

## Overweight, obesity, and self-esteem in adolescents from northwestern Mexico

Judith Liliana BELTRÁN-GARCÍA<sup>1</sup> (<http://orcid.org/0009-0000-0131-4392>)

Patricia LÓPEZ-BACA<sup>1</sup> (<https://orcid.org/0009-0004-3263-3520>)

Roberto Joel TIRADO-REYES<sup>2,3</sup> (<https://orcid.org/0000-0002-1492-7507>)

Pedro Moisés NOH-MOO<sup>4,5</sup> (<https://orcid.org/0000-0003-1580-5533>)

Lubia del Carmen CASTILLO-ARCOS<sup>5</sup> (<http://orcid.org/0000-0002-4368-4735>)

María Elena AGUILAR-LIZÁRRAGA<sup>2</sup> (<http://orcid.org/0000-0001-8480-7087>)

<sup>1</sup>IMSS-BIENESTAR, Servicios Públicos de Salud, Los Mochis, Ahome, Sinaloa, México. <sup>2</sup>Instituto Mexicano del Seguro Social, Unidad de Medicina Familiar No. 55 con Unidad Médica Ambulatoria, Culiacán, Sinaloa, México. <sup>3</sup>Universidad Autónoma de Sinaloa, Facultad de Enfermería, Culiacán, Sinaloa, México. <sup>4</sup>Instituto Mexicano del Seguro Social, Unidad de Medicina Familiar No. 12, Ciudad del Carmen, Campeche, México. <sup>5</sup>Universidad Autónoma del Carmen, Facultad de Ciencias de la Salud, Ciudad del Carmen, Campeche, México. <sup>6</sup>Universidad Autónoma de Sinaloa, Facultad de Enfermería, Mazatlán, Sinaloa, México

Contact: [robertojr@uas.edu.mx](mailto:robertojr@uas.edu.mx) (Roberto Joel Tirado Reyes)

Doi:

### Abstract

Objective: to analyze the relationship between being overweight, obesity, and self-esteem in secondary school students. Methods: an observational study involving 480 adolescents in Los Mochis, Sinaloa, Mexico. Personal data were collected, and self-esteem was assessed using the Rosenberg scale [EAR-10]. Results: adolescents had a mean age of 13,06 years (SD = 0,92) and an average weight of 57,10 kg (SD = 14,52). Among them, 25,6 % were overweight and 20,6 % were obese. Regarding self-esteem levels, 18,5 % showed low self-esteem, 27,9 % medium, and 53,5 % high self-esteem. A significant negative relationship was identified between overweight/obesity and self-esteem ( $r_s = -0,45$ ,  $p < 0,05$ ). Conclusions: adolescents with overweight and obese showed significantly lower levels of self-esteem. It is recommended to implement preventive and psychoeducational strategies that promote healthy habits and emotional strengthening to reduce the risks associated with being overweight and obesity.

Keywords: Overweigh. Obesity. Self-esteem. Adolescent.

### Introduction

Obesity and overweight in adolescence are critical public health problems globally, due to the alarming growth recorded in recent decades.<sup>1</sup> These conditions not only represent physical risks, but also lead to significant repercussions on adolescents' biopsychosocial development. During this stage, profound transformations occur that affect the construction of identity and self-esteem. In this process, adolescents tend to be particularly focused on their body image and social perception, determining aspects that directly influence their self-evaluation and emotional well-being.<sup>2-4</sup>

A variable of interest, closely linked to overweight and obesity, is self-esteem. This is understood as the adolescent's self-esteem and is essential for his or her physical and mental development.<sup>5-7</sup> The literature indicates that overweight adolescents tend to have lower levels of self-esteem, a situation associated with social isolation, feelings of sadness,

anxiety, and a negative perception of body image, motivated by the social pressure exerted on their appearance.<sup>8-10</sup>

In addition to emotional problems, overweight and obese adolescents often face social repercussions, such as stigmatization, bullying, and peer rejection, which deepens their psychological vulnerability and increases the likelihood of developing physical and mental problems, with negative repercussions on their personal, family, and academic lives.<sup>11-13</sup>

