

# Nursing training and its association with burnout syndrome among Mexican undergraduate students

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## ABSTRACT

**Introduction.** Previous data suggest that healthcare students, such as nursing students, might have a differential risk of presenting burnout syndrome caused by the stress they are subjected to. However, the evidence is still scarce and inconclusive. **Objective.** To evaluate the association between nursing training and burnout syndrome among undergraduate students in Hidalgo, Mexico. **Method.** A cross-sectional analytical study was conducted on 566 undergraduate students (56% were nursing students and the rest were non-healthcare students). Burnout syndrome was identified using the Spanish version of the Maslach Burnout Inventory-Student Survey, consisting of subscales: emotional exhaustion, depersonalization, and diminished academic efficacy. The association between the variables of interest was evaluated using logistic regression models adjusted for confounders. **Results.** In the depersonalization subscale, nursing students, compared with non-healthcare students, had an adjusted Odds Ratio (*aOR*) of moderate/high burnout syndrome of 2.08 (95% confidence interval [CI] = [1.34, 3.22]). In addition, the association was stronger among students in the third and fourth school years (*aOR* = 3.58; 95% CI = [1.62, 7.89]) compared with those in the first and second school years (*aOR* = 1.20; 95% CI = [.71, 2.03]). **Discussion and conclusion.** It is necessary that universities provide nursing students with tools that allow them to cope with stressful situations during their academic training and their future life as health professionals.

**Keywords:** Burnout syndrome, student burnout, school burnout, nursing students.

## RESUMEN

**Introducción.** Datos previos sugieren que los estudiantes del cuidado a la salud, como es el caso de enfermería, podrían tener un riesgo diferencial de presentar síndrome de burnout debido al estrés al que están sometidos, no obstante, la evidencia aun es escasa y no concluyente. **Objetivo.** Evaluar la asociación entre la formación académica en enfermería con el síndrome de burnout en estudiantes universitarios de Hidalgo, México. **Método.** Estudio trasversal analítico realizado en una muestra de 566 estudiantes universitarios (56% eran estudiantes de enfermería y el resto de las áreas diferentes a la salud). Para determinar la presencia de síndrome de burnout se utilizó la versión en español de la escala Maslach Burnout Inventory-Student Survey, conformada por las subescalas: agotamiento, eficacia académica y despersonalización. La asociación entre las variables de interés se evaluó mediante modelos de regresión logística ajustados por confusores. **Resultados.** En la subescala de despersonalización los estudiantes de enfermería tuvieron mayores posibilidades de presentar síndrome de burnout medio/alto en comparación con los de las otras formaciones académicas (razón de momios ajustada [*RMa*] = 2.08; intervalo de confianza [IC] al 95% = [1.34, 3.22]). Además, la asociación fue más fuerte entre aquellos que cursaban el tercer y cuarto año escolar (*RMa* = 3.58; IC 95% = [1.62, 7.89]) a diferencia de los que cursaban los primeros dos años escolares (*RMa* = 1.20; IC 95% = [.71, 2.03]). **Discusión y conclusión.** Es importante que las universidades brinden a los estudiantes de enfermería herramientas que les permitan sobrellevar las situaciones estresantes durante su formación académica y su futura vida profesional.

