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CONTENT

On the cover
William Cheselden giving an anatomical demonstration to six spectators in the anatomy-theatre of the Barber-Surgeons' Company, London

Anonymous
Oil painting, ca.(1730-*1740)*

Instituto Nacional de Psiquiatría
Ramón de la Fuente Muñiz

Directorio

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EDITORIAL
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Towards the design of holistic mental health programs in the student population

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During the COVID-19 pandemic, society experienced many changes in daily life; the limitation of social activities led to drastic changes in how interpersonal relationships were conceived. The impact of the pandemic was vast in various spheres, such as economy, politics, education, and health. The effect of the pandemic on education is a complex issue because it leads to discussing student-teacher, student-student, and teacher-teacher relationships; the dynamics of interaction migrated to environments facilitated by technology, each educational level and school discipline have particular experiences of the pandemic impact on their daily lives, undoubtedly all equally interesting. Still, particularly one discipline that the pandemic drastically affected is medical education. The social expectation of the medical profession is very high. During the pandemic, they became heroes, and in turn, some members of society saw them as possible viral vectors, which added to the general fear of the pandemic. Medical education is a complex area of clinical professional training, and it is a scientific and humanistic discipline, so the importance of human interaction is necessary and part of entire study programs. In general, medical and health sciences students need to develop competencies and social skills, which in basic training cycles are integrated into the hidden curriculum and are evaluated through the dynamics in the face-to-face setting. This abrupt change in the teaching and learning process in health sciences led to social isolation, higher suicidal ideation, emotional exhaustion, decreased physical activity, and depression, among others. Published reports on the impact of the pandemic on health sciences students are vast (Carpi & Vestri, 2023; Pitanupong, Sathaporn, Ittasakul, & Karawekpanyawong, 2023), a good part of them coming from developed countries; however, in Latin American countries, there is limited evidence. It is crucial to make visible the studies carried out in the region, one with the most significant social vulnerability to the pandemic. This monothematic number seeks to report the studies carried out in Latin America that address the issue of mental health in education in health sciences. The monothematic comprises nine articles that address the issue of mental health from different methodological perspectives, all of which are undoubtedly very valuable for understanding the mental health challenges that we must address post-pandemic. In this sense, it is worth inviting mental health and medical education specialists to continue documenting how the post-pandemic student population is, both in adapting to the new normality (gradual and controlled opening of social spaces) and in the complete opening of social spaces. Although the pandemic is getting closer to ending, its implications on the health status of those who suffered from it (both directly and indirectly) are not over yet.

Educators and heads of education in health sciences are responsible for detecting and promoting mental health care and promotion programs, which in turn contribute to the construction of healthy coexistence environments. This monothematic presents works that demonstrate the efforts made by educational institutions to improve the mental health of students, such as online mindfulness sessions and psychiatry courses. In addition, evaluations of psychosomatic manifestations, depression, anxiety, stress, suicidal ideation, quality of sleep, physical activity, and resilience are presented in university students during the pandemic. On the other hand, the monothematic includes an article on the statistical validation of the Psychological Well-Being Scale in Mexican medical students, which will

undoubtedly be a work that will be used for various studies in our country. The papers presented come from Peru, Colombia, and Mexico, multicultural countries in Latin America which have diverse training programs in health sciences but converge in many ways through Latin American philosophy.

The mental health of our students is a big task that the various educational actors must face together, involving and working with educators, psychologists, teachers, psychiatrists, academic counselors, university authorities, students, and parents. Each of us from the action nucleus can work on programs articulated and directed by mental health experts that combine different objectives, action methodology, strategic activities, and the ability to be evaluated to know the global and particular impact on our student population. Teachers interested in our students' biopsychosocial development must strive to design this type of holistic program that goes beyond the screening of factors but instead carry out actions and evaluate their impact from various scientific research paradigms. It is essential to add activities, wills, and experiences that translate into real, participatory, and purposeful explosions that favorably impact our students' mental health.

REFERENCES

Carpi, M., & Vestri, A. (2023). The Mediating Role of Sleep Quality in the Relationship between Negative Emotional States and Health-Related Quality of Life among Italian Medical Students. *International Journal of Environmental Research and Public Health*, *20*(1), 26. doi: 10.3390/ijerph20010026

Pitanupong, J., Sathaporn, K., Ittasakul, P., & Karawekpanyawong, N. (2023). Relationship of mental health and burnout with empathy among medical students in Thailand: A multicenter cross-sectional study. *Plos One*, *18*(1), e0279564. doi:10.1371/journal.pone.0279564

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ORIGINAL ARTICLE
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Effectiveness evaluation of online Mindfulness in mental health and alcohol consumption in medical students during the COVID-19 pandemic

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ABSTRACT

Introduction. As a result of the COVID-19 pandemic, the prevalence of stress, anxiety, depression, and alcohol consumption has increased among medical students. Mindfulness is an intervention to decrease these psychopathologies and alcohol consumption; however, evidence has shown unclear results regarding its efficacy. **Objective.** To evaluate the effectiveness of an online Mindfulness-based intervention (MBI) on stress, anxiety, and depression symptomatology levels, as well as on alcohol consumption and mindfulness status in medical students during the COVID-19 pandemic. **Method.** A quasi-experimental study was conducted on 237 students, obtaining sociodemographic data. In addition the levels of psychopathology, alcohol consumption, and state of mindfulness: were measured pre-and post-intervention through the DASS-21, AUDIT, and MASS instruments. Eight online Mindfulness sessions were conducted once a week for approximately one hour each. **Results.** MBI did not reduce levels of psychopathologies or alcohol consumption, nor did the mindfulness status improve. High levels of psychopathologies, dropout rate, and lack of voluntary participation were the main factors limiting the effectiveness of the online MBI. **Discussion and conclusion.** The online MBI wasn't effective among the population under study: we recommend generation strategies where students are involved in and complete intervention programs. Results from this research will help enhance future online mindfulness interventions.

Keywords: Mindfulness, medical education, anxiety, stress, depression, alcohol consumption.

RESUMEN

Introducción. Derivado de la pandemia del COVID-19, la prevalencia de estrés, ansiedad, depresión y consumo de alcohol ha incrementado entre los estudiantes de medicina. La intervención por Mindfulness ha reportado disminuir estas psicopatologías y el consumo de alcohol; no obstante, la evidencia muestra resultados poco claros respecto a su eficacia. **Objetivo.** Evaluar la eficacia de la intervención basada en Mindfulness online (IBM) sobre los niveles de sintomatología de estrés, ansiedad y depresión, así como en el consumo de alcohol y el estado de atención plena en estudiantes de medicina durante la pandemia por COVID-19. **Método.** Se realizó una investigación cuasi-experimental en 237 estudiantes de medicina, de los cuales se obtuvieron datos sociodemográficos; además, se midieron los niveles de psicopatologías, consumo de alcohol, y el estado de atención plena pre y post intervención a través de los instrumentos DASS-21, AUDIT, y MASS. Se llevaron a cabo ocho sesiones de Mindfulness online, una vez por semana, de aproximadamente una hora cada una. **Resultados.** La IBM no redujo los niveles de psicopatologías ni de consumo de alcohol ni mejoró el estado de atención plena. Los altos niveles de psicopatologías, la tasa de abandono y la falta de participación voluntaria, fueron los principales factores que limitan la eficacia del IBM online. **Discusión y conclusión.** La IBM online no fue efectiva entre la población estudiada: se recomienda la generación de estrategias en las que los estudiantes se involucren y completen los programas de intervención, los resultados de esta investigación ayudarán a mejorar futuras intervenciones de mindfulness online.

Palabras clave: Mindfulness, educación médica, ansiedad, estrés, depresión, consumo de alcohol.

INTRODUCTION

The COVID-19 pandemic, declared by the World Health Organization in March 2020, has wreaked unprecedented havoc and difficulties in the quality and development of human life, impacting cultural, political, economic, social, physical, and mental (Gloster et al., 2020).

The closure of educational institutions to reduce the transmission of COVID-19 puts education at risk and damages the mental health of millions of children and young people (Caldera-Villalobos et al., 2020; O'Byrne, Gavin, & McNicholas, 2020; Sanchez, Peña, & Ng, 2020). Recent international reports show that during the pandemic, 26 and 40% of university students show symptoms of anxiety, 21.6% of depression and up to 84% of students show stress (Lai et al., 2020; Lasheras et al., 2020; Ramón-Arbués et al., 2020).

Moreover, these restrictions predispose to feelings of loneliness, despair, and dysfunction in emotional regulation that may lead to alcohol consumption and abuse (Alsoufi et al., 2020; Chodkiewicz, Talarowska, Miniszewska, Nawrocka, & Bilinski, 2020; Meo, Abukhalaf, Alomar, Sattar, & Klonoff, 2020; Testino, 2020; Killgore, Cloonan, Taylor, Lucas, & Dailey, 2021). In this respect, people with depression or anxiety comorbidity with alcohol dependency, up to 70% (Pitchot & Dor, 2019). Among medical students, the prevalence of alcohol use is high, ranging between 66% and 97% (Coker, Coker, & Sanni, 2018; Freire, Castro, & Petroianu, 2020). This has been linked to absenteeism, school dropout, learning difficulties, poor academic performance, and other psychiatric disorders (Freire et al., 2020). As well as high rates of unemployment, social conflicts, domestic violence, and legal penalties (Soares, Farias, & Monteiro, 2019; Witkiewitz, Litten, & Leggio, 2019; Nasui et al., 2021).

Mindfulness-Based Intervention programs (MBI) employ mindfulness techniques in the present moment. Some research has shown that MBI is effective in reducing stress, anxiety, and depression by up to 41% in different types of populations, including university students (Sancho et al., 2018; Huberty et al., 2019). However, it reports that MBIs have low compliance rates and high dropout rates, which reduces their effectiveness (Danilewitz et al., 2018). On the other hand, with the restrictions on physical interaction due to the COVID-19 pandemic, the online MBI application may be an alternative strategy to prevent the development of psychopathologies and alcohol consumption among students (Farris et al., 2021). Morledge et al. (2013) conducted a randomized controlled trial of an online MBI and found a significant reduction in stress levels in medical students. Nevertheless, the research evaluating the effectiveness of online MBIs on psychopathologies and alcohol consumption is still recent; little is known about the factors that might influence the effectiveness of such interventions.

To prevent and improve the mental health conditions of the student population, as well as to propose and refine cost-effective and flexible intervention strategies in their application, this study aimed to evaluate the effectiveness of the online MBI on mental health and alcohol consumption in medical students during the COVID-19 pandemic.

METHOD

Study design and subjects

A longitudinal, quasi-experimental, interventional study was carried out on medical students at the University of Veracruz, Minatitlán campus, in March-July 2021. Was used a non-probabilistic sample of medical students invited of both sexes (n = 560), from the first to the fifth year of the degree, who had accepted and signed their voluntary participation in the study, and who answered completed pre- and post-intervention inventories. Students under psychiatric/psychological treatment or who wanted to drop out of the intervention were excluded and eliminated.

Measurements

Sociodemographic Questionnaire

A questionnaire was applied to collect sociodemographic data that included: sex, age, school semester, school grades, family characteristics, health, hygiene measures, isolation, activities, hobbies, perception of the situation, and online classes, as well as nutritional quality and sleeping time during the pandemic.

Depression, Anxiety, and Stress Scale - 21 (DASS-21)

The DASS-21 is a set of three self-report scales designed to measure the emotional states of depression, anxiety, and stress (Zanon et al., 2021). Each of the three DASS-21 subscales contains seven items, scored from 0 to 3, added up, and interpreted separately. In the data analysis, we used cut-off scores established by Román, Santibáñez, and Vinet (2016) to identify youth at risk of mental health problems.

Alcohol Use Disorders Identification Test (AUDIT)

This test was applied to identify people with patterns of risk of alcohol harm. It has three evaluation domains, consisting of 10 items in total. The first three items: evaluate risky drinking (8-15 points) with questions aimed at knowing the frequency of drinking; items 4 to 6 determined the symptoms of dependence (from 16 to 19 points), looking for data on loss of control over drinking; and questions 7 to 10, evaluate the high-risk of alcohol consumption (from 20 points or more), with questions about the sense of guilt and alcohol abuse consequences (Kamboj et al., 2017; Wielgosz, Goldberg, Kral, Dunne, & Davidson, 2019; Shuai, Bakou, Hardy, & Hogarth, 2020).

Mindfulness Attention Awareness Scale test (MASS)

This instrument measures the frequency of the state of dispositional mindfulness in daily activities without the need for prior training, that is, the open or receptive awareness of attention to what is happening in the present. It consists of 15 items that score individually from 1 to 6. The total score is a result of the arithmetic mean of all items: where high scores indicate a higher level of attention fully and consciously (Schuman-Olivier et al., 2020).

