, the facets of stigma and adaptive eating behaviors showed statistically significant correlation with BMI and BWP. It is important to highlight that BMI and BWP showed statistically significant negative correlation with intuitive eating, (Table 3).

Table 3. Correlation of facets of stigma, adaptive behaviors, BMI and BWP, 2024 (n = 782)

Variable	1	2	3	4	5	6	7	8
1. Experienced stigma	-							
2. Internalized stigma	0.395	-						
3. Anticipated stigma	0.499	0.560	-					
4. Awareness of stigma	0.301	0.362	0.372	-				
5. Intuitive eating	-0.260	-0.274	-0.277	-0.191	-			
6. Mindful eating	0.175	0.327	0.293	0.165	-0.349	-		
7. BMI	0.238	0.228	0.309	0.136	-0.134	0.098	-	
8. BWP	0.260	0.360	0.337	0.195	-0.236	0.194	0.655	-

Source: Own-development. Note: BMI= Body Mass Index, BWP= Body Weight Perception
Pearson correlation, all correlation values were p < 0.001.

To verify objective 3, regression models were conducted for intuitive eating and mindful eating, including the variables: experienced stigma, internalized, anticipated, BWP, BMI and gender. The variables that explained intuitive eating R^2= 0.122, p< 0.001, were experienced stigma (ß= -0.129,

p= 0.001), internalized (ß= -0.120, p= 0.004), anticipated (ß= -0.104, p= 0.019) and BWP (ß= -0.125, p= 0.001), (Table 4).

Table 4. Multiple regression model for intuitive eating. 2024 (n= 782)

Variable	Model 1					Model 2				
	B	CI Lower	CI Upper	ß	*p*	B	CI Lower	CI Upper	ß	*p*
Constant	24.803	22.208	27.208		0.000	24.785	23.641	25.944		0.000
EE	-0.285	-0.474	-0.102	-0.125	0.002	-0.293	-0.468	-0.119	-0.129	0.001
El	-0.030	-0.059	-0.003	-0.103	0.016	-0.035	-0.065	-0.007	-0.120	0.004
EA	-0.087	-0.166	-0.010	-0.101	0.024	-0.089	-0.161	-0.009	-0.104	0.019
CdE	-0.046	-0.114	-0.020	-0.050	0.133					
BWP	-0.557	-0.890	-0.219	-0.163	0.001	-0.426	-0.696	-0.168	-0.125	0.001
BMI	0.073	-0.020	0.163	-0.066	0.145					
Gender	0.056	-0.601	0.713	0.006	0.867					

Source: Own-development. Note: B= Non-Standardized Coefficient, β= Standardized Coefficient, *p*= Significance Value, EE= Experienced Stigma, EI= Internalized Stigma, EA= Anticipated Stigma, CdE= Stigma Awareness, BWP= Body Weight Perception, BMI= Body Mass Index.

For mindful eating, an R2= 0.143, p< 0.001, internalized stigma (ß= 0.240, p< 0.001), anticipated (ß= 0.169, p= 0.001) and gender (ß= -0.146, *p*< 0.001) were found to explain mindful eating, (Table 5).

Table 5. Multiple regression model for mindful eating, 2024 (n = 782)

Variable	Model 1					Model 2				
	B	CI Lower	CI Upper	ß	*p*	B	CI Lower	CI Upper	ß	*p*
Constant	30.997	32.265	39.777		0.000	35.840	34.31	37.309		0.000
EE	-0.008	-0.292	0.270	-0.002	0.953					
El	0.098	0.056	0.139	0.212	0.000	0.111	0.068	0.149	0.240	0.000
EA	0.226	0.099	0.353	0.165	0.001	0.232	0.113	0.354	0.169	0.001
CdE	0.054	-0.051	0.140	0.041	0.266					
BWP	0.368	-0.073	0.992	0.068	0.146					
BMI	-0.111	-0.261	0.027	-0.063	0.154					
Gender	-2.145	-3.198	-1.178	-0.137	0.000	-2.273	-3.248	-1.297	-0.146	0.000

Source: Own-development. Note: B= Non-Standardized Coefficient, β= Standardized Coefficient, *p*= Significance Value, EE= Experienced Stigma, EI= Internalized Stigma, EA= Anticipated Stigma, CdE= Stigma Awareness, BWP= Body Weight Perception, BMI= Body Mass Index.

Discussion

It was found that stigma awareness and anticipated stigma, as well as mindful eating and BWP showed significant statistical difference according to gender; in addition, a significant positive

statistical correlation was identified between the facets of stigma (experienced, internalized, stigma awareness and anticipated) with mindful eating and a significant negative statistical correlation with intuitive eating.