**Palabras clave:** Síndrome de burnout, burnout en estudiantes, burnout escolar, estudiantes de enfermería.

## INTRODUCTION

Burnout syndrome (BS) is defined, as a gradual process of emotional exhaustion, loss of work interest, and lack of personal accomplishment as a result of prolonged exposure to high levels of work stress (Maslach, Schaufeli, & Leiter, 2001). Initially, BS was described, mainly in health professionals, due to the physical and emotional demands related to caring for another person (Maslach et al., 2001); nevertheless, studies have shown that BS is related to both work demands and the lack of resources for compliance, regardless of the job that the individual is performing (Demerouti, Bakker, Nachreiner, & Schaufeli, 2001; Leiter & Schaufeli, 1996; Maslach, Leiter, & Schaufeli, 2009). Students, as well as employees, can be exposed to prolonged periods of stress. Since they must comply with academic demands, such as attending classes, completing and submitting assignments on time, and passing exams (McCarthy, Pretty, & Catano, 1990). Schaufeli Martínez, Marqués-Pinto, Salanova, and Bakker (2002) extended the concept of BS to the academic context and characterized it as the presence of feelings of emotional exhaustion due to academic demands, apathetic attitude towards studies, and self-perceived incompetence in accomplishing school tasks (Schaufeli et al., 2002). Thus, in recent years, the presence of BS has been documented in undergraduate students globally, including nursing students (Kaggwa et al., 2021; Rosales-Ricardo et al., 2021).

Despite the lack of accurate estimates about the global prevalence of BS in nursing students, proportions ranging from 10.5% to 100% have been reported in the subjects studied (Quina Galdino et al., 2020; Reyes & Blanco, 2016; Rudman & Gustavsson, 2012; Silva, Chiquito, Andrade, Brito, & Camelo, 2011; Vasconcelos, Trindade, Barbosa, & Martino, 2020); nonetheless, these proportions depend on the characteristics of each country, as well as the measuring tools and cut-off point used for its definition. The high levels of BS reported may be because nursing students are exposed to a highly stressful environment characterized by full-time courses, with an excessive workload, lack of sleep, pressure from the demands of professors, competitiveness, anxiety to perform satisfactorily in each class, as well as other institutional, personal, and affective factors (Njim et al., 2018; Pereira, Miranda, & Passos, 2010; Pérez Contreras et al., 2021; Quina Galdino et al., 2020). BS in nursing students has been associated with depression, substance abuse, sleep deprivation, thoughts of dropping out of school, and poor school performance (Hernández-Martínez, Marques Rodrigues, Jiménez-Díaz, & Rodríguez-de-Vera, 2016; Hwang & Kim, 2022; Wei et al., 2021). Data suggest that nursing students who present BS will be nurses who suffer from the same syndrome once they work in hospitals as nurses (Rudman & Gustavsson, 2012), which can lead to a lack of professionalism, poor quality of patient care, errors in care, depression, suicidal ideation, and alcohol and

tobacco abuse (Bakhamis, Paul, Smith, & Coustasse, 2019; Chen & Meier, 2021; Jun, Ojemeni, Kalamani, Tong, & Crecelius, 2021; Kelsey et al., 2021; Reith, 2018).

To date, few studies have compared the presence of BS among nursing students with those students of non-healthcare academic training, hence it is not yet clear whether the presence of this syndrome among undergraduate students depends on the type of academic training they are studying. The main limitation of the available studies is that they do not distinguish between the different areas of training that are grouped within health sciences (Guzmán, Parrello, & Romero, 2020; March-Amengual et al., 2022; Wing et al., 2018). Hence, it is still unknown whether nursing students are more likely to have BS.

In the State of Hidalgo, Mexico, the proportion of people living in poverty (50.8%) is higher than the national percentage (43.9%; CONEVAL, 2021). It has been suggested that students with greater economic deprivation present higher rates of BS (Lin & Yang, 2021), therefore the population of this region could be more susceptible to presenting this problem. Although previous studies in the State of Hidalgo have identified the presence of BS in university students (Ledezma et al., 2017), we do not have knowledge about studies that have examined whether the presence of this syndrome is differential among non-healthcare students and nursing students. Generating evidence in this regard would help to better understand this condition in university students and thus, encourage the development of strategies for its prevention and mitigation. Therefore, our objective was to evaluate the association between nursing training and BS among university students in Hidalgo, Mexico.