Given the physical, emotional, and social implications of overweight in adolescence, it is essential to delve deeper into the relationship between these conditions and self-esteem during this stage of development.<sup>14</sup> Exploring this phenomenon can help identify specific risk factors and key areas of intervention to promote the psychological and social well-being of adolescents, as well as to support healthy development in their transition to youth and adulthood.<sup>15-17</sup> For this reason, the purpose of this study is to analyze the relation-

ship between overweight and obesity and self-esteem in high school adolescents.

## Methods

A quantitative approach was used with a correlational observational design.<sup>18</sup> The target population consisted of 1,315 adolescents from a public secondary school in the state of Sinaloa. Participants were selected using stratified sampling by sex. The sample size was estimated using the software *nQuery Advisor* version 4,0, based on an expected correlation of 0,14, a confidence level of 95 % and a statistical power of 90 %, which resulted in a sample of 480 adolescents (249 women and 231 men).

For data collection, the relevant permits were managed. First, with the educational institution, which requested student lists to identify the number of men and women and conduct the random selection using a Microsoft Excel spreadsheet. Subsequently, written informed consent was requested from the parents or guardians of minor participants. Likewise, informed consent signed by each adolescent was obtained.

Once the authorizations were gathered, the students were summoned to their respective classrooms, where the objective of the study and the estimated time to answer the instruments were explained to them. Initially, adolescents completed a sociodemographic questionnaire and another to assess overweight and obesity, followed by the Rosenberg Self-Esteem Scale (EAR-10).<sup>19</sup>

Following application, the instruments were placed in an urn, to safeguard confidentiality and anonymity of the information provided by the participants. The sociodemographic form was intended to collect data related to age, gender, shift, and grade level. Likewise, specific interventions were incorporated to evaluate overweight and obesity by recording weight and height. With these data, the Body Mass Index (BMI) was calculated, the results of which were classified as normal weight, overweight, and obesity.

The Rosenberg Self-Esteem Scale (EAR-10)<sup>19</sup> consists of ten statements that value respect and personal acceptance, organized so that five items present a positive formulation and the other five, a negative one, to minimize the acquiescence effect. Each statement is answered on a four-point Likert scale: 1 = strongly agree, 2 = agree, 3 = disagree, and 4 = strongly disagree, resulting in a total score between 10 and 40. A higher score indicates higher self-esteem. The results can be grouped into three categories: high self-esteem (30 to 40 points), moderate self-esteem (26 to 29 points), and low self-esteem (25 points or less). Previous studies have reported Cronbach's alpha coefficients between 0,75 and 0,86.<sup>20,21</sup> In this study, the scale achieved a reliability of  $\alpha = 0,80$ .

The research was carried out in accordance with the provisions of the Regulations of the General Health Law on Research. The ethical principles set out in the Helsinki Declaration and the Belmont Report were respected. The protocol was approved by the Ethics and Research Committee of the Universidad Pacífico Norte. Likewise, authorization was obtained from the educational institution where the study was conducted, as well as the informed consent of the underage participants and of their parents or guardians.

Data analysis was performed using quantitative techniques and the software *SPSS* version 22,0 for Windows. Descriptive statistical methods were applied to characterize the sample, as well as inferential statistics to evaluate the relationship between BMI and self-esteem levels. The BMI was transformed into categories to describe the participants' nutritional status. However, to answer the research question, it was treated as a continuous variable. Tests such as Chi square, point estimate with 95 % confidence intervals (95 % CI) were used to determine the accuracy of the results, and Simple Linear Regression analysis was applied to respond to the objective of the study.

## Results

Of the 480 adolescents included in the study, 51,9 % were female and 48,1 % were male, with a mean age of 13,06 years ( $SD = 0,92$ ). In terms of school grade, 34,4 % of adolescents are in the first year ( $n = 165$ ), 31,3 % in the second year, and 34,4 % in the third year.