The variables that explained intuitive eating were experienced, internalized, anticipated stigma and BWP, results that agree with other studies that have addressed internalized stigma [15] and experienced stigma [14]. This may be due to the fact that experienced stigma is the facet in which the person experiences labeling situations, based on prejudices, as well as harassment and being harassed because of their body weight with which there is a devaluation of the person that can have a negative effect on their emotions and psychological aspects that could negatively impact eating behaviors [6,11], while internalized stigma involves cognitive processes in which the person accepts these prejudices and considers the negative labels valid through the internalization of these negative thoughts, which could potentiate the presence of anticipated stigma, together the facets of stigma generate an increase in the stress experienced by the person, which can lead to an increase in food consumption, particularly those that provide emotional relief, such as foods with high sugar levels, as well as a decrease in the ability to identify hunger and satiety signals, i.e. less intuitive eating [7,28].

Furthermore, in the present study BWP was considered as a variable and it was found that it contributes to explain intuitive eating, the contribution was negative, i.e., as the person perceives that he has a higher BMI, intuitive eating decreases, probably related to the idea that he already has a higher BMI and it is more difficult to implement actions to manage it. Furthermore, ruminative thoughts, overthinking and focusing on negative aspects resulting from the stigma of weight may occur [29,30]. However, it is noteworthy that by BMI measured, a higher percentage of participants showed OW-OB, a lower percentage according to the BWP, i.e. underestimation of the measured body weight is presented.

It is important to highlight that BWP guides actions and decisions, sometimes more frequently than measured weight [31], in addition it has been documented that adequate BWP is related to better eating behaviors [32], so generating nursing interventions to promote adequate BWP could reduce weight stigma and favorably impact adaptive eating behaviors, as well as decrease its psychological, emotional and physical effects, which contribute to maintaining a healthy weight.

Furthermore, it was identified that the variables that explained mindful eating were internalized stigma, anticipated stigma and gender, results that are consistent with findings of internalized stigma [16] and differ with results regarding gender [33]; internalized and anticipated stigma had a positive effect that could be due to the fact that people may be aware of foods that are not appropriate or that the portions are larger than they should consume or that they consume certain hyper caloric foods as a response to stress [6,28] and it has been normalized that despite knowing that it is not appropriate they will continue to consume it to mitigate the effects of weight stigma [34].

Moreover, the gender of the individual explained mindful eating but not intuitive eating, so, cultural aspects are considered to be involved, generally women are the ones who are more pressured by social standards of a certain body type, weight or physique, which could generate a lower development of adaptive behaviors such as mindful eating [17]. Furthermore, empirical evidence regarding the facets of weight stigma and adaptive eating behaviors is scarce, thus, it is recommended to continue studying these variables in other age and population groups, also given that the facets of stigma and BWP contribute to explain eating behaviors, but not the measured BMI, it is recommended the design of interventions that promote in the general population to prevent stigmatizing actions and attitudes related to weight, as well as to promote an adequate BWP.

One of the strengths of the study is that the sample is considered to be representative of the study population, and the questionnaires applied were validated in the Mexican population. However, one limitation is that it is a cross-sectional study that was conducted on students in one area of knowledge.

Conclusions

Anticipated stigma, stigma awareness, mindful eating and BWP are different according to gender. As for intuitive eating and experienced stigma, internalized, stigma awareness, BMI and BWP presented statistically significant negative correlation; experienced stigma, internalized, anticipated stigma and BWP explained intuitive eating, while internalized stigma, anticipated stigma and gender explained mindful eating. BMI did not contribute to explain adaptive eating behaviors: Intuitive eating and mindful eating.

Since facets of stigma are related to adaptive behaviors in a negative way, it is recommended the design of interventions aimed at preventing people from being stigmatized by their weight, i.e., experienced stigma, in addition interventions should be focused on recognizing that overweight and obesity are conditions in which multiple factors are involved, such as biological, lifestyle, economic and sociocultural, which requires the intervention of a multidisciplinary team to care for people with excess weight, additionally, the stigma of weight, generates emotional problems and can cause the person not to seek health care to address excessive weight; likewise, it highlights the importance of continuing to address these variables as the existing empirical evidence is still scarce.

Conflict of interests

The authors stated that there is no conflict of interests.

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The authors declare that they have not used any type of artificial intelligence resources in any of the sections of this manuscript (in preparation, design, writing, structuring and proposals of figures, tables or graphs).

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