## METHOD

### Design of the study and subjects

A cross-sectional analytical study was conducted on a group of students enrolled in one of the three academic programs (nursing [ $N = 610$ ]; administration [ $N = 317$ ]; and software engineering [ $N = 102$ ]) of the Superior School of Tlahuelilpan of the Autonomous University of the State of Hidalgo ( $N = 1,029$ ). Hidalgo, Mexico, ranks eleventh in terms of economic inequality in that country. In addition, it exceeds the national proportion of people living in poverty by 1.8 percentage points (CONEVAL, 2021).

Men and women aged  $\geq 18$  and with no previous diagnosis of mental health disorders (*i.e.*, depression, anxiety disorder, etc.) were invited to participate in this study. Of 1,023 students who met the eligibility criteria, 566 agreed to participate (participation rate of 55.3%). Originally, it had been considered to exclude from the present study those participants with missing data on academic training or BS; nevertheless, since all subjects who agreed to participate

provided complete information, none of the subjects were ultimately excluded from the present analysis.

## Procedure

In February 2022, a dissemination campaign was carried out to invite undergraduate students to participate in the study. Between March to May 2022, data collection was performed at the university campus facilities by personnel previously trained in the study procedures. Informed consent was obtained for all participants.

## Measurements

General information was obtained by means of a structured questionnaire that included questions on the sociodemographic characteristics of the participants: age (in years); sex (male, female); marital status (married or informal marriage, unmarried), gainful employment (yes, no); offspring (yes, no); academic training (nursing, administration, or software engineer); and the school year (1-2, 3-4 school year). To identify the BS of the participants, we used the Maslach Burnout Inventory-Student Survey (MBI-SS) that was adapted by [Schaufeli et al. \(2002\)](#) and originally applied to a sample of Spanish students. This measurement tool has previously been validated by [Banda Guzmán, Robles Francia, and Lussier \(2021\)](#) for Mexican undergraduate students, obtaining acceptable levels of internal consistency (Cronbach alpha > .70) in each of its subscales. The MBI-SS consists of 15 items grouped into three subscales: I) exhaustion, which evaluates the feeling of physical and emotional fatigue that the student experiences when he feels overwhelmed by the academic load (*i.e.*, “*I feel tired when I wake up in the morning and have to face another day at university*”); II) depersonalization, which measures the distant attitude towards studies (*i.e.*, “*I have become less interested in my studies since I started university*”) and; III) diminished academic efficacy, that assesses the feeling of lack of competence to meet academic demands (*i.e.*, “*I believe I can make an effective contribution in the classes I attend*”). The MBI-SS is a Likert scale with seven response options ranging from “never” (0) to “every day” (6), depending on how often the student experienced the situation described in each item. The score of each subscale is obtained by adding the points of the items corresponding to it and dividing the result by the number of total items that compose it. According to the criteria suggested by [Banda Guzmán et al. \(2021\)](#) in the exhaustion subscale a score of .5 to 1.2 is indicative of low burnout; between 1.3 and 2.8 is moderate, and from 2.9 to 4.50 is high. For the depersonalization subscale from .3 to .5 is low, from .6 to 2.25 is moderate, and from 2.26 to 4.0 is high. In the diminished academic efficacy subscale, a score of 2.84 to 3.83 is low, from 3.84 to 5.16 is moderate, and from 5.17 to 5.83 is high ([Banda Guzmán et al., 2021](#)).

## Statistical analysis

The sociodemographic characteristics and BS levels were described with frequencies and percentages in the case of categorical variables, while the age of the participants (the only continuous variable) was described using the median since its distribution was not normal according to the Shapiro-Wilk normality test ( $p$ -value < .01). The comparisons of these characteristics between nursing students and those from other academic programs were carried out using Pearson's  $X^2$  or Fisher's Exact for the difference in proportions and the Mann-Whitney U test for the difference in medians. The association between nursing training and BS was evaluated with logistic regression models separately for each subscale. To improve the statistical power of the models, we collapsed the moderate and high categories of each MBI-SS subscale, therefore we estimate the Odds Ratio ( $OR$ ) of presenting BS (moderate/high) in nursing students taking as a reference those of any other academic training (administration and software engineering).