In relation to anthropometric measurements, adolescents have an average weight of 57,10 kg ( $SD = 14,52$ ), having an average height of 1,61 m ( $SD = 0,081$ ). When calculating the body mass index (BMI), adolescents obtained an average of 21,97 ( $SD = 4,74$ ). When categorizing the BMI, it was found that 26,0 % were underweight, 27,7 % were normal weight, 25,6 % were overweight, and 20,6 % were obese.

Regarding the level of self-esteem, 18,5 % of adolescents have low, 27,9 % moderate, and 53,5 % high self-esteem (see Table 1).

**Table 1.** Qualitative sociodemographic characteristics, nutritional status, and self-esteem

Variable	f	%	95% IC
Gender			
Female	249	51,9	
Male	231	48,1	
Shift			
Morning	270	56,3	
Afternoon	210	43,8	
School Grade			
First	165	34,4	
Second	150	31,3	
Third	165	34,4	
Nutritional Status			
Underweight	125	26,0	22,0 – 30,0
Normal weight	133	27,7	23,7 – 31,7
Overweight	123	25,6	21,6 – 29,6
Obesity	99	20,6	16,6 – 24,6
Self-esteem level			
Low self-esteem	89	18,5	14,5 – 22,5
Average self-esteem	134	27,9	23,9 – 31,9
High self-esteem	257	53,5	49,5 – 57,5

Source: CDP-4, EAR-10

n=480

Regarding BMI, it was based on the variables of age, school grade and sex. In the case of the age variable, a statistically significant association was found with nutritional status ( $X^2 = 18,1$ ,  $p = ,03$ ). The 12-year-old group has a higher

proportion of overweight and obesity; however, a collateral finding is that 14-year-olds have a higher proportion of underweight compared to other age groups.

Regarding school grade, a significant association is also observed between this variable and nutritional status ( $X^2=15,06, p=,02$ ). First-year students have a higher proportion of overweight and obesity compared to adolescents in their second and third years. Regarding the gender variable, a significant association was observed ( $X^2=7,54, p=,005$ ), with a higher proportion of overweight and obesity in women compared to men (see Table 2).

**Table 2.** BMI by age, school grade and gender

Nutritional status	Age								$\chi^2$	Value of p
	12		13		14		15			
	f	%	f	%	f	%	f	%		
Underweight	35	21,3	31	21,4	47	32,0	12	50	18,1	,03
Normal weight	41	25,0	47	32,4	39	26,5	6	25		
Overweight	45	27,4	37	25,5	37	25,2	4	16,7		
Obesity	43	26,2	30	20,7	24	16,3	2	8,3		
	School grade								$\chi^2$	Value of p
	First		Second		Third					
	f	%	f	%	f	%	f	%		
Underweight	36	21,8	30	20	59	35,8			15,06	,02
Normal weight	44	26,7	50	33,3	39	23,6				
Overweight	44	26,7	39	26	40	24,2				
Obesity	41	24,8	31	20,7	27	16,4				
	Gender								$\chi^2$	Value of p
	Female				Male					
	f	%	f	%	f	%	f	%		
Underweight	54	21,7	71	30,7					7,54	,005
Normal weight	78	31,3	55	23,8						
Overweight	69	27,7	54	23,4						
Obesity	48	19,3	51	22,1						

Source: CDP-4 n=480

In relation to the levels of self-esteem based on the variables age, school grade, sex, no significant association was found between self-esteem and age groups ( $X^2=2,82, p=,24$ ). However, by school grade, there is a significant association between the level of self-esteem and the school grade ( $X^2=16,88, p=,002$ ). Third grade students have the highest proportion of high self-esteem (63,0%), while second grade students have the highest proportion of medium self-esteem (38,0%). For the gender variable, a statistically significant association was found with the level of self-esteem ( $X^2=10,18, p=,006$ ). Men have a higher proportion of high self-esteem (59,3%) compared to women (48,2%), while women have a higher proportion of low self-esteem (23,7%) compared to men (13,0%) (see Table 3).