Procedure

The dissemination project and its objectives were addressed to the university medical students through social networks (Facebook and WhatsApp), employing infographics and posters. Subsequently, the first assessment (pre-intervention): was determined using a digital form in Google Forms, where the levels of symptoms of stress, anxiety, and depression were measured using the DASS-21 scale, as well as the high risk of alcohol consumption using the AUDIT. Finally, we used the MASS scale to determine the student's level of the state of dispositional mindfulness.

Subsequently, the online MBI was performed: for eight sessions supervised by a psychologist, one session every week, lasting approximately one to two hours, using the Zoom platform. Finally, the efficacy of the MBI on the symptomatology of stress, anxiety, depression, alcohol consumption, and full awareness: was evaluated post-intervention through the same inventories (Figure 1).

Online Mindfulness-Based Intervention programs (MBI)

The online MBI was taught in eight sessions, lasting approximately one to two hours, once a week, using the virtual platform Zoom, consisting of group meditation guided and supervised by an expert psychologist. The content of each session was based on: relaxation techniques, breathing, movement meditation, guided meditation, single-pointed focus meditation, formal meditation, informal meditation, and body scanning. Were recommended that the students were in a space large enough to perform the movements, in a comfortable posture, seated and with a straight back, preferably wearing comfortable clothing. After each session, was rec-

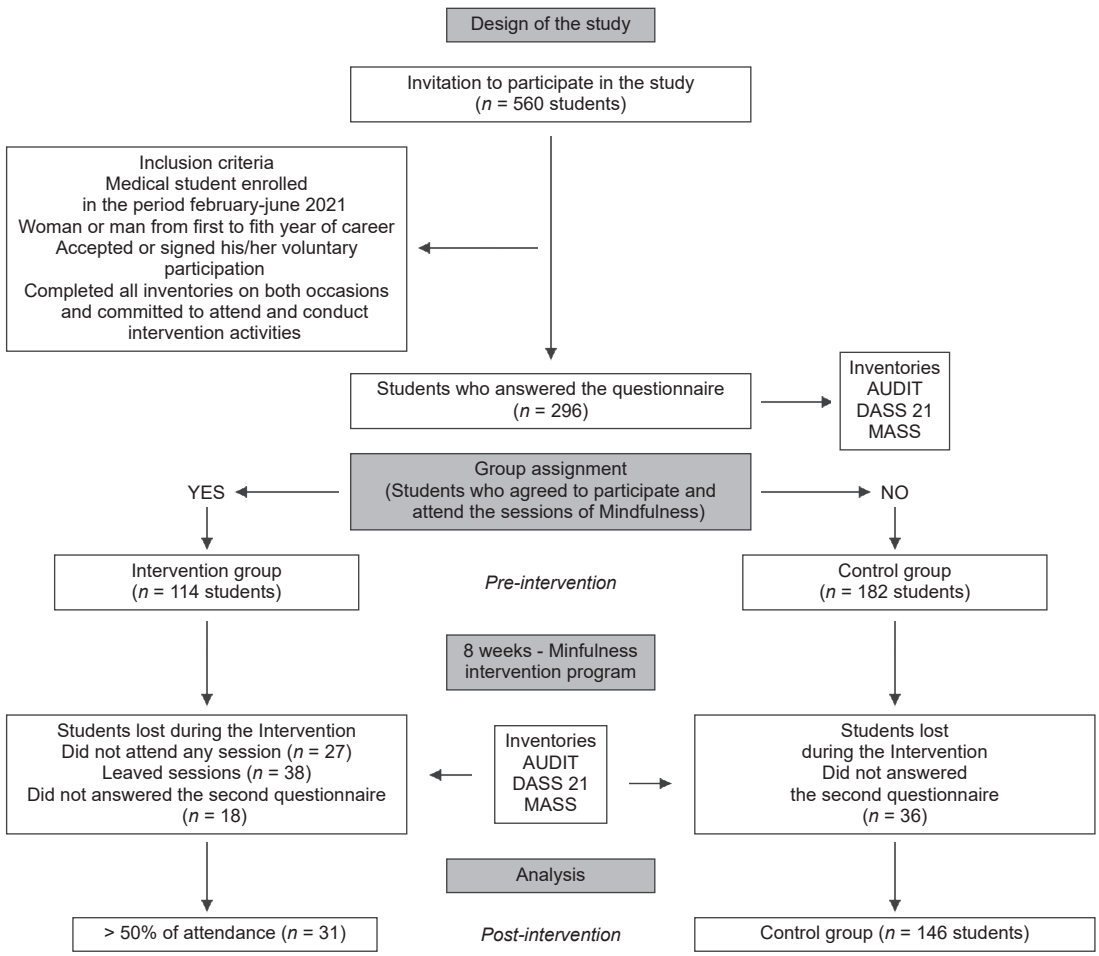

Figure 1. Flow diagram - quasi-experimental study process.

ommended to the participants to do a series of meditation exercises, recorded in a logbook, which was reviewed in subsequent sessions to promote concentration for a longer time.

Statistical analysis

Qualitative variables were analyzed as frequencies and percentages, and quantitative variables as means and standard error. The Chi-square test and Pearson R were used to verify the association and, or correlation between dependent; and independent variables. Comparisons of psychopathologies, alcohol consumption, and sociodemographic variables were performed using Student's t statistics and dependent and independent analysis of variance (ANOVA). The tests were selected depending on normality and homoscedasticity of variance. All data were analyzed with the SPSS 25 for Mac OS (IBM Corp., Armonk, NY, USA). Were considered a 95% confidence level for all statistical tests, and $p \leq .05$ as statistically significant.

Ethical considerations

The project was approved by the Ethics and Institutional Research Committee (CI-001-2021). In addition, it is subject to the General Health Law of Mexico in Articles 13, 14, 16, 20, and 36, Chapters 96, 100, and 102, and following with the Declaration of Helsinki for Medical Research Involving Human Subjects (Ley General de Salud, 1984; Asociación Médica Mundial, 2013).

Table 1
Sociodemographic characteristics of medical students

		Frequency	*Percentage*
Sex	Women	105	59.3
	Men	72	40.7
Age (years old)	18-19	43	24.3
	20-21	70	39.5
	> 22	54	30.5
Semester	2	59	33.3
	4	35	19.8
	6	32	18.1
	8	34	19.2
	10	17	9.6
School grades	7.51 to 8.0	10	5.7
	8.01 to 8.50	24	13.6
	8.51 to 9.0	72	40.7
	9.01 to 9.5	60	33.9
	9.51 to 10	9	5.1
Working status/work situation	Just study	138	78.0
	Mainly works and also studies	28	15.8
	Studies and also looking for work	11	6.2
Reasons to drop out school	Neither or does not apply	89	50.3
	Physical health problems	4	2.3
	Mental health problems	41	23.2
	Economic problems	30	16.9
	Family problems	7	4.0
	Other	6	3.4
Family conformation	Married parents live together	109	61.6
	Married parents live separately	13	7.3
	Divorced parents	23	13.0
	Single mother	16	9.0
	Widowed father/mother	6	3.4
	Other	10	5.6
Head of household's educational attainment	Primary school	7	4.0
	Middle school	24	13.6
	High school	42	23.7
	Bachelor's degree	88	49.7
	Post-graduate education	16	9.0

RESULTS

The final sample consisted of 177 students, of which 105 (59.3%) were women and 72 (40.7%) men, with an average age of 20.8 ± .13 years (range 18 to 25 years), most with overall school grades between 8.5 and 9.0 and whose only concern was studying. Only one student (.6%) was living as a concubine, and the remainder of the students were single (99.4%). Most lived with both their parents (61.6%), and about 50% mentioned mental health problems, followed by economic issues for which they might drop out school (Table 1).

The lifestyle and routines that students had maintained during the pandemic show that 73.4% practiced social distancing, health care, and hygiene basics; additionally, about 60% of students mentioned having social interaction with people outside their family and having some hobbies. Likewise, most of them did some physical activity twice to thrice times a week for no longer than one hour. In addition to 39.7% of students reported having poor or regular sleep quality, sleeping less than six hours a day (Table 2).

On the other hand, it was observed that about 29% of the students were not afraid of SARS-CoV-2 infection, however, 31.6% reported being afraid of the transmission. In addition, 69.5% said they were afraid that a family member would die from COVID-19 and about 30% were afraid of returning to face-to-face classes (Figure 2A). Regarding the perception of taking online classes during the pandemic, most of the medical students considered their experience, learning, academic performance, and relationship with teachers as "regular", while their relationship with classmates was considered mostly "good" (Figure 2B). Finally, 13.1% of the students indicated having thought about suicide.

By the end of the MBI was observed that 31 (17.5%) students attended more than four sessions, and 146 (82.5%) did not attend any sessions. When comparing pre- and post-MBI values, no significant differences were observed in any variable between the previously established groups. On

Table 2
Habits and lifestyles during the pandemic of medical students

		Frequency	*Percentage*
Current situation at home	Does not apply isolation, social distancing, or basic healthcare measures	1	.6
	Only basic healthcare measures	9	5.1
	Social distancing and basic healthcare measures	130	73.4
	Strict home isolation	37	20.9
Social interaction	No	67	37.9
	Yes	110	62.1
Hobby	No	67	37.9
	Yes	110	62.1
Physical activity	No	77	43.5
	Yes	100	56.5
Time spent on physical activity	Neither or does not apply	77	43.5
	< 1 hour	73	41.2
	1-2 hours	11	6.2
	> 2 hours	16	9.0
The weekly amount of physical activity	Neither or does not apply	77	43.5
	1-2 times per week	17	9.6
	3-4 times per week	46	25.9
	> 4 times per week	37	20.9
Sleep quality	Bad	69	38.9
	Regular	80	45.2
	Good	28	15.8
Hours of sleep	1-3 hours	15	8.5
	4-6 hours	127	71.8
	7-8 hours	29	16.4
	> 8 hours	6	3.4
Nutritional quality	Bad	25	14.1
	Regular	63	35.6
	Good	89	50.3

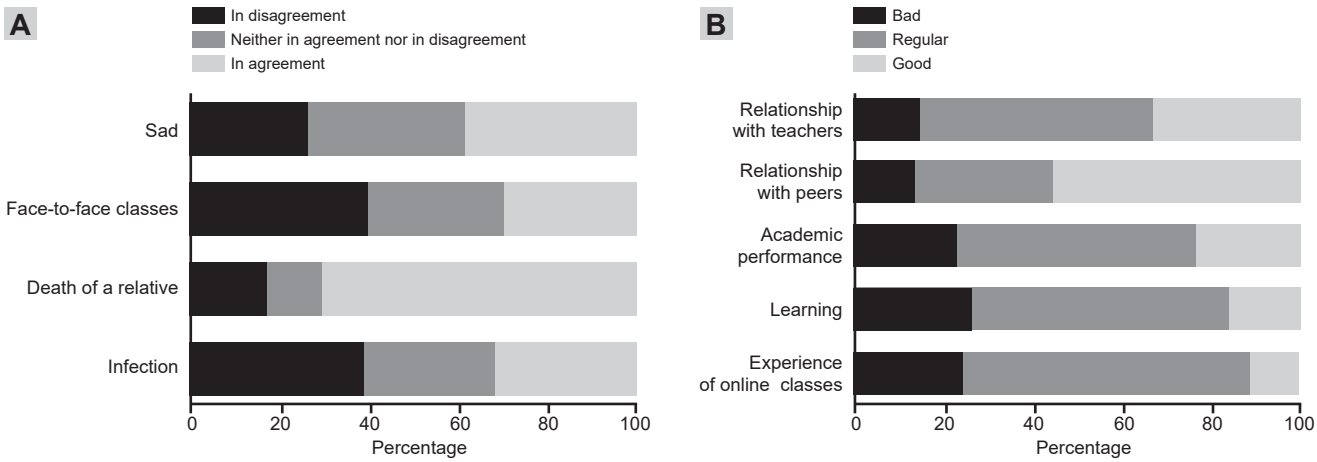

Figure 2. A) Students' perception of the situation and the fears they face during the pandemic. B) Students' perception of the experience of taking online classes during the pandemic.

the contrary, when comparing pre- and post- MBI values, the group that did not attend any session showed significant changes in most of the variables, except AUDIT. In contrast, the group that assisted more than 50% of the MBI sessions did not show significant differences in any variable (Table 3).

Elevated levels of stress, anxiety, depression symptoms, and alcohol consumption were associated with: the experience of taking online classes, poor sleep quality, poor perception of academic performance, their learning, relationship with teachers and peers, less physical activity, thoughts of dropping out of medical school, increased measures of social distancing and health care, and hygiene basics.

Besides that, it observed that students with higher levels of anxiety and stress symptomatology presented a higher attendance at the MBI sessions (supplementary table). In addition, about 20% of the students who showed high-risk alcohol consumption had considered suicide and dropped out of medical school during the pandemic.