Potential confounding variables were identified in the existing literature. These variables were assessed as potential confounders using the estimate change method (*i.e.*,  $OR \geq 10\%$  change), starting with all variables in the models and deletion them one by one in a stepwise manner ([Greenland, 1989](#)). Finally, the adjustment variables for all models were age, sex, and school year.

Due to previous data suggest that BS levels among undergraduate students might be different according to the school year, marital status, and the sex of people ([Njim et al., 2018](#); [Rodríguez-Villalobos et al., 2019](#); [Guzmán et al., 2020](#)), we evaluate independently, the potential interaction (modifying effect) of these variables on the association between nursing training and BS to assess the homogeneity of the effect, therefore, we added a multiplicative-scale interaction term in the adjusted models (*i.e.*, nursing training\*scholar year, nursing training\*marital status, and nursing training\*sex; [Altman & Matthews, 1996](#)).

Statistical significance for hypothesis tests and statistical models was based on a  $p$ -value < .05. All analyses were performed using the STATA statistical package, version 15.1 (Stata Corporation, College Station, TX).

## Ethical considerations

The protocol of the present research study was approved by the Ethics and Research Committee of the Superior School of Tlahuelilpan of the Autonomous University of the Hidalgo State (code assigned: 2021-I-XVIII-28).

## RESULTS

The median age of participants was 20 years, 70.9% were women, 94.5% were single, 95.6% had no children, and

**Table 1**  
*Characteristics of the participants by academic training status. Hidalgo, Mexico, 2022*

Characteristics	Total (n = 566)	Nursing training (n = 320)	Administration/ software engineering training (n = 246)	p-value <sup>a</sup>
Age, median (IQR)	20 (2)	20 (2)	21 (2)	< .01
Sex, f (%)				
Men	165 (29.1)	104 (32.5)	61 (24.8)	.05
Women	401 (70.9)	216 (67.5)	185 (75.2)	
School year, f (%)				
1-2 school year	317 (56)	216 (67.5)	101 (41.1)	< .01
3-4 school year	249 (44)	104 (32.5)	145 (58.9)	
Marital status, f (%)				
Single	535 (94.5)	309 (96.6)	226 (91.9)	.02
Married or informal marriage	31 (5.5)	11 (3.4)	20 (8.1)	
Offspring, f (%)				
Yes	25 (4.4)	17 (5.3)	8 (3.2)	.30
No	541 (95.6)	303 (94.7)	238 (96.8)	
Employment, f (%)				
Yes	188 (33.2)	95 (29.7)	93 (37.8)	.04
No	378 (66.8)	225 (70.3)	153 (62.2)	
<b>Subscales of burnout syndrome</b>				
Emotional exhaustion, f (%)				
Low	64 (11.3)	34 (10.6)	30 (12.2)	.59
Moderate/High	502 (88.7)	286 (89.4)	216 (87.8)	
Depersonalization, f (%)				
Low	143 (25.3)	71 (22.2)	72 (29.3)	.06
Moderate/High	423 (74.7)	249 (77.8)	174 (70.7)	
Diminished academic efficacy, f (%)				
Low	68 (12)	37 (11.6)	31 (12.6)	.79
Moderate/High	498 (88)	283 (88.4)	215 (84.4)	

Abbreviations: IQR, interquartile range; f, frequency.

<sup>a</sup> Comparing subjects by academic training status using Pearson's chi-squared or Fisher's exact tests for categorical variables and Mann-Whitney U test for difference of medians.