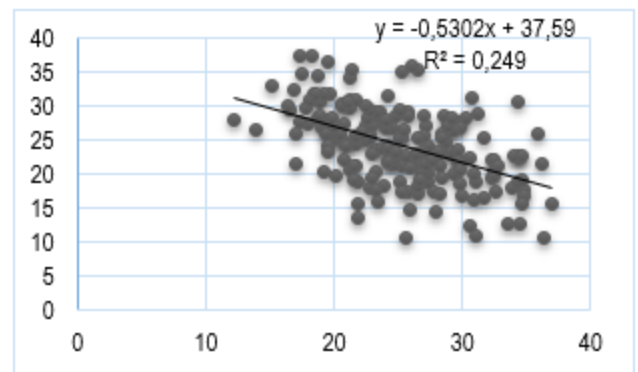
Finally, a simple linear regression model was applied to analyze the relationship between the levels of overweight and obesity, measured by the body mass index (BMI) as a continuous variable (X axis), and the levels of self-esteem (Y axis) (see Figure 1). The resulting equation of the model was:  $y = -0,5302x + 37,59$ , which indicates that, for each unit of increase in BMI, self-esteem decreases on average 0,53 points. The coefficient of determination ( $R^2 = 0,249$ ) reveals that 24,9% of the variability in self-esteem levels can be explained by BMI.

**Table 3.** Self-esteem according to age, school grade and gender

Self-esteem	Age								$\chi^2$	Value of p
	12		13		14		15			
	f	%	f	%	f	%	f	%		
Low	29,5	9,55	25,9	9,55	15	8,75	15	8,75	2,82	,24
Mean	46,5	15,05	46,5	15,05	20,5	12	20,5	12		
High	78,5	25,40	78,5	25,40	50	29,25	50	29,25		
	Schoolar grade								$\chi^2$	Value of p
	First		Second		Third					
	f	%	f	%	f	%	f	%		
Low	30	18,2	31	20,7	28	17,0			16,88	,002
Mean	44	26,7	57	38,0	33	20,0				
High	91	55,2	62	41,3	104	63,0				
	Gender								$\chi^2$	Value of p
	Female				Male					
	f	%	f	%	f	%	f	%		
Low	59	23,7	30	13,0					10,18	,006
Mean	70	28,1	64	27,7						
High	120	48,2	137	59,3						

Source: CDP-4, EAR-10 n=480

**Figure 1.** Spearman correlation between self-esteem and BMI



Source: CDP-4, EAR-10 n=480

**Discussion**

The analysis provided insight into how body weight and adolescents' self-perception are intertwined. The information gathered from this group of 480 young people offers valuable insight into how overweight and obesity can influence the development of their self-esteem during a key stage of personal development. A quarter of the participants were identified as being overweight or obese. These results are comparable to those reported in a study conducted in rural areas of Ecuador, where similar rates of overweight and obesity were documented.<sup>16</sup> This congruence could be associated with analogous eating patterns and lifestyles, characterized by limited physical activity and the consumption of ultra-processed foods, common phenomena in contexts with restricted access to healthy resources.

Regarding self-esteem levels, it was determined that the majority of adolescents fell into the high, moderate, or low self-esteem categories. These findings differ from the results obtained in a study conducted in Iraq, where more than half of the adolescents presented low self-esteem, and only a third reported high self-esteem.<sup>9</sup> This contrast could be explained by differences in contextual and cultural factors, such as social expectations and the degree of family support, aspects that significantly influence the development of self-esteem. Furthermore, adolescents in this study showed higher levels of high self-esteem, possibly related to a less criti-

cal social environment toward body image or cultural values that emphasize emotional resilience.

Likewise, the study found that male adolescents presented a higher proportion of high self-esteem compared to women, which coincides with a study carried out in the Chilean context, where men reported significantly higher levels of self-esteem.<sup>5,11</sup> This difference may be due to the fact that men face less social pressure in terms of physical appearance, while women tend to be more exposed to strict body standards that can negatively affect their personal perception.