In the MASS inventory, lower scores were associated: with non-attendance at MBI sessions. Conversely, higher scores were positively associated with a better experience of online classes and a higher educational level of the head of household ($X^2 = 22.635$, $p = .031$), where higher levels of education were associated with higher levels of concentration (supplementary table).

Other variables such as gender, school grades, nutritional quality, number of people at home, having a hobby, fear of COVID-19, and fear of death of a family member caused by COVID-19, fear of returning to face-to-face classes, among others were not associated with the symptomatology of stress, anxiety, depression, and alcohol consumption.

DISCUSSION AND CONCLUSION

The findings in this study showed that the online MBI was not effectiveness on stress symptomatology, anxiety, de-

Table 3
Comparative analysis between the groups that attended or not the sessions of MBI

	Not attended (n = *146)*		*Attended to > 50% of sessions* (n = *31)*	
	Pre-MBI	Post- MBI	Pre-MBI	Post- MBI
AUDIT	2.527 ± .297	2.472 ± .266	2.548 ± .474	2.283 ± .520
Stress	6.932 ± .423	4.199 ± .384	7.516 ± .689	5.581 ± 1.004
	*Wilcoxon = -4153, $p < .001$			
Depression	5.411 ± .432	3.336 ± .370	5.839 ± .994	4.355 ± .805
	*Wilcoxon = -3130, $p < .001$			
Anxiety	4.925 ± .393	2.822 ± .324	5.419 ± .917	4.581 ± .931
	*Wilcoxon = -3191, $p < .001$			
MASS	59.58 ± 1.425	65.12 ± 1.529	62.68 ± 3.291	64.03 ± 3.318
	*Wilcoxon = 2431, $p = .015$			

* Significant intra-group differences between pre- and post-MBI scores, analyzed with the Wilcoxon sign range test. No intergroup differences were observed in any variables.

pression, alcohol consumption, or mindfulness in medical students. Those could be associated: with the size sample, the high levels of psychopathology of the participants at the beginning of the intervention, the high dropout rate, and the low voluntary participation.

In this regard, in a recent review, the authors analyzed ten studies of Mindfulness intervention in medical students indicating that these interventions did not produce significant reductions in the levels of stress, anxiety, or depression, compared to the groups without intervention (Sekhar et al., 2021) which is consistent with the results obtained in this research. It has also been reported, that the lower effectiveness of the MBIs is due to small sample sizes, high dropout rates from the program, the timeframe implemented intervention, and the lack of participation, commitment, and development of the activities during the sessions (Chmielewski, Łoś, & Łuczyński, 2021) characteristics observed in this study.

Likewise, the lack of reduction in the psychopathologies levels after the MBI could be associated with: the severity of the symptoms presented by the students who attended the sessions since they showed elevated symptomatology (severe or extreme) in the indicators of stress, anxiety, and depression before the intervention, compared to those who did not attend. These findings suggest that the practice of Mindfulness may have limitations in subjects with some psychological disorders (Schuman-Olivier et al., 2020). Similarly, despite the great popularity that MBIs have recently gained, a recent meta-analysis revealed the low or almost null effectiveness of this type of intervention on emotional problems (anxiety and depression) in young students (Zenner, Herrnleben-Kurz, & Walach, 2014), which is consistent with the results obtained in this study.

On the contrary, it was observed on an intra-group level that individuals who did not attend the MBI showed reduced levels of psychopathology and an increase in mindfulness between the first and second measurements. Those could be due to the timeframe or date when the questionnaires were applied (Puig-Lagunes, Vargas-Álvarez, Salinas-Méndez, Ricaño-Santos, & Puig-Nolasco, 2020). Other papers suggested: that the timeframe of the study is crucial, as it may bias the results on the effectiveness of the MBIs (Godara et al., 2021) and a similar situation occurred in the present study, where the first measurement was performed in May when students were in the final evaluations and could present high levels of psychopathologies, while the second measurement was carried out near the vacation period when there was a less academic load.

On the other hand, although the mental health needs of medical students are evident, they are reluctant to seek treatment and to use psychological care services (Rodriguez, Corse, & Rosen, 2017), the main barriers to seeking them are: the feeling that their problems are not important, economic costs, the concern that nobody understands them, and the lack of time due to their rotations and extensive study schedules (Arenas-Monreal, Hernández-Tezoquipa, Valdez-Santiago, & Bonilla-Fernández, 2004; Givens & Tjia, 2002; Rodriguez et al., 2017), this, at the same time, decreases their autonomy and willingness to participate in sports, hobbies and social life, negatively affecting the balance of work life, family life and self-care (Arenas-Monreal et al., 2004; Picton, 2021).

It has been reported that some medical students underestimate other areas of health and the effectiveness of non-medical treatments such as psychotherapy, reducing their voluntary approach and attachment to interventions (Constantinou, Georgiou, & Perdikogianni, 2017). Moreover, most students ignore conventional healthcare routes, formal consultations, promoting self-diagnosis, and peer counseling, with whom they can take informal treatments that, in most cases, are inefficient (Gold, Johnson, Leydon, Rohrbaugh, & Wilkins, 2015; Thistlethwaite, Quirk, & Evans, 2010).

Likewise, there has been reported significant concern about the use of mental health services by students due to the fear of losing the confidentiality of any diagnosis of an emotional problem (Givens & Tjia, 2002; Gold et al., 2015; Rodriguez et al., 2017), as it may represent a danger to their academic record, for the stigma of using mental health services, since students who receive psychological counseling are less likely to obtain residency positions (Givens & Tjia, 2002).

The foregoing is evidence of a lack of policies, programs, and spaces that promote self-care in medical schools, so it is essential to promote the development of self-care skills within these schools, so that future health professionals may be able to induce a favorable change in themselves and people (Arenas-Monreal et al., 2004), considering that some research shows that education in self-care of medical students can contribute to laying the foundation for the formation of physicians more capable of serving patients by taking care of themselves (Ayala, Omorodion, Nmecha, Winseman, & Mason, 2017; Ball & Bax, 2022).

Regarding alcohol consumption, there was no post-MBI reduction or change compared to the non-intervention group, which could be explained by a reduced number of students with high-risk alcohol consumption (8.4%) or problematic alcohol consumption (.56%). However, the prevalence of alcohol consumption observed is higher than in other reports (6.1%; Killgore et al., 2021; Pitchot & Dor, 2019). It has been reported that individuals with higher levels of alcohol consumption tend to present a more gradual or less significant reductions after IMB, presenting less effectiveness in situations of high-risk alcohol consumption (Kamboj et al., 2017; Wielgosz et al., 2019). Furthermore, the Mindfulness effects in reducing alcohol consumption are higher in subjects who also showed a reduction in emotional triggers associated with alcohol consumption (Wiel-

gosz et al., 2019; Shuai et al., 2020) in combination with other prevention programs, or implementation of more intensive MBIs, in terms of duration, which together favor a decrease of the severity and craving to consume, and same time increase abstinence (Huberty et al., 2019; Kamboj et al., 2017; Li, Howard, Garland, McGovern, & Lazar, 2017; Schuman-Olivier et al., 2020). All of the aforementioned may be associated with the lack of reduction in alcohol consumption observed in this study.

On the contrary, the MBIs that have shown less efficacy in the treatment of alcohol consumption have in common: high dropout rates from the program, lack of participation, commitment, and development of the activities during the sessions, and small sample sizes (Witkiewitz & Bowen, 2010) therefore, it is clear that the favorable effects of Mindfulness is positively correlated between the interest of the participants, the time of participation and monitoring of the activities (Sancho et al., 2018) strengths that were not observed in this study.

In addition, many variables (e.g., suicidal thoughts, college dropout, poor relationship with teachers and peers, poor social interaction, poor sleep quality, and home background) were found associated with high levels of psychopathologies and alcohol consumption. These variables could also be restricting the effectiveness of the online MBI. These results are on par with a study conducted in 78 countries during the COVID-19 pandemic, which reported a strong association between the onset of mental health problems and the severity of the restriction measures adopted during quarantine. Likewise, important indicators such as social support and interaction, educational level, and economic-financial status are also important (Gloster et al., 2020).

About the experience of online classes, it was observed a connection with the perception of poor learning, data that are consistent with other studies, where 53.8% of medical students mentioned that the COVID-19 pandemic affected their learning, 75.7% had poor online education, 59.1% presented fear of transmission of the SARS-CoV-2 virus, and 23.5% reported sadness and hopelessness (Coker et al., 2018; Freire et al., 2020).

The results obtained in this research support and contribute to previous reports, which point out that the main factors limiting the effectiveness of online MBI is: low adherence to the program, high dropout rate, loss of interest due to poor virtual interaction, lack of time for medical students, concerns about digital privacy, stigma about psychopathologies, and lack of emotional openness (Puig-Lagunes et al., 2020; Sancho et al., 2018; Schuman-Olivier et al., 2020).

It has also been described that poor motivation to practice meditation outside of sessions, little or complete lack of response to self-report forms or logs, inability to check and count total minutes of meditation, difficulty in scheduling daily sessions, and attendance at more than one session are limitations related to attrition and lack of adherence to MBI (Walsh, Saab, & Farb, 2019; Yang, Schamber, Meyer, & Gold, 2018).

Finally, we emphasize continuing with studies that contribute to the reduced prevalence of stress, anxiety, and depression symptomatology, as well as alcohol consumption in medical students. This unfavorable context exposes the importance of informing students about the consequences of such behaviors on their physical, social, and emotional condition, as well as their academic performance and learning. It also demonstrates the importance of making the medical-student community aware of the need to seek medical and psychological help. In addition, it shows a strong need for educational institutions to implement effective programs focused on mental health and alcohol consumption in students, which can effectively detect, and early treatment of the psychopathologies exposed in this study.

For all the above, we conclude that the online MBI was not effective among the population under study, which: was evidenced by the lack of reduction in the levels of stress symptomatology, anxiety, depression, and alcohol consumption, as well as an increased absence of mindfulness. Our findings suggest that the high prevalence of psychopathologies and alcohol consumption during the COVID-19 pandemic requires the most intensive interventions, with greater adherence and participation. Therefore, we recommend implementation of courses, or workshops, about the promotion of health and wellness, the generation of strategies in which medical students are involved and complete intervention programs, as well as awareness of the short and long-term biopsychosocial consequences inherent to psychopathologies and alcohol abuse.

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Conflict of interest

The authors declare they have no conflicts of interest.

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Author contributions

All authors contributed to the study conception, design, material preparation, data collection and analysis, as well as in the first draft of the manuscript. Similarly, all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

REFERENCES

Alsoufi, A., Alsuyihili, A., Msherghi, A., Elhadi, A., Atiyah, H., Ashini, A., … Elhadi, M. (2020). Impact of the COVID-19 pandemic on medical education: Medical students' knowledge, attitudes, and practices regarding electronic learning. *PLoS One*, *15*(11), e0242905. doi: 10.1371/journal.pone.0242905

Arenas-Monreal, L., Hernández-Tezoquipa, I., Valdez-Santiago, R., & Bonilla-Fernández, P. (2004). Las instituciones de salud y el autocuidado de los médicos. *Salud Pública de México*, *46*(4), 326-332. doi: 10.1590/S0036-36342004000400007

Asociación Médica Mundial. (2013). *Declaración de Helsinki. Principios éticos para la investigación en seres humanos*. (64º Asamblea General).

Ayala, E. E., Omorodion, A. M., Nmecha, D., Winseman, J. S., & Mason, H. R. C. (2017). What Do Medical Students Do for Self-Care? A Student-Centered Approach to Well-Being. *Teaching and Learning in Medicine*, *29*(3), 237-246. doi: 10.1080/10401334.2016.1271334

Ball, S., & Bax, A. (2022). Self-care in Medical Education: effectiveness of health-habits interventions for first-year medical students. *Academic Medicine*, *77*(9), 911-917. doi: 10.1097/00001888-200209000-00023

Caldera-Villalobos, C., Garza-Veloz, I., Martínez-Avila, N., Delgado-Enciso, I., Ortiz-Castro, Y., Cabral-Pacheco, G. A., & Martinez-Fierro, M. L. (2020). The Coronavirus Disease (COVID-19) Challenge in Mexico: A Critical and Forced Reflection as Individuals and Society. *Frontiers in Public Health*, *8*, 337. doi: 10.3389/fpubh.2020.00337

Chmielewski, J., Łoś, K., & Łuczyński, W. (2021). Mindfulness in healthcare professionals and medical education. *International Journal of Occupational Medicine and Environmental Health*, *34*(1), 1-14. doi: 10.13075/ijomeh.1896.01542

Chodkiewicz, J., Talarowska, M., Miniszewska, J., Nawrocka, N., & Bilinski, P. (2020). Alcohol Consumption Reported during the COVID-19 Pandemic: The Initial Stage. *International Journal of Environmental Research and Public Health*, *17*(13), 4677. doi: 10.3390/ijerph17134677

Coker, A., Coker, O., & Sanni, D. (2018). Sociodemographic correlates and symptoms of depression, anxiety, and stress among a sample of nigerian medical students. *Nigerian Journal of Basic and Clinical Science*, *15*(1), 58-62. doi: 10.4103/njbcs.njbcs_50_16

Constantinou, C. S., Georgiou, M., & Perdikogianni, M. (2017). Medical Students' Attitudes and Beliefs towards Psychotherapy: A Mixed Research Methods Study. *Behavioral Sciences*, *7*(3), 55. doi: 10.3390/bs7030055

Danilewitz, M., Koszycki, D., Maclean, H., Sanchez-Campos, M., Gonsalves, C., Archibald, D., & Bradwejn, J. (2018). Feasibility and effectiveness of an online mindfulness meditation program for medical students. *Canadian Medical Education Journal*, *9*(4), e15-e25.