33.2% had gainful employment. Most participants presented a moderate/high level of BS in the three MBI-SS subscales (emotional exhaustion, 88.7%; depersonalization, 74.7%; and diminished academic efficacy, 88%; Table 1). Compared to students in other academic programs, those

who studied nursing were slightly younger (median age: 21 vs. 20 years), a higher percentage were in the first two years of academic education (41.1% vs. 67.5%), a slightly higher percentage were married (91.9% vs. 96.6%), and a lower percentage had gainful employment (37.8% vs. 29.7%; Ta-

**Table 2**  
*Adjusted odds ratios of presenting a moderate/high level of burnout syndrome according to the type of academic training among undergraduate students in Hidalgo, Mexico, 2022*

Academic training	Subscales of burnout syndrome					
	Emotional exhaustion		Depersonalization		Diminished academic efficacy	
	OR <sup>a</sup> (95% CI)	p-value	OR <sup>a</sup> (95% CI)	p-value	OR <sup>a</sup> (95% CI)	p-value
Administration/ software engineering	Ref.		Ref.		Ref.	
Nursing	1.21 (.69 – 2.12)	.48	2.08 (1.34 – 3.22)	< .01	.94 (.55 – 1.61)	.83

Abbreviations: OR, odds ratio; CI, confidence interval.

<sup>a</sup> Adjusted for sex, age, and school year.

**Table 3**  
Adjusted odds ratios of presenting a moderate/high level of burnout syndrome in the depersonalization subscale according to the type of academic training by school year among undergraduate students in Hidalgo, Mexico, 2022.

Academic training	School year				
	1-2 school years		3-4 school years		p-interaction
	OR <sup>a</sup> (95% CI)	p-value	OR <sup>a</sup> (95% CI)	p-value	
Administration/ software engineering	Ref.		Ref.		
Nursing	1.20 (.71 – 2.03)	.48	3.58 (1.62 – 7.89)	< .01	.03

Abbreviations: OR, Odds ratio; CI, confidence interval.

<sup>a</sup> Adjusted for sex, and age.

ble 1). We did not observe significant differences with the rest of the variables between nursing students and those of the other academic programs.

After adjustment for confounders, we found that nursing students had an adjusted OR (*aOR*) of presenting a moderate/high BS level of 2.08 (95% interval confidence [CI] = [1.34, 3.22]) in the subscale of depersonalization compared with students of non-healthcare academic training (Table 2); in this subscale, there was evidence of heterogeneous effects (interaction) when evaluating the association of nursing training with the BS between the different strata of the variable school year (p-interaction = .03), observing greater strength of the association in the stratum in the 3rd and 4th school years (*aOR* = 3.58; 95% CI = [1.62, 7.89]) compared to those in the first two years (*aOR* = 1.20; 95% CI = [.71, 2.03]; Table 3). We did not observe significant interaction according to the sex (p-interaction = .26) or marital status (p-interaction = .53) of the participants (data not shown).

## DISCUSSION AND CONCLUSION

In our results, we observed a high proportion of nursing students with a moderate/high level of BS in the three subscales evaluated by the MBI-SS: emotional exhaustion, 88.9%; depersonalization, 77.8%; diminished academic efficiency, 88.4%. These proportions are different compared to those found in previous studies in which the MBI-SS was also used. A study conducted in Spain reported a lower frequency of students with a moderate/high BS level in the depersonalization subscale (50%), but similar frequencies to those of our findings for the rest of the subscales (emotional exhaustion, 70%; diminished academic efficacy, 84%; Hernández-Martínez et al., 2016). In contrast to our results, in Italy, a higher proportion of students presented a moderate/high level of BS in the depersonalization subscale (99%), nonetheless, a lower proportion was reported in the emotional exhaustion subscale (78%) and diminished academic efficiency (86%; Ferri, Guerra, Marcheselli, Cunico, & Di Lorenzo, 2015). The differences observed between the