In relation to the study's objective, a negative correlation between overweight and obesity and self-esteem was confirmed, demonstrating that as levels of overweight and obesity increase, self-esteem decreases. This finding is consistent with studies conducted in Iran, France, and Saudi Arabia, where it has been reported that adolescents who are overweight or obese have greater body dissatisfaction and lower self-confidence compared to those with normative weight.<sup>7-8,13</sup> Thus, the findings show that overweight and obesity have negative repercussions on adolescents' self-esteem, which puts their physical and emotional development at risk.

This study has some limitations. First, the cross-sectional design does not allow for establishing causal relationships between the variables analysed. Second, the sample size does not allow the results to be generalized to other adoles-

cent populations with different characteristics. Furthermore, additional contextual or psychological factors, such as social support, mental health, or academic performance, which could influence both self-esteem and nutritional status, were not included. For future research, longitudinal studies are recommended to explore the evolution of the relationship between self-esteem and nutritional status over time. It would also be appropriate to include a broader range of psychological and contextual variables, such as stress level, body image perception, and family support, to provide a more comprehensive understanding of the phenomenon.

## Conclusions

Based on the results of this study, it is concluded that overweight and obesity in adolescents are significantly associated with factors such as age, grade level, and sex, and are more common in females, first-year students, and younger adolescents. Conversely, men reported higher levels of self-esteem compared to women, and an inverse relationship was found between overweight and obesity and self-esteem. These findings underscore the need for nursing staff to design preventive and educational interventions that integrate both the promotion of healthy habits, such as emotional strengthening, with a particular focus on gender differences and social factors that influence this stage of development.