Farris, S. R., Grazzi, L., Holley, M., Dorsett, A., Xing, K., Pierce, C. R., & Wells, R. E. (2021). Online Mindfulness May Target Psychological Distress and Mental Health during COVID-19. *Global Advances in Health and Medicine*, *10*, 216495612110024. doi: 10.1177/21649561211002461

Freire, B. R., Castro, P. A. S. V. de, & Petroianu, A. (2020). Alcohol consumption by medical students. *Revista da Associação Médica Brasileira*, *66*(7), 943-947. doi: 10.1590/1806-9282.66.7.943

Givens, J. L., & Tjia, J. (2002). Depressed medical students' use of mental health services and barriers to use. *Academic Medicine*, *77*(9), 918-921. doi: 10.1097/00001888-200209000-00024

Gloster, A. T., Lamnisos, D., Lubenko, J., Presti, G., Squatrito, V., Constantinou, M., … Karekla, M. (2020). Impact of COVID-19 pandemic on mental health: An international study. *PLoS One*, *15*(12), e0244809. doi: 10.1371/journal.pone.0244809

Godara, M., Silveira, S., Matthäus, H., Heim, C., Voelkle, M., Hecht, M., … Singer, T. (2021). Investigating differential effects of socio-emotional and mindfulness-based online interventions on mental health, resilience, and social capacities during the COVID-19 pandemic: The study protocol. *PLoS One*, *16*(11), e0256323. doi: 10.1371/journal.pone.0256323

Gold, J. A., Johnson, B., Leydon, G., Rohrbaugh, R. M., & Wilkins, K. M. (2015). Mental health self-care in medical students: a comprehensive look at help-seeking. *Academic Psychiatry*, *39*(1), 37-46. doi: 10.1007/s40596-014-0202-z

Huberty, J., Green, J., Glissmann, C., Larkey, L., Puzia, M., & Lee, C. (2019). Efficacy of the Mindfulness Meditation Mobile App "Calm" to Reduce Stress Among College Students: Randomized Controlled Trial. *JMIR mHealth and uHealth*, *7*(6), e14273. doi: 10.2196/14273

Kamboj, S. K., Irez, D., Serfaty, S., Thomas, E., Das, R. K., & Freeman, T. P. (2017). Ultra-Brief Mindfulness Training Reduces Alcohol Consumption in At-Risk Drinkers: A Randomized Double-Blind Active-Controlled Experiment. *International Journal of Neuropsychopharmacology*, *20*(11), 936-947. doi: 10.1093/ijnp/pyx064

Killgore, W. D. S., Cloonan, S. A., Taylor, E. C., Lucas, D. A., & Dailey, N. S. (2021). Alcohol dependence during COVID-19 lockdowns. *Psychiatry Research*, *296*, 113676. doi: 10.1016/j.psychres.2020.113676

Lai, A. Y., Lee, L., Wang, M., Feng, Y., Lai, T. T., Ho, L., … Lam, T. (2020). Mental Health Impacts of the COVID-19 Pandemic on International University Students, Related Stressors, and Coping Strategies. *Frontiers in Psychiatry*, *11*, 584240. doi: 10.3389/fpsyt.2020.584240

Lasheras, I., Gracia-García, P., Lipnicki, D., Bueno-Notivol, J., López-Antón, R., de la Cámara, C., … Santabárbara, J. (2020). Prevalence of Anxiety in Medical Students during the COVID-19 Pandemic: A Rapid Systematic Review with Meta-Analysis. *International Journal of Environmental Research and Public Health*, *17*(18), 6603. doi: 10.3390/ijerph17186603

Ley General de Salud. (1984). *Diario Oficial de la Federación. Última Reforma publicada en el Diario Oficial de la Federación el 16-02-2022*. (Número 27).

Li, W., Howard, M. O., Garland, E. L., McGovern, P., & Lazar, M. (2017). Mindfulness treatment for substance misuse: A systematic review and meta-analysis. *Journal of Substance Abuse Treatment*, *75*, 62-96. doi: 10.1016/j.jsat.2017.01.008

Meo, S. A., Abukhalaf, A. A., Alomar, A. A., Sattar, K., & Klonoff, D. C. (2020). COVID-19 Pandemic: Impact of Quarantine on Medical Students' Mental Wellbeing and Learning Behaviors. *Pakistan Journal of Medical Sciences*, *36*(COVID19-S4), S43-S48. doi: 10.12669/pjms.36.covid19-s4.2809

Morledge, T. J., Allexandre, D., Fox, E., Fu, A. Z., Higashi, M. K., Kruzikas, D. T., … Reese, P. R. (2013). Feasibility of an Online Mindfulness Program for Stress Management—A Randomized, Controlled Trial. *Annals of Behavioral Medicine*, *46*(2), 137-148. doi: 10.1007/s12160-013-9490-x

Nasui, B. A., Popa, M., Buzoianu, A. D., Pop, A. L., Varlas, V. N., Armean, S. M., & Popescu, C. A. (2021). Alcohol Consumption and Behavioral Consequences in Romanian Medical University Students. *International Journal of Environmental Research and Public Health*, *18*(14), 7531. doi: 10.3390/ijerph18147531

O'Byrne, L., Gavin, B., & McNicholas, F. (2020). Medical students and COVID-19: the need for pandemic preparedness. *Journal of Medical Ethics*, *46*(9), 623-626. doi: 10.1136/medethics-2020-106353

Picton, A. (2021). Work-life balance in medical students: self-care in a culture of self-sacrifice. *BMC Medical Education*, *21*(1), 8. doi: 10.1186/s12909-020-02434-5

Pitchot, W., & Dor, B. (2019). Complications psychiatriques liées à l'alcoolisme. [Psychiatric complications associated with alcoholism]. *Revue Médicale de Liège*, *74*(5-6), 300-303.

Puig-Lagunes, Á. A., Vargas-Álvarez, J. E., Salinas-Méndez, L. E., Ricaño-Santos, K. A., & Puig-Nolasco, Á. (2020). Prevalencia de depresión, ansiedad y estrés académico entre estudiantes de medicina, durante distintos periodos de estrés. *Atención Familiar*, *27*(4), 165-171. doi: 10.22201/fm.14058871p.2020.4.76891

Ramón-Arbués, E., Gea-Caballero, V., Granada-López, J. M., Juárez-Vela, R., Pellicer-García, B., & Antón-Solanas, I. (2020). The Prevalence of Depression, Anxiety and Stress and Their Associated Factors in College Students. *International Journal of Environmental Research and Public Health*, *17*(19), 7001. doi: 10.3390/ijerph17197001

Rodriguez, M. L., Corse, A. K., & Rosen, L.D. (2017). Mental Health Services Use Among Medical Students: Perceived Stigma and Barriers to Care. *Medical Science Educator*, *27*(2), 267-272. doi: 10.1007/s40670-017-0392-6

Román, F., Santibáñez, P., & Vinet, E. V. (2016). Uso de las Escalas de Depresión Ansiedad Estrés (DASS-21) como Instrumento de Tamizaje en Jóvenes con Problemas Clínicos. *Acta de Investigación Psicológica*, *6*(1), 2325-2336. doi: 10.1016/s2007-4719(16)30053-9

Sanchez, T., Peña, E., & Ng, B. (2020). Mental health in the age of COVID-19, a Mexican experience. *Indian Journal of Psychiatry*, *62*(Suppl 3), S377-S379. doi: 10.4103/psychiatry.indianjpsychiatry_1048_20

Sancho, M., De Gracia, M., Rodríguez, R. C., Mallorquí-Bagué, N., Sánchez-González, J., Trujols, J., … Menchón, J. M. (2018). Mindfulness-Based Interventions for the Treatment of Substance and Behavioral Addictions: A Systematic Review. *Frontiers in Psychiatry*, *9*, 95. doi: 10.3389/fpsyt.2018.00095

Schuman-Olivier, Z., Trombka, M., Lovas, D. A., Brewer, J. A., Vago, D. R., Gawande, R., … Fulwiler, C. (2020). Mindfulness and Behavior Change. *Harvard Review of Psychiatry*, *28*(6), 371-394. doi: 10.1097/hrp.0000000000000277

Sekhar, P., Tee, Q. X., Ashraf, G., Trinh, D., Shachar, J., Jiang, A., … Turner, T. (2021). Mindfulness-based psychological interventions for improving mental well-being in medical students and junior doctors. *Cochrane Database of Systematic Reviews*, *12*(12), CD013740. doi: 10.1002/14651858.cd013740.pub2

Shuai, R., Bakou, A. E., Hardy, L., & Hogarth, L. (2020). Ultra-brief breath counting (mindfulness) training promotes recovery from stress-induced alcohol-seeking in student drinkers. *Addictive Behaviors*, *102*, 106141. doi: 10.1016/j.addbeh.2019.106141

Soares, F. R. R., Farias, B. R. F. de, & Monteiro, A. R. M. (2019). Consumption of alcohol and drugs and school absenteeism among high school students of public schools. *Revista Brasileira de Enfermagem*, *72*(6), 1692-1698. doi: 10.1590/0034-7167-2018-0828

Testino, G. (2020). Are Patients With Alcohol Use Disorders at Increased Risk for Covid-19 Infection? *Alcohol and Alcoholism*, *55*(4), 344-346. doi: 10.1093/alcalc/agaa037

Thistlethwaite, J., Quirk, F., & Evans, R. (2010). Medical students seeking medical help: A qualitative study. *Medical Teacher*, *32*(2), 164-166. doi: 10.3109/01421590903434177

Walsh, K. M., Saab, B. J., & Farb, N. A. (2019). Effects of a Mindfulness Meditation App on Subjective Well-Being: Active Randomized Controlled Trial and Experience Sampling Study. *JMIR Mental Health*, *6*(1), e10844. doi: 10.2196/10844

Wielgosz, J., Goldberg, S. B., Kral, T. R. A., Dunne, J. D., & Davidson, R. J. (2019). Mindfulness Meditation and Psychopathology. *Annual Review of Clinical Psychology*, *15*(1): 285-316. doi: 10.1146/annurev-clinpsy-021815-093423

Witkiewitz, K., & Bowen, S. (2010). Depression, craving, and substance use following a randomized trial of mindfulness-based relapse prevention. *Journal of Consulting and Clinical Psychology*, *78*(3), 362-374. doi: 10.1037/a0019172

Witkiewitz, K., Litten, R. Z., & Leggio, L. (2019). Advances in the science and treatment of alcohol use disorder. *Science Advances*, *5*(9), eaax4043. doi: 10.1126/sciadv.aax4043

Yang, E., Schamber, E., Meyer, R. M. L., & Gold, J. I. (2018). Happier Healers: Randomized Controlled Trial of Mobile Mindfulness for Stress Management. *The Journal of Alternative and Complementary Medicine*, *24*(5), 505-513. doi: 10.1089/acm.2015.0301

Zanon, C., Brenner, R. E., Baptista, M. N., Vogel, D. L., Rubin, M., Al-Darmaki, F. R., … Zlati, A. (2021). Examining the Dimensionality, Reliability, and Invariance of the Depression, Anxiety, and Stress Scale–21 (DASS-21) Across Eight Countries. *Assessment*, *28*(6), 1531-1544. doi: 10.1177/1073191119887449

Zenner, C., Herrnleben-Kurz, S., & Walach, H. (2014). Mindfulness-based interventions in schools-A systematic review and meta-analysis. *Frontiers in Psychology*, *5*, 603 doi: 10.3389/fpsyg.2014.00603

SUPPLEMENTARY TABLE

Associations between the psychopathologies symptoms, alcohol consumption, sociodemographic variables, and habits and lifestyles of medical students during the pandemic