findings of these studies and ours could be due to the socioeconomic characteristics of the populations studied and the time at which those studies were carried out. Regarding socioeconomic characteristics, unlike Mexico, Spain, and Italy have a higher human development index, which is related to the economic condition of a country (United Nations Development Programme, 2020). Data suggest higher levels of BS in students from families with low socioeconomic status (SES; Lin & Yang, 2021). The SES represents the availability of resources to cover expenses related to compliance with academic requirements (*i.e.*, payment for transportation, purchase of books, uniforms, or materials; Merritt & Buboltz, 2015). Therefore, lack of access to these resources may contribute to prolonged stress exposure. On the other hand, the above-mentioned studies were carried out before the pandemic by COVID-19, unlike ours which was carried out once the containment measures for this contingency were withdrawn in Mexico, and thus our participants lived the experience of the social restrictions enacted to prevent the spread of the virus, as well as the changes it brought about in the academic environment by migrating from classroom learning mode to a virtual one, to return a new account to a face-to-face mode. During this period, studies have described high levels of BS among undergraduate students (Pamungkas & Nurlaili, 2021). However, due to the lack of a target group for comparison, it is not possible to ensure that these levels are indeed due to the implications arising from the COVID-19 pandemic. In addition, in a previous investigation in our country, conducted long before the pandemic, we found a proportion of nursing students with a moderate/high BS level similar to that reported in our findings (emotional exhaustion, 78%; depersonalization, 81%; diminished academic efficiency, 86%; Santes et al., 2009), which might suggest that Mexican nursing students present high levels of BS regardless of the social restrictions that this contingency brought.

When comparing our findings with other relatively recent studies in Mexico, we observed that those carried out in regions with lower levels of poverty and inequality reported lower proportions of burnout syndrome among nursing students. A study conducted in San Luis Potosí, reported

a lower frequency of students with a moderate/high level on the diminished academic efficiency subscale (46.5%), although with a not very marked difference in the rest of the subscales, there were also slightly lower proportions (emotional exhaustion, 82.7%; and depersonalization, 77.8%) compared to our findings (Muñoz et al., 2022), whereas in Coahuila, the frequency of BS students was only 18.4% (Velasco-Rodríguez, Córdova-Estrada, & Suárez-Alemán, 2013). On the contrary, in Chiapas, one of the regions of Mexico with the highest level of poverty (CONEVAL, 2021), a percentage of moderate/high BS of 80% was reported (Padilla, Chávez, Hernández, & Monterrubio, 2022). These data suggest that the SES between the different regions of Mexico could be related to differential rates of BS, since, as mentioned above, the lack of economic resources limits the possibility to cover expenses related to the fulfillment of academic requirements, which is related to higher levels of student stress.

In our study population, we observed that in the depersonalization subscale, nursing students were more likely to have a moderate/high level of BS compared to those students of non-healthcare academic training. Although to date there are no other published studies that have evaluated the association between nursing training and the presence of BS, our findings are consistent with those reported by studies that have compared the presence of academic burnout among healthcare students (in which nursing students were included) and those in any other field. A study conducted on Mexican undergraduate students showed that social science and physical-mathematical students had a lower mean level of burnout than health sciences students, including nursing and medical students (Guzmán et al., 2020). On the other hand, Wing et al. (2018) reported that a group of undergraduate computer science, biology, social science, and healthcare students (such as nursing or dentistry students) were more likely to experience burnout compared to medical students (Wing et al., 2018). The responsibility involved in caring for people's health, and the exposure to the physical and emotional suffering of patients and their families in the hospital environment, might explain the reasons why nursing students and other healthcare students have higher levels of SB than students in any other fields.

The particularities of university nursing curricula, whose training is focused on professional care, contribute to experiencing stressful situations in the classroom, laboratories, as well as clinical practices in which they must perform care procedures that could cause distress or emergency cases can be found with a high probability of facing events such as death (Silva et al., 2011). Therefore, the association observed in our study in the subscale of depersonalization might be indicative of a coping mechanism by students to distance themselves from the stressors implicit in academic nursing training and thereby, mitigate emotional fatigue or feelings of frustration (Ferri et al., 2015).