## References

1. Organización Mundial de la Salud. *Obesidad y sobrepeso*. Ginebra: OMS; 2024. <http://bit.ly/4kypGjC>.
2. Byth S, Frijters P, Beaton T. The relationship between obesity and self-esteem: longitudinal evidence from Australian adults. *Oxford Open Econ*. 2022; 1. <https://doi.org/10.1093/oec/odac009>.
3. Sanyaolu A, Okorie C, Qi X, Locke J, Rehman S. Childhood and adolescent obesity in the United States: A public health concern. *Glob Pediatr Health*. 2019; 6. <https://doi.org/10.1177/2333794X19891305>.
4. Guevara Valtier MC, Santos Flores JM, Muñoz Gallegos I, Paz Morales M de los Ángeles, Gutiérrez Valverde JM, Soltero Rivera SG. Adicción digital a la comida e índice de alimentación saludable en adultos jóvenes universitarios. *Rev Horiz Enferm*. 2023. [https://doi.org/10.7764/Horiz\\_Enferm.Num.esp.285-299](https://doi.org/10.7764/Horiz_Enferm.Num.esp.285-299).
5. Delgado-Floody P, Caamaño-Navarrete F, Jerez-Mayorga D, Cofré-Lizama A. Calidad de vida, autoestima, condición física y estado nutricional en adolescentes y su relación con el rendimiento académico. *Rev Soc Latinoam Nutr*. 2019; 69(3):174-81. <https://doi.org/10.37527/2019.69.3.006>.
6. Mosqueda Diaz A, Pacheco Flores C, Muñoz Huerta I, Delaunoy Tardone N, Arancibia Pizarro C, Aravena Cerda D, Ahumada Estay J. Factores relacionados a la depresión durante la adolescencia: una revisión integrativa. *Rev Horiz Enferm*. 2023; 34(2):321-58. <http://bit.ly/44I6oCt>.
7. Moradi M, Mozaffari H, Askari M, Azadbakht L. Asociación entre el sobrepeso/obesidad con la depresión, la ansiedad, la baja autoestima y la insatisfacción corporal en niños y adolescentes: una revisión sistemática y un metaanálisis de estudios observacionales. *Crit Rev Food Sci Nutr*. 2020; 62:555-70. <https://doi.org/10.1080/10408398.2020.1823813>.
8. Scotto di Luzio S, Martinet G, Popa-Roch M, Ballereau M, Chahdi S, Escudero L, et al. Obesity in childhood and adolescence: The role of motivation for physical activity, self-esteem, implicit and explicit attitudes toward obesity and physical activity. *Children (Basel)*. 2023; 10(7):1177. <https://doi.org/10.3390/children10071177>.
9. Jumaily Z, Ibrahim R. Correlación entre la autoestima y la obesidad en las escuelas secundarias superiores de la ciudad de Mosul. *Rev Int Cienc Salud*. 2022. <https://doi.org/10.53730/ijhs.v6ns4.10790>.
10. Sánchez-Villena AR, De La Fuente-Figuerola V, Ventura-León J. Modelos factoriales de la Escala de Autoestima de Rosenberg en adolescentes peruanos. *Rev Psicopatol Psicol Clin*. 2021;26(1):47. <https://doi.org/10.5944/rppc.26631>.
11. Rojas-Barahona CA, Zegers PB, Förster MCE. La escala de autoestima de Rosenberg: Validación para Chile en una muestra de jóvenes adultos, adultos y adultos mayores. *Rev Med Chil*. 2009; 137(6):791-800. <https://doi.org/10.4067/S0034-98872009000600009>.
12. King JE, Jebeile H, Garnett SP, Baur LA, Paxton SJ, Gow ML. Physical activity based pediatric obesity treatment, depression, self-esteem and body image: A systematic review with meta-analysis. *Ment Health Phys Act*. 2020; 19(100342): 100342. <https://doi.org/10.1016/j.mhpa.2020.100342>.
13. Youssef M, Shariff S, Albalawi R, Aljohani B, Masoud R, Al-hadidi S. Impact of obesity on self-esteem and academic performance among medical students in Al-Rayan Colleges, Al-Madinah. *Dubai Med J*. 2023; 6(3):188-94. <https://doi.org/10.1159/000531086>.
14. Alghawrien D, Al-Hussami M, Ayaad O. The impact of obesity on self-esteem and academic achievement among university students. *Int J Adolesc Med Health*. 2022; 34(3). <https://doi.org/10.1515/ijamh-2019-0137>.
15. Rivera-Vázquez P, Carbajal-Mata FE, Maldonado-Guzmán G. Valoración del nivel de autoestima en adolescentes con sobrepeso y obesidad; oportunidad de cuidado enfermero. *Rev Enferm Herediana*. 2017; 10(1):22. <http://dx.doi.org/10.20453/renh.v10i1.3127>.

16. Castelo-Rivas W, Cedeño-Romero J, Cruzate-Rodríguez N, Cofre-Rodríguez M. Sobrepeso, obesidad y autoestima de adolescentes en una zona rural del Ecuador. *Rev Peru Cienc Salud*. 2023; 5(1):23–8. <https://doi.org/10.37711/rpcs.2023.5.1>. 403.
17. Lister NB, Baur LA, Felix JF, Hill AJ, Marcus C, Reinehr T, et al. Child and adolescent obesity. *Nat Rev Dis Primers*. 2023; 9(1). <https://doi.org/10.1038/s41572-023-00435-4>.
18. Gray JR, Grove SK. Burns and Grove's *The practice of nursing research: Appraisal, synthesis, and generation of evidence*. 9th ed. St. Louis: Elsevier; 2020.
19. Rosenberg M. *Society and the adolescent self-image*. Princeton: Princeton University Press; 1965.
20. Lima TJS, Souza LEC. Rosenberg Self-Esteem Scale: Method effect and gender invariance. *Psico-USF*. 2019; 24(3):517–28. <https://doi.org/10.1590/1413-82712019240309>.
21. Sánchez-Villena AR, De La Fuente-Figuerola V, Ventura-León J. Modelos factoriales de la Escala de Autoestima de Rosenberg en adolescentes peruanos. *Rev Psicopatol Psicol Clin*. 2021; 26(1):47. <https://doi.org/10.5944/rppc.26631>.