	AUDIT	*Stress*	*Anxiety*	*Depression*	*MASS*
Age	$X^2 = 8.047$, $p = .018$				
Semester	$X^2 = 10.475$, $p = .033$				
Situation	$X^2 = 10.768$, $p = .005$				
Career drop-out	$X^2 = 4.231$, $p = .040$	$X^2 = 22.306$, $p < .001$	$X^2 = 11.162$, $p = .025$	$X^2 = 21.384$, $p < .001$	
Family conformation				$X^2 = 43.497$, $p = .009$	
Online classes experience					$X^2 = 18.735$, $p = .001$
Online learning		$X^2 = 23.662$, $p = .003$	$X^2 = 16.371$, $p = .037$	$X^2 = 26.636$, $p = .001$	
Online academic performance		$X^2 = 18.442$, $p = .018$		$X^2 = 27.877$, $p < .001$	
Current home situation		$X^2 = 26.141$, $p = .010$		$X^2 = 25.914$, $p = .011$	
Social interaction	$X^2 = 4.023$, $p = .045$				
Physical activity			$X^2 = 27.254$, $p = .007$		
Quality of sleep		$X^2 = 34.385$, $p = .005$	$X^2 = 34.450$, $p = .005$	$X^2 = 26.769$, $p = .044$	
Has considered suicide	$X^2 = 6.825$, $p = .033$	$X^2 = 12.495$, $p = .014$	$X^2 = 15.252$, $p = .004$	$X^2 = 23.955$, $p < .001$	
Attended to sessions		$X^2 = 9.92$, $p = .042$	$X^2 = 13.117$, $p = .011$		$X^2 = 26.81$, $p = .044$

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Association between level of anxiety and degree of psychosomatic features in medical students at a private university in Northern Peru

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ABSTRACT

Introduction. University students experience multiple academic and social activities that cause enormous anxiety and stress, affecting them psychologically and physically. In this case, the psychosomatic symptoms, resulting from stress and anxiety, are part of a physical ailment and their emergence can be linked to the setting and time when they occur. **Objective.** To determine the association between anxiety levels and the degree of psychosomatic features (PF). **Method.** A study with a cross-sectional analytical design was developed, which included a total of 352 medical students from the city of Piura, Peru, to whom the PHQ-15 test was administered through Google Forms. Those with a previous psychiatric diagnosis were excluded. **Results.** It was found that PF are influenced by being female (RPa = 1.45, CI 95% = [1.23, 1.71], $p \leq .001$), and having mild (RPa = 1.11, CI 95% = [1.20, 1.63], $p \leq .001$) and moderate anxiety levels (RPa = 1.7, CI 95% = [1.24, 2.34], $p = .001$). **Discussion and conclusion.** The presence of a mental condition is necessary for the presence of PF. These stressors create selective alterations of large-scale brain networks involved in the cognitive control, regulation and processing of emotions, stress, and somatic-visceral perception. The study concludes that psychosomatic features are found in approximately 75% of medical students and anxiety in approximately 15%. Mild and moderate anxiety is an influential factor in psychosomatic features, as is being female.

Keywords: Psychophysiological disorders, anxiety, medical students, PHQ-15.

RESUMEN

Introducción. Los estudiantes universitarios viven un escenario de acumulación de actividades académicas y sociales que generan gran ansiedad y estrés, afectándolos psicológica y físicamente. En este caso, los síntomas psicosomáticos, producto del estrés y la ansiedad, forman parte de una dolencia física y pueden vincular su aparición con el escenario y el tiempo que los presenta. **Objetivo.** Determinar la asociación entre el nivel de ansiedad y el grado de manifestación psicosomática. **Método.** Se desarrolló un estudio con diseño analítico transversal que incluyó un total de 352 estudiantes de medicina de la ciudad de Piura, Perú, a quienes se les aplicó mediante Google forms el test de PHQ-15. Se excluyeron a aquellos con diagnóstico psiquiátrico previo. **Resultados.** Se encontró que las MS se ven influenciadas por el sexo femenino (RPa = 1.45, IC 95% = [1.23, 1.71], $p \leq .001$), nivel de ansiedad leve (RPa = 1.11, IC 95% = [1.20, 1.63], $p \leq .001$) y nivel de ansiedad moderada (RPa = 1.7 IC 95% = [1.24, 2.34]; $p = .001$). **Discusión y conclusión.** Es necesario la presencia de una afección mental para la presencia de la MS. Estos factores estresantes generan alteraciones selectivas de redes cerebrales a gran escala implicadas en el control cognitivo, regulación y procesamiento de emociones, estrés y percepción somático-visceral. Se concluye que las manifestaciones psicosomáticas se encuentran en 75% y la ansiedad en 15% aproximadamente, en estudiantes de medicina. La ansiedad leve y moderada es un factor influyente en las manifestaciones psicosomáticas, así como el sexo femenino.

Palabras clave: Trastornos psicofisiológicos, ansiedad, estudiantes de medicina, PHQ-15.

INTRODUCTION

The current global prevalence estimate for anxiety is 26.9% (Nochaiwong et al., 2021). Anxiety is a response of the autonomic nervous system consisting of defensive reactions to danger, which perform a protective function and are considered to be the basis of learning and motivation. If it happens repeatedly, prolonged manner, it disrupts physiological and psychosocial functioning (Galiano-Ramírez, Castellanos-Luna, & Moreno-Mora, 2016). Compounded by the context of the COVID-19 pandemic and the new normality, it leads to psychosomatic disorders (Bartmann et al., 2021; Tollos, Theodorakopoulou, & Christodoulou, 2021).

A psychosomatic disorder is a condition in which psychological stresses negatively affect a person's physiological (somatic) functioning. Psychosomatic symptoms therefore arise as a physiological concomitant of an emotional state (Sajid, Ahmad, & Khalid, 2015). In this case, psychosomatic symptoms, resulting from stress and anxiety, are part of a physical ailment and their emergence can be linked to the setting and time in which they occur (Trebin, 2020).

University students often report anxiety and stress together with psychosomatic symptoms. It has been documented that they may have similar levels to those of other populations, such as the chronically ill. University students are considered to be a particularly vulnerable population, which is exposed to stressors and their effects (Maria-Jereyard & Bhuvaneswari, 2019).

Medical students are not exempt from this, undergoing adaptive physiological, neuroendocrine, immunological, emotional, and behavioral processes during their university education (Atta & Almilaibary, 2022; Salam et al., 2015). They experience multiple academic and social activities that create enormous anxiety and stress, affecting optimal learning and academic performance (Alzahrani, Alghamdi, Alqarni, Alshareef, & Alzahrani, 2019; Cabanach, Souto-Gestal, & Fernández Cervantes, 2017).

The academic factors associated with the development of anxiety and depression are grade retention, age, and sex (de La Rosa-Rojas et al., 2015; Quito-Calle, Tamayo-Piedra, Buñay-Barahona, & Neira-Cardenas, 2017). Anxiety and depression increase in intensity according to the year of study, with higher levels of anxiety occurring during clinical science semesters (Anton et al., 2021).

It is important to evaluate mental health in medical students, specifically during the pandemic. As a result of the factors mentioned earlier, the aim was to determine the association between anxiety levels and the degree of psychosomatic features in medical students.

METHOD

Study design

A cross-sectional, analytical study was undertaken with convenience sampling.

Subjects/sample description

The study was conducted in the city of Piura in Northern Peru. Three hundred and fifty-two medical students from Antenor Orrego Private University (UPAO), César Vallejo University (UCV) and the National University of Piura (UNP) were enrolled in the study. The UPAO and UCV are private universities, whereas the UNP is a state university. University students enrolled in the 2022-I semester were included. Study participants were youths aged seventeen and older. Those with psychiatric diagnoses prior to their admission to university were excluded.

Measurements

A survey was designed in Google Forms with the instruments used, comprising three sections. The first records general characteristics (age, sex, semester, and grade retention); the second psychosomatic features and the third the degree of anxiety. To assess psychosomatic features, the 15-item PHQ-15 (Patient Health Questionnaire Physical Symptoms) was used, with scores ranging from 0 to 30 and scores ≥ 5, ≥ 10, and ≥ 15 representing mild, moderate, and severe levels of somatization (Kroenke, Spitzer, & Williams, 2002). This scale was previously used in a national study on adolescents in metropolitan Lima in 2018 (Bulnes-Bedón, Alvarez-Taco, & Morales-Isasi, 2018). The degree of anxiety was evaluated using Zung's 20-item Self-rating Anxiety Scale (Dunstan & Scott, 2020). In its Spanish version, each item was evaluated on a Likert scale, rated from 1 to 4, with the lowest score being 20 and the highest 80. Scores 50-59, 60-69, and 70 and over represent mild, moderate, and severe anxiety, respectively.

Procedure

Once permission had been granted by the universities and the study had been approved by the ethics committee of Antenor Orrego Private University, data were collected in March and April of 2022. To corroborate their status as registered students, standardized messages were sent with an invitation to participate in the study to the institutional emails of medical students from UPAO, UCV, and UNP universities. If the students agreed to participate, they were contacted via WhatsApp on their personal cell phones to explain the objective of the study, the selection criteria, the informed consent form and the way the measurement tool

Table 1
Anxiety level and psychosomatic features of medical students from three university medical faculties in Northern Peru

	Psychosomatic features				
	Absent n *(%)*	*Mild* n *(%)*	*Moderate* n *(%)*	*Severe* n *(%)*	*p-value*
Anxiety level	77 (21.9)	126 (35.8)	105 (29.8)	44 (12.5)	
Absent	73 (94.8)	116 (92.0)	76 (72.3)	34 (77.3)	
Mild	4 (5.2)	9 (7.1)	28 (26.7)	8 (18.1)	< .001
Moderate	0 (0)	1 (.9)	1 (1)	2 (4.6)	

Source: UPAO, UCV and UNP student data sheets.

should be completed. Students who met the selection criteria and voluntarily agreed to participate were sent the online link to Google Forms.

Statistical analysis

Data from the surveys undertaken were entered into a Microsoft Excel spreadsheet for cleaning and purging. STATA version 16 was used for the analysis. The PHQ-15 screening instrument and Zung's test scores were categorized and regarded as qualitative variables, which were presented in frequency and percentage. The quantitative variable age was presented as a mean and standard deviation. The chi-square test was used to find an association. The PRc and PRa were subsequently calculated (adjusting for age, gender, study cycle and grade retention).

Ethical considerations

There were no risks or benefits for any participant. Answering the virtual survey did not involve any expense, nor were financial incentives provided. Data confidentiality was maintained, and participant anonymity respected. The project was approved by the ethics committee of Antenor Orrego Private University with code RR Nº 3335-2016-R-UPAO.

RESULTS

Association between anxiety and psychosomatic features

As can be seen from Table 1, the degrees of PF were categorized, determining the level of anxiety for each degree. It was found that over 75% of the students surveyed presented PF. The maximum level of anxiety found was moderate, with a progressive increase being observed in cases with the most severe degrees of PF. The association was highly significant.

Factors associated with psychosomatic features

Table 2 shows that being female increases the risk of presenting psychosomatic features by 45% compared to males. Presenting a mild and moderate level of anxiety increases the risk of PF by 40% and 70% respectively. There were no significant associations with age, studying clinical sciences or grade retention.

DISCUSSION AND CONCLUSION

This study, which was designed to determine the association between psychosomatic features and anxiety levels in university students, included a total of 352 students.

It was found that 35.8% presented mild, 29.8% moderate, and 12.5% severe psychosomatic features, with a total of 78.1% presenting some type of psychosomatic feature. Despite these figures, there is a dearth of information in the recent literature on the prevalence of psychosomatic features in university students. However, this is associated with the high prevalence of psychosomatic features in health workers, which is above 75% (López-Rodríguez, García-Gracia, Ponce-Martín, Arranz-Ballesteros, & Parejo-Aguilera, 2021; Uribe-Prado, 2020).

The degree of anxiety found was distributed as follows: 13.9% presented a mild degree of anxiety and 1.1% a mod-

Table 2
Bivariate and multivariate analysis of psychosomatic features and their association with the variables studied

	n (%)	*Bivariate PRc (95% CI)*	*p-value*	*Multivariate PRa (95% CI)*	*p-value*
Female sex	199 (56.5)	1.5 (1.27, 1.78)	< .001	1.45 (1.23, 1.71)	< .001
Age (M ± SD)	23.2 ± 3.7	.98 (.96, 1.00)	.147	.98 (.96, 1.01)	.427
Clinical sciences (≥ 6th cycle)	220 (62.4)	1.08 (.91, 1.27)	.343	1.11 (.92, 1.33)	.24
Grade retention	172 (48.9)	.91 (.78, 1.05)	.229	.91 (.78, 2.34)	.22
Anxiety level		1.24 (1.26, 1.61)	< .001		
Absent	299 (84.9)			References	
Mild	49 (13.9)			1.4 (1.20, 1.63)	< .001
Moderate	4 (1.1)			1.7 (1.24, 2.34)	.001

Source: UPAO, UCV and UNP student data sheets.

erate degree. The degree of anxiety found was distributed as follows: 13.9% showed a mild and 1.1% a moderate degree. These results vary according to the type of test used to determine the degree of anxiety. Thus, for example, a study conducted by Ordóñez-Galeano (2020) in Guatemala using Beck's inventory with first and last year medical students found that 68% and 66% experienced mild anxiety, and 41% and 57% moderate anxiety respectively (Ordóñez-Galeano, 2020). At the international level, in Spain, Gutiérrez-Pastor I. used Goldberg's Anxiety and Depression Scale (GADS) for medical students at a Spanish university, finding a global anxiety rate of 54.9% (Gutiérrez-Pastor, Quesada-Rico, Gutiérrez-Pastor, Nouni-García, and Carratalá-Munuera, 2021). Peruvian studies have revealed a high incidence of anxiety, ranging from 23% according to the Beck Inventory to 75.4% using the Generalized Anxiety Disorder Assessment (GAD-7; Armas-Elguera, Talavera, Cárdenas, & de la Cruz-Vargas, 2021; Saravia-Bartra, Cazorla-Saravia, & Cedillo-Ramirez, 2020). These values can be influenced by social and political settings such as the COVID-19 Pandemic (Saravia-Bartra et al., 2020) as well as by the year of study and the consumption of harmful products such as alcohol and tobacco (Robles-Mariños, Angeles, & Alvarado, 2022).