In our association analyses, there was evidence of significant interaction according to the school year, with a stronger association being observed in those students who were in the last two years of academic training. Existing data suggest that undergraduate students who attend the last years of their training present higher levels of BS in the depersonalization subscale, as a consequence of a greater degree of difficulty in the subjects studied as the study plan advances, which in turn brings with it a greater workload (García, 2002). In addition, nursing students must be integrated into clinical practices in hospital institutions (Quina Galdino et al., 2020).

Despite previous data in undergraduate students suggesting that the presence of BS might be differential between men and women due to other social roles that students play (Rodríguez-Villalobos et al., 2019), in our analyses we found no evidence of interaction according to the sex of the participants; nonetheless, these findings are consistent with other studies conducted in undergraduate nursing students in which no differences in BS levels were observed between men and women (Quina Galdino et al., 2020; Tomaschewski-Barlem et al., 2014); which might be due to the low proportion of married students or with children in our study population. Unlike the previous data (Njim et al., 2018), in our analysis there was also no evidence of interaction according to the marital status of the participants; however, the proportion of married students in our study sample was very low (5%).

Compared to other countries, especially those with high incomes, the characteristics of certain sociodemographic factors related to burnout syndrome in Mexican university students (i.e., monthly family income) are different (Fares, Al Tabosh, Saadeddin, El Mouhayyar, & Aridi, 2016; Kagawa et al., 2021). Therefore, our findings might be generalized only to those countries with a similar socioeconomic status or human development index. However, our research sets a precedent for the development of future studies that confirm or refute this assertion.

To adequate interpretation of our results, it is necessary to consider some limitations. The transversal approach of this study did not permit the establishment of the time sequence between nursing training and the presence of BS; therefore, the estimated associations are not causal and should be interpreted with caution. Although the present analysis was controlled for important confounding factors, no data were available on the number of siblings of the participants or the family's monthly income, such variables may influence BS levels (Guzmán et al., 2020), consequently, our *aORs* might be affected by residual confounding. The present study was conducted on a group of university students from Hidalgo, Mexico. This region of Mexico presents a higher level of poverty and inequality and since it is suggested that the SES plays a determining role in the development of academic SB, our findings could be generalizable only to populations

with similar socioeconomic characteristics (Merritt & Boltz, 2015; Lin & Yang, 2021).

Despite these limitations, our study has important strengths. For the present study, we conducted logistic regression models to estimate the *aOR* among the variables of interest, therefore, unlike some previous studies, we estimated the magnitude and strength of the association between nursing training and BS. The sample size of our study was large enough to detect the presence of interaction on a multiplicative scale. A validated instrument with acceptable levels of reliability was used to determine the BS, which was applied by trained personnel, and thus we do not expect our findings to have been affected by a differential misclassification bias.

In our study, we found a high proportion of undergraduate students in Hidalgo, Mexico with moderate and high levels of BS in its three components (emotional exhaustion, depersonalization, and diminished academic efficacy). Nursing students were more likely to have a moderate/high level of BS in the depersonalization subscale compared to students of non-healthcare academic training. Among students in the second and third school years, the association between nursing training and burnout levels was stronger compared to those in the first and second school years. Since the studies that have analyzed the role of undergraduate training on the risk of BS are still scarce, it is necessary to continue generating evidence in this regard to better understand this condition. More qualitative research or with a mixed design are required to inquire about the particular sources of stress to which nursing students are exposed and that are related to their type of academic training. Likewise, longitudinal studies are required to establish a temporal sequence between entering university with the development of BS as academic training progresses to infer causality. Due to BS affecting the emotional well-being of nursing students and may be predictive of BS when they become nurses, it is necessary that university programs provide sufficient psychological preparation to enable students to cope with stressful situations both in their academic life and in their future life as healthcare professionals.

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### Conflict of interest

The authors declare they have no conflicts of interest.

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