Our study found a low probability of the association between the degree of anxiety and psychosomatic features being due to chance ($p < .001$). It also discovered that the presence of any degree of anxiety increased by 40% (PRc = 1.4, 95% CI [1.26, 1.61], p value ≤ .001) the possibility of presenting psychosomatic features compared to students who had no anxiety. In the statistical analysis adjusted by age, gender, year of study and grade retention, it was found that female students were 45% were more likely (RPa = 1.45, CI 95% [1.23, 1.73], p value ≤ .001) to present psychosomatic features than male students In addition, having a mild or moderate level of anxiety meant that students were 40% (PRa = 1.4, 95% CI [1.20, 1.63], p value = ≤ .001) and 70% (PRa = 1.7, 95% CI [1.24, 2.34]. p value = .001) more likely to present psychosomatic features respectively, compared with those who do not experience anxiety. This can be explained by the nature of these somatic symptoms, which are often considered to be vague somatoform disorders superimposed on depression or anxiety or organic causal attributions. This means that the presence of a mental condition is necessary for the presence of a psychosomatic symptom (Trebin, 2020). These stressors produce selective alterations of large-scale brain networks involved in cognitive control and the regulation, and processing of emotions, stress, and somatic-visceral perception, leading to various psychosomatic features such as headaches, low back pain, joint pain, retro-ocular pain, nausea, dizziness, vomiting, seizures (conversion syndrome), and fainting (Rossetti et al., 2021).

The study concludes that psychosomatic features are found in approximately 75% of medical students and anxiety in approximately 15%. Mild and moderate anxiety is an influential factor in psychosomatic features, as is being female. Given this situation, periodic evaluations and anxiety management sessions could be proposed to reduce psychosomatic features to ensure the mental health of future doctors, which will have a positive effect on their academic training.

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Conflict of interest

The authors declare that they have no conflicts of interest.

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REFERENCES

Alzahrani, A., Alghamdi, A., Alqarni, T., Alshareef, R., & Alzahrani, A. (2019). Prevalence and predictors of depression, anxiety, and stress symptoms among patients with type II diabetes attending primary healthcare centers in the western region of Saudi Arabia: a cross-sectional study. *International Journal of Mental Health Systems*, *13*, 48. doi: 10.1186/s13033-019-0307-6

Anton, N. E., Rendina, M. A., Hennings, J. M., Stambro, R., Stanton-Maxey, K. J., & Stefanidis, D. (2021). Association of Medical Students' Stress and Coping Skills With Simulation Performance. *Simulation in Healthcare*, *16*(5), 327-333. doi: 10.1097/sih.0000000000000511

Armas-Elguera, F., Talavera, J. E., Cárdenas, M. M., & de la Cruz-Vargas, J. A. (2021). Trastornos del sueño y ansiedad de estudiantes de Medicina del primer y último año en Lima, Perú. *FEM: Revista de la Fundación Educación Médica*, *24*(3), 133-138. doi: 10.33588/fem.243.1125

Atta, I. S., & Almilaibary, A. (2022). The Prevalence of Stress Among Medical Students Studying an Integrative Curriculum During the COVID-19 Pandemic. *Advances in Medical Education and Practice*, *13*, 35-45. doi: 10.2147/amep.s345330

Bartmann, C., Fischer, L. M., Hübner, T., Müller-Reiter, M., Wöckel, A., McNeill, R. V., ... Diessner, J. (2021). The effects of the COVID-19 pandemic on psychological stress in breast cancer patients. *BMC Cancer*, *21*(1), 1356. doi: 10.1186/s12885-021-09012-y

Bulnes-Bedón, M. S., Alvarez-Taco, C. L., & Morales-Isasi C. (2018). Ansiedad social y regulación emocional en adolescentes de Lima metropolitana con y sin presencia de síntomas somáticos. *Temática Psicológica*, *14*(14), 51-68. doi: 10.33539/tematpsicol.2018.n14.1810

Cabanach, R. G., Souto-Gestal, A., & Fernández Cervantes, R. (2017). Perfiles de regulación emocional y estrés académico en estudiantes de fisioterapia. *European Journal of Education and Psychology*, *10*(2), 57-67. doi: 10.1016/j.ejeps.2017.07.002

de La Rosa-Rojas, G., Chang-Grozo, S., Delgado-Flores L., Oliveros-Lijap L., Murillo-Pérez D., Ortiz-Lozada R., … Carreazo, N. Y. (2015). Niveles de estrés y formas de afrontamiento en estudiantes de Medicina en comparación con estudiantes de otras escuelas; lima: Universidad Peruana de Ciencias Aplicadas; 2015. *Gaceta Médica de México*, *151*(4), 443-449.

Dunstan, D. A., & Scott, N. (2020). Norms for Zung's Self-rating Anxiety Scale. *BMC Psychiatry*, *20*(1), 90. doi: 10.1186/s12888-019-2427-6

Galiano-Ramírez, M. de la C., Castellanos-Luna, T., & Moreno-Mora, T. (2016). Manifestaciones somáticas en un grupo de adolescentes con ansiedad. *Revista Cubana de Pediatría*, *88*(2), 195-204.

Gutiérrez-Pastor, I., Quesada-Rico, J. A., Gutiérrez-Pastor, A., Nouni-García, R., & Carratalá-Munuera, M. C. (2021). Depresión, ansiedad y salud autopercibida en estudiantes de Medicina: un estudio transversal. *Revista Española de Educación Médica*, *2*(2), 21-31.

Kroenke, K., Spitzer, R. L., & Williams, J. B. (2002). The PHQ-15: validity of a new measure for evaluating the severity of somatic symptoms. *Psychosomatic Medicine*, *64*(2), 258-266. doi: 10.1097/00006842-200203000-00008

López-Rodríguez, B., García-Gracia, E., Ponce-Martín, P., Arranz-Ballesteros, B., & Parejo-Aguilera, M. C. (2021). Entorno psicosocial y manifestaciones psicosomáticas en enfermeras de una unidad de quirófano. *Revista de la Asociación Española de Enfermería Quirúrgica*, *46*(1885-2548), 21-27.

Maria-Jereyard, K. G., & Bhuvaneswari, U. (2019). Psychosomatic symptoms and Higher Seondary School students. *Indian Journal of Applied Research*, *9*(11).

Nochaiwong, S., Ruengorn, C., Thavorn, K., Hutton, B., Awiphan, R., Phosuya, C., ... Wongpakaran, T. (2021). Global prevalence of mental health issues among the general population during the coronavirus disease-2019 pandemic: a systematic review and meta-analysis. *Scientific Reports*, *11*(1), 10173. doi: 10.1038/s41598-021-89700-8

Ordóñez-Galeano, R. A. (2020). Depresión y ansiedad en estudiantes de medicina. *Revista Ciencia Multidisciplinaria CUNORI*, *4*(2), 15-21. doi: 10.36314/cunori.v4i2.123

Quito-Calle, J. V., Tamayo-Piedra, M. del C., Buñay-Barahona, D. P., & Neira-Cardenas, O. S. (2017). Estrés académico en estudiantes de tercero de bachillerato de unidades educativas particulares del Ecuador. *Revista Electrónica de Psicología Iztacala*, *20*(3), 253-276.

Robles-Mariños, R., Angeles, A. I., & Alvarado, G. F. (2022). Factores asociados con la ansiedad por la salud en estudiantes de Medicina de una universidad privada en Lima, Perú. *Revista Colombiana de Psiquiatría*, *51*(2), 89-98. doi: 10.1016/j.rcp.2020.11.002

Rossetti, M. G., Delvecchio, G., Calati, R., Perlini, C., Bellani, M., & Brambilla, P. (2021). Structural neuroimaging of somatoform disorders: A systematic review. *Neuroscience & Biobehavioral Reviews*, *122*, 66-78. doi: 10.1016/j.neubiorev.2020.12.017

Sajid, A., Ahmad, T., & Khalid, T. (2015). Stress in medical undergraduates; its association with academic performance. *Bangladesh Journal of Medical Science*, *14*(2), 135-141. doi: 10.3329/bjms.v14i2.21815

Salam, A., Mahadevan, R., Abdul Rahman, A., Abdullah, N., Abd Harith, A. A., & Shan, C. P. (2015). Stress among First and Third Year Medical Students at University Kebangsaan Malaysia. *Pakistan Journal of Medical Sciences*, *31*(1), 169-173. doi: 10.12669/pjms.311.6473

Saravia-Bartra, M. M., Cazorla-Saravia, P., & Cedillo-Ramirez, L. (2020). Nivel de ansiedad de estudiantes de medicina de primer año de una universidad privada del Perú en tiempos de Covid-19. *Revista de la Facultad de Medicina Humana*, *20*(4), 568-573. doi: 10.25176/rfmh.v20i4.3198

Tollos, I., Theodorakopoulou, A., & Christodoulou, G. N. (2021). Stress and pathophysiological mechanisms for the development of psychosomatic disease. *Psychiatriki*, *32*(2), 148-156. doi: 10.22365/jpsych.2021.023

Trebin, E. (2020). Psychosocial and Somatoform Disorders. *Deutsches Ärzteblatt International*, *116*(8), 134. doi: 10.3238/arztebl.2020.0134a

Uribe-Prado, J. F. (2020). Riesgos psicosociales, burnout y factores psicosomáticos en servidores públicos. *Investigación Administrativa*, *49*, 125. doi: 10.35426/iav49n125.03

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Depression, suicide ideation, and irrational beliefs: Explanatory models in psychology students

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ABSTRACT

Introduction. In rational emotive behavioral therapy, irrational beliefs are significant in mental health since their presence leads to conditions such as depression and suicidal ideation. Since these conditions have been increasing worldwide, it is essential to explore the factors that contribute to their understanding. **Objective.** To design explanatory models for depression and suicidal ideation based on irrational beliefs in psychology students. **Method.** Quantitative, non-experimental, cross-sectional study with multivariate analysis. **Results.** Two explanatory models were designed: one for depression and the other for suicidal ideation. Thirty-nine per cent of depressive symptomatology can be explained by the presence of irrational beliefs concerning perfectionism, avoidance of responsibilities, concern over the future, and the determinism of the past. At the same time, 54% of suicidal ideation can be explained by the presence of beliefs centering on perfectionism, avoidance of responsibilities, external locus of control, and the determinism of the past. **Discussion and conclusion.** Depression and suicidal ideation in psychology students can partly be explained by irrational beliefs concerning perfectionism, external locus of control, concern over the future, avoidance of responsibilities, and the determinism of the past. Clinical care approaches can modify these beliefs to reduce symptoms and promote mental health.

Keywords: Mental health, depression, suicide, suicidal ideation, irrational beliefs.

RESUMEN

Introducción. Para la terapia racional emotiva conductual las creencias irracionales tienen un gran peso en la salud mental, ya que la presencia de estas genera padecimientos como depresión e ideación suicida. Se sabe que en el mundo estos padecimientos han ido en aumento, por ello, es importante explorar factores que faciliten su explicación. **Objetivo.** Generar modelos explicativos para la depresión y la ideación suicida desde las creencias irracionales en estudiantes de psicología. **Método.** Estudio cuantitativo, no experimental, transversal con análisis multivariado. **Resultados.** Se realizaron modelos explicativos; uno para la depresión y otro para ideación suicida. La sintomatología depresiva se explica en 39% con la presencia de creencias irracionales de perfeccionismo, evitación de responsabilidades, preocupación por el futuro y determinismo del pasado. Por otro lado, la ideación suicida se explica en 54% con la presencia de las creencias de perfeccionismo, evitación de responsabilidades, locus de control externo y determinismo del pasado. **Discusión y conclusión.** La depresión e ideación suicida en estudiantes de psicología se puede explicar en parte por creencias irracionales de perfeccionismo, locus de control externo, preocupación por el futuro, evitación de responsabilidades y determinismo del pasado. A través de enfoques de atención clínica es factible modificar dichas creencias con el objetivo de disminuir sintomatología y promover la salud mental.

Palabras clave: Salud mental, depresión, suicidio, ideación suicida, creencias irracionales.

INTRODUCTION

Mental health is a global topic of interest due to the increasing prevalence of mental disorders, with depression being the most frequent worldwide (World Health Organization [WHO], 2021), and suicide the worst outcome. In Mexico, approximately fifteen million people report some type of mental illness, with depression being the most common (Secretaría de Salud, 2020). Moreover, according to the National Institute of Statistics and Geography (INEGI, 2021), from 2018 to 2020, the suicide rate rose from 5.4 to 6.2 per 100,000 inhabitants, with young people aged between 18 and 29 comprising the group with the highest rate (10.7).

To better understand these phenomena, it is essential to define each one. Depression is characterized by low mood, persistent sadness, feelings of worthlessness and guilt, as well as a lack of interest in previously rewarding activities (WHO, 2021).

Ellis and Grieger (1990) proposed an explanatory model of depression in which people feel guilty, see themselves as incapable and self-defeating, and think they are failing to control their lives. In this proposal, clinical intervention focuses on modifying irrational beliefs such as the following: *you must be successful in life, you must obtain approval, other people should treat you decently, life should not be so complicated and it is horrible when life does not turn out the way you would like*.

Suicidal ideation refers to thoughts about taking one's own life (Turecki et al., 2019). The explanatory model of suicide proposed by O'Connor, called the motivational-volitional model (MVM), comprises three phases: pre-motivational, motivational, and volitional. The pre-motivational phase comprises environmental factors and life events that can cause discomfort, whereas in the motivational phase, suicidal ideation emerges as a result of ideas of defeat and/or humiliation. These beliefs are reinforced through social perfectionism, which, when not achieved, creates feelings of defeat and humiliation. Furthermore, the person believes they will never emerge from this state. This contributes to beliefs of pessimism and negative affect that encourage the feeling of being trapped in a problem that is beyond their control. Finally, during the volitional phase, a person arrives at suicidal behavior (O'Connor & Kirtley, 2018).

Irrational beliefs are absolute, rigid thoughts that make it difficult to generate states of well-being, adaptive behaviors, or goal achievement (Ruiz, Díaz, & Villalobos, 2012). Studies have been conducted that focus on examining the relationship between irrational beliefs, depression, and suicidal ideation.

A study by Dudău, Sfeatcu, Funleru, and Dumitrache (2015) on ninety Romanians pursuing an undergraduate degree in dentistry or a master's in psychotherapy found a positive correlation between irrational beliefs and depression, anxiety, and stress symptoms.

For their part, Stephenson, Watson, Chen, and Morris (2018) sought to determine the relationship between irrational beliefs, self-concept, self-esteem, and emotional disturbances in 184 university students. They observed a positive correlation between depression and low frustration tolerance.

Likewise, in Turkey, Balkis and Duru (2020) attempted to identify irrational beliefs in men and women with depression in 476 university students. They showed that demand and catastrophizing together contribute to the prediction of depressive symptoms in both sexes.

The relationship between irrational beliefs and suicidal ideation has also been explored. In Ecuador, Quimbiulco and Castro (2017) sought to identify the irrational beliefs that predispose people to attempt suicide. They studied thirty patients with suicide attempts and found that beliefs of hopelessness, guilt, and helplessness can influence suicide attempts.

A study by Bahamón, Alarcón, García, and Trejos (2015) reported the relationship between maladaptive schemes and suicidal risk in 151 psychology students from Colombia. Approximately 75% of the sample showed a medium to high level of suicidal risk, while maladaptive schemes of emotional deprivation, abandonment, self-demandingness, distrust, and insufficient self-control positively correlated with suicidal risk.

In Mexico, Córdova, Rosales, and Montufa (2015) described the characteristics of 593 high school students with suicidal ideation, finding high scores for negative outlook. They considered that irrational beliefs contribute to predicting the risk of suicidal behaviors.

The study by Flink et al. (2017) analyzed irrational beliefs, depression, and suicidal ideation in seventy-nine psychiatric outpatients in Finland, finding that patients with suicidal ideation scored higher in catastrophic beliefs.

Another study by Zou et al. (2017) explored the effects of psychological pain, finding positive correlations between negative automatic thoughts and depressive symptoms and suicidal ideation in thirty-two patients.

Lastly, in Latin America, Gómez, Núñez, Caballo, Agudelo, and Grisales (2019) evaluated 1,408 Colombian students to analyze the risk factors and predictors of suicidal behavior, finding that depression and hopelessness beliefs are among the factors that best predict suicidal behavior.

After observing the association between these three variables and realizing the social impact these mental health problems create worldwide, the authors sought to create explanatory models of depression and suicidal ideation based on the presence of irrational beliefs in undergraduate psychology students.

Proposing explanatory models for depression and suicidal ideation based on irrational beliefs, based on rational emotive behavioral therapy (REBT), will allow an explanatory vision of mental health problems from an ap-

proach which, in the first instance, has demonstrated the relationship between thoughts and emotional and behavioral symptoms. At the same time, there is also evidence of the effectiveness of interventions using this approach to improve mental health, reduce problems and generate rational thoughts (Ellis & Grieger, 1990). According to REBT, these beliefs affect mental health in general. However, this study points out how they can contribute to depressive states and suicidal ideation.

METHOD

Study design

This is a quantitative, non-experimental, cross-sectional study, with multivariate analysis (Lévy & Varela, 2006).

Subjects

Non-probabilistic, convenience sampling was used to secure a total of 391 university students from a public university in northern Mexico, where the bachelor's program in psychology is taught. The sample was obtained during the time the questionnaires were available to be answered.

Instruments

The instruments applied were the Beck Depression Inventory (BDI), the Inventory of Suicidal Orientation (ISO-21) and the Adaptation of the Jones Irrational Beliefs Questionnaire.

Beck's Depression Inventory (Beck, 1988), validated in Mexico by Jurado et al. (1998), is a one-dimensional instrument that measures the depressive symptoms the subject has experienced in the past week. It contains twenty-one items, with Likert-type response options and four categories for identifying minimal (zero to nine points), mild (ten to sixteen points), moderate (seventeen to twenty-nine points), and severe depression (thirty to sixty-three points), with Cronbach's alpha of .87 (Jurado et al., 1998), which obtained an alpha of .940 in the study presented.

The Inventory of Suicide Orientation (King & Kowalchuk, 1994), validated in Mexico by Valdés and González (2019), is an instrument designed to measure ideas associated with suicide. It contains twenty-one items with responses on a Likert scale, and includes five categories: low self-esteem, hopelessness, inability to cope with emotions, suicidal ideation, and loneliness and despondency, with qualifying ranges of low (0 to 20), moderate (21 to 31), and high (32 to 63). Reliability was obtained from a root mean square error of approximation (RMSEA) analysis of .054, an adjusted goodness-of-fit index (AGFI) of .882, a goodness-of-fit index (GFI) of .906, a root mean square error (RMSE) of .098 and a chi-square ratio over the degrees of freedom (CMIN) of 2.180 (Valdés & González, 2019). In the present study, Cronbach's Alpha of .898 was obtained.

The Jones (1968) irrational beliefs questionnaire, validated and adapted in the Mexican population by Olvera (2014), is an instrument that quantifies the beliefs people have, consisting of fifty items with responses on the Likert scale. It measures nine categories of irrational beliefs: need for approval (α = .693), perfectionism (α = .824), tendency to blame (α = .645), external locus of control (α = .723), concern over the future (α = .714), avoidance of responsibilities (α = .578), dependency (α = .680), determinism of the past (α = .545), and ideal solutions (α = .674; Olvera, 2014). In the present study, Cronbach's Alpha of .851 was obtained.

Procedure

To conduct the research, a letter was sent to the academic units where the bachelor's program in psychology was being taught to request the dissemination of the battery of tests among students.

These tests was administered using a virtual form to students enrolled in the psychology degree program of a public university in Northern Mexico, with data being collected between September and October 2021. To avoid potential sources of bias, responses were not allowed to be submitted unless all the questions in the battery of tests had been answered.

Parametric statistics were used, checking for the normal distribution of data. In SPSS version 24, descriptive analyses were performed with statistics such as percentages to identify levels of depression, suicidal ideation, and irrational beliefs, as well as the Kolmogorov Smirnov statistic, symmetry, kurtosis, and effect size to identify the data distribution. Correlational analyses were undertaken of the three study variables using Pearson's bivariate correlation, as well as multiple linear regression analysis using the input method, one to predict depression and another to predict suicidal ideation based on irrational beliefs.

Based on the predictive results of both variables, the IBM Analysis of Moment Structures AMOS 18 program was used for the explanatory analysis through structural equation modeling, with the maximum likelihood estimation method. The CMIN score (x2/gl) with a parameter of less than three for goodness-of-fit indices, GFI with a parameter greater than .900, CFI with a parameter greater than .900 and RMSEA with a parameter less than .050 (Lévy & Varela, 2006) were used.

Ethical considerations

The study was reviewed and approved on November 9, 2020 by the ethics committee of the master's program in Clinical Psychology of the participating university.

Table1
Summary of correlation matrix between subscales and total of irrational beliefs test with BDI and ISO-21

	BDI	*ISO-21*
Need for approval	.397**	.454**
Perfectionism	.513**	.624**
Tendency to blame	.191**	.251**
External locus of control	.194**	.232**
Concern over the future	.373**	.385**
Avoidance of responsibilities	.440**	.547**
Dependence	.167**	.315**
Determinism of the past	.552**	.603**
Ideal solutions		
Total irrational beliefs	.581**	.697**

Note: **Correlation is significant at the .01 level (bilateral).

Each subject subsequently gave their informed consent during the administration of the battery of tests. Those who so requested were sent their results, together with a directory of clinical psychologists and psychiatrists whom they could consult in the event they required psychological care if they presented depressive symptoms or suicide orientation.

RESULTS

Three hundred and ninety-one psychology students participated in the research, of which 310 were women (79.3%) and seventy-seven men (19.7%) while four people (1%) answered other in the question on sex. The mean age of subjects was twenty, with a standard deviation of 3.58. Most subjects were enrolled in the first four semesters of the degree (65%).

A total of 34.5% scored a minimum level of depression on the BDI, 21.7% a mild level and 28.4% a moderate level, while 15.3% were classified as having severe depression. In the ISO-21, 35.8% of the population obtained a low risk level of suicide orientation, 30.2% a moderate and 34% a high risk level.

The asymmetry score was analyzed to ensure that it did not exceed two points, to perform differential procedures. Likewise, kurtosis values ranged between .620 and -.686, which represents mesokurtic behavior and normal distribution (Hernández, Fernández, & Baptista, 2010).

The Kolmogorov-Smirnov normality test accepted the null hypothesis of the total score of irrational beliefs with a significance level of p = .473, perfectionism (p = .371), external locus of control (p = .106), avoidance of responsibilities (p = .078), and the total score of the ISO-21 (p = .077), showing that the data followed a normal distribution.

Conversely, the null hypotheses for all other scales and subscales were rejected by the same test, but the effect size for them was less than .20, indicating that the difference between the distribution and the data was not as large, which is why parametric tests were administered (Coe & Merino, 2003).

In the correlation analysis, coefficients were estimated between the subscales and the total score of the irrational beliefs questionnaire with the total score of the BDI and the ISO-21, using Pearson's correlation. Positive and significant correlations were observed between all the subscales and the total score of the irrational beliefs test, except for the ideal solutions subscale (Table 1). This means that the greater a person's irrational beliefs, the greater their depressive symptoms and suicidal ideation. The same is true of beliefs regarding the need for approval, perfectionism, the tendency to blame, external locus of control, concern over the future, avoidance of responsibilities, dependency, and the determinism of the past.

When the correlation measures were performed, it was possible to observe that the assumption of linear association was fulfilled between all the variables in the irrational beliefs test, except for the subscale of ideal solutions, and the total BDI score. For this reason, linear regression models were performed, finding that the total BDI score was adjusted to an equation consisting of the following predictors: determinism of the past (β = .341), avoidance of responsibilities (β = .198), perfectionism (β = .181), and concern over the future (β = .106); This model has a predictive capacity of R^2 = .408 (Table 2). This shows that 40% of depressive symptoms were linked to irrational beliefs that the past determines the present, avoiding responsibilities is better than facing them, perfection must be sought, and worrying dis-

Table 2
Linear regression model of BDI with total population

Model	*Unstandardized coefficients*		*Standardized coefficients*			*95% CI for B*		*Collinearity statistics*	
	B	*ET*	*β*	*t*	*Sig.*	*LI*	*LS*	*T*	*FIV*
(Constant)	-26.129	3.536		-7.390	.000	-33.081	-19.177		
Determinism of the past	1.184	.165	.341	7.160	.000	.859	1.509	.676	1.480
Perfectionism	.391	.114	.181	3.415	.001	.166	.615	.545	1.836
Avoidance of responsibilities	.559	.128	.198	4.369	.000	.308	.811	.751	1.332
Concern over the future	.350	.150	.106	2.336	.020	.055	.645	.747	1.338

Notes: R = .639; R^2 = .408.
Dependent variable = Total depression (BDI).

Table 3
Linear regression model of ISO-21 with total population

	Unstandardized coefficients		Standardized coefficients			95% CI for B		Collinearity statistics	
Model	B	ET	β	t	Next.	LI	LS	T	FIV
(Constant)	-19.863	2.450		-8.106	.000	-24.681	-15.046		
Determinism of the past	1.099	.137	.332	8.052	.000	.831	1.368	.689	1.451
Perfectionism	.645	.090	.313	7.187	.000	.468	.821	.615	1.625
Avoidance of responsibilities	.677	.111	.250	6.117	.000	.459	.895	.699	1.431
External locus of control	.226	.111	.073	2.039	.042	.008	.444	.909	1.100

Notes: R = .741; R^2 = .549.
Dependent variable = ISO-21.

proportionately about the future. It is worth mentioning that the effect size is large (.332; Dominguez, 2017).

A linear regression was also performed for the total score of the ISO-21, which was associated with all the subscales in the irrational beliefs test, except for the ideal solutions one, since it did not meet the assumption of linear association. For the total ISO-21 score, an equation was adjusted, which consisted of the following predictors: determinism of the past (β = .332), perfectionism (β = .313), avoidance of responsibilities (β = .250) and external locus of control (β = .073, Table 3). This model has a predictive capacity of R^2 = .549. This shows that 54% of having suicide orientation depends on holding irrational beliefs such as the past determines the present, perfection must be sought, avoiding responsibilities is better than facing them and believing that things happen regardless of what a person does (external locus of control). It is worth mentioning that the effect size is large (.482; Dominguez, 2017).

An explanatory model of depression was subsequently built, in which it was observed that beliefs concerning perfectionism, the avoidance of responsibilities, concern over the future and the determinism of the past explain the presence of depressive symptoms in 39% of subjects (Figure 1). This model shows indicators of goodness of fit with a CMIN of 1.248, GFI of .999, CFI of 1, and RMSEA of .025, indicating that the model has an excellent fit (Lévy & Varela, 2006).

Likewise, an explanatory model was created for suicide orientation (Figure 2), in which beliefs concerning perfectionism, the avoidance of responsibilities, an external locus of control and the determinism of the past explain 54% of suicide orientation. This model shows indicators of goodness of fit with a CMIN of .533, GFI of .999, CFI of 1, and RMSEA of .000, indicating that the model has an excellent fit (Lévy & Varela, 2006).

DISCUSSION AND CONCLUSION

To achieve the proposed objective, the authors sought to create one explanatory model of depression and another for

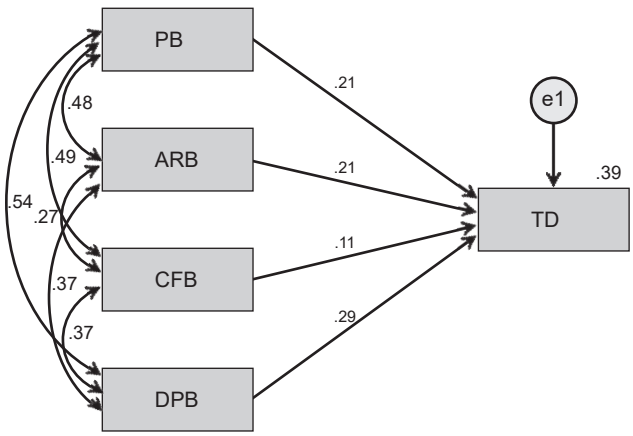

Figure 1. Explanatory model of depression caused by irrational beliefs.

Notes: PB = Perfectionism Belief; ARB = Avoidance of Responsibilities Belief; CFB = Concern over the Future Belief; DPB = Determinism of the Past Belief; TD = Total Depression.

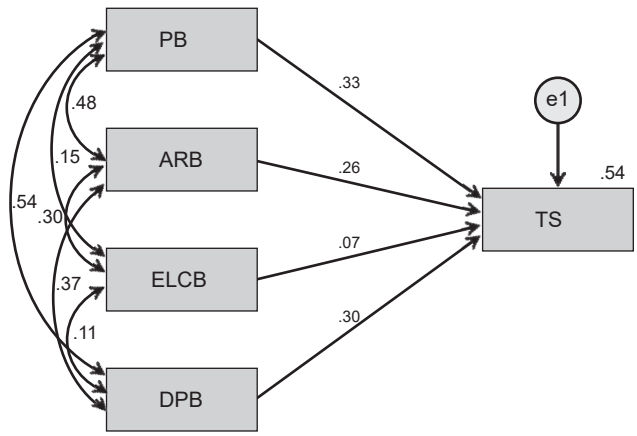

Figure 2. Explanatory model of suicide orientation due to irrational beliefs.

Notes: PB = Perfectionism Belief; ARB = Avoidance of Responsibilities Belief; ELCB = External Locus of Control Belief; DPB = Determinism of the Past Belief; TS = Total Suicide (total suicide ideation).

suicidal ideation based on irrational beliefs in psychology students. To this end, three hundred and ninety-one subjects enrolled in this degree course at a public university in the north of the country were analyzed.

A total of 43.7% of the sample studied reported moderate or high levels on the depression scale. Regarding the prevalence of suicide risk in the present research, it was found that 64.2% of the sample reported a moderate to high level of risk, which is below that reported in studies such as the one by Bahamón et al. (2015), which found a 75% risk in psychology students in Colombia.

Consistent with what has been reported in research on university students, a positive correlation was found with certain irrational beliefs and depressive symptoms (Balkis & Duru, 2020; Dudău et al., 2015; Stephenson et al., 2018). Likewise, correlations between suicidal ideation and irrational beliefs were identified, as reported in other research conducted with high school and university students (Bahamón et al., 2015; Córdova et al., 2015; Gómez et al., 2019; Quimbiulco & Castro, 2017).

In addition, the present research found that depression was predicted in 40% of subjects due to the presence of beliefs concerning the determinism of the past, avoidance of responsibilities, perfectionism, and concern over the future. In the case of the sample, 54% of suicide orientation depended on the presence of irrational beliefs concerning the determinism of the past, perfectionism, avoidance of responsibilities, and external locus of control.

In line with what was reported by Flink et al. (2017) and Zou et al. (2017) in their study of patients with psychiatric diagnoses, in psychology students, it was found that irrational beliefs have a bearing on depression and suicidal ideation.

According to what has been reviewed in the literature in relation to the explanatory model of depression (Ellis & Grieger, 1990) and suicidal behaviors (O'Connor & Kirtley, 2018), these models can contribute to an understanding of the specific irrational beliefs that may promote their presence. They also contribute to the development of specific strategies for cognitive-behavioral interventions by modifying these beliefs in therapeutic interventions in patients with depression and/or suicidal ideation.

An explanatory model of depression was created, based on beliefs concerning perfectionism, avoidance of responsibilities, concern over the future, and the determinism of the past. This model of depression coincides with the one proposed by Ellis and Grieger (1990), which mentions the presence of the belief that a person must be successful in everything they do (perfectionism). When people think they have failed, they stop trying to do something for their lives (avoidance of responsibilities), view themselves with self-defeatism, believe that the situation will always remain like this (concern over the future), and feel guilty over past events (determinism of the past).

For its part, the explanatory model of suicidal ideation is based on the beliefs of perfectionism, avoidance of responsibilities, external locus of control, and the determinism of the past, which are consistent with the volitional motivational model of O'Connor and Kirtley (2018), which notes that suicidal ideation emerges at the point when a person feels defeated because of failing to achieve social perfection (perfectionism). They therefore prefer to stop trying to avoid humiliation (avoidance of responsibilities), which, in turn, leads to pessimism. This is caused by the feeling of being trapped (external locus of control) and that they will never be able to emerge from this state (determinism of the past).

The main limitations are the size of the sample, and the fact that the subjects were only drawn from one university in one state, meaning that other populations must be included to be able to generalize the data. Likewise, since we did not work with clinical samples, it is necessary to confirm the results with people who have been diagnosed with depression or who have reported significant intentionality in regard to their suicidal ideation.

Finally, we consider that this study could be used in higher education institutions, in the areas of health sciences or social sciences, to include care strategies for depressive symptoms and the modification of irrational beliefs in the training of future professionals who will treat mental health problems.

Depression and suicidal ideation in psychology students can be predicted by irrational beliefs involving the need for approval, perfectionism, a tendency to blame, external locus of control, concern over the future, avoidance of responsibilities, dependency, and the determinism of the past.

Clinical care approaches such as REBT make it possible to modify these beliefs to reduce symptoms or create actions for mental health prevention and promotion in university students, specifically those pursuing degrees in psychology.

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Conflict of interest

The authors declare they have no conflicts of interest.

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REFERENCES

Bahamón, M., Alarcón, Y., García, C., & Trejos, A. (2015). Riesgo suicida, funcionalidad familiar y esquemas maladaptativos en jóvenes universitarios. In Y. Alarcón, F. Vásquez, W. Pineda, & Y. Martínez, (Ed.), *Estudios Actuales en Psicología (197-222)*. Barranquilla, Colombia: Universidad Simón Bolívar.

Balkis, M., & Duru, E. (2020). Gender differences in the organizational structure of the rational/irrational beliefs in depressive symptoms. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, *38*(2), 272-294. doi: 10.1007/s10942-020-00343-6

Beck, A., Steer, R. A., & Carbin, M. G. (1988). Psychometric properties of the Beck Depression Inventory: Twenty-five years of evaluation. *Clinical Psychology Review*, *8*(1), 77-100. doi: 10.1016/0272-7358(88)90050-5

Coe, R., & Merino, C. (2003). Magnitud del Efecto: Una guía para investigadores y usuarios. *Revista de Psicología*, *21*(1), 145-177. doi: 10.18800/psico.200301.006

Córdova, M., Rosales, J., & Montufa, E. (2015). Ideación suicida en estudiantes de educación media superior: descripción con base en la aproximación dialéctico conductual. *Revista Intercontinental de Psicología y Educación*, *17*(1), 79-100. Retrieved from www.redalyc.org/pdf/802/80242935005.pdf

Dominguez, S. (2017). Magnitud del efecto en análisis de regresión. *Interacciones*, *3*(1), 3-5. doi: 10.24016/2017.v3n1.46

Dudău, D., Sfeatcu, I., Funleru, C., & Dumitrache, M. (2015). Professional stress in relation to anxiety, depression, and irrational beliefs among dental and psychotherapy students. *Procedia - Social and Behavioral Sciences*, *187*, 158-162. doi: 10.1016/j.sbspro.2015.03.030

Ellis, A., & Grieger, R. (1990). *Manual de terapia racional emotiva*. España: Desclée de Brouwer.

Flink, N., Lehto, S., Koivumaa-Honkanen, H., Viinamäki, H., Ruusunen, A., Valkonen-Korhonen, M., & Honkalampi, K. (2017). Early maladaptive schemas and suicidal ideation in depressed patients. *The European Journal of Psychiatry*, *31*(3), 87-92. doi: 10.1016/j.ejpsy.2017.07.001

Gómez, A., Núñez, C., Caballo, V., Agudelo, M., & Grisales, A. (2019). Predictores psicológicos del riesgo suicida en estudiantes universitarios. *Psicología Conductual*, *27*(3), 391-413. Retrieved from www.behavioralpsycho.com/wp-content/uploads/2019/12/03.Gomez-27-3oa-1.pdf

Hernández, R., Fernández, C., & Baptista, M. (2010). *Metodología de la investigación*. México: McGraw Hill.

Instituto Nacional de Estadística y Geografía [INEGI]. (2021). *Estadística a propósito del día mundial para la prevención del suicidio. Datos nacionales. INEGI*. Comunicado de prensa núm. 520/21. Retrieved from www.inegi.org.mx/contenidos/saladeprensa/aproposito/2021/Suicidios2021_Nal.pdf

Jones, R. (1968). *A factory measure of Ellis irrational belief system, with personality and maladjustment correlates*. [Tesis doctoral, Technological Collage Texas]. Texas Tech University Libraries. Retrieved from https://ttu-ir.tdl.org/handle/2346/18941

Jurado, S., Villegas, M., Méndez, L., Rodríguez, F., Loperena, V., & Varela, R. (1998). La estandarización del inventario de depresión de Beck para los residentes de la ciudad de México. *Salud Mental*, *21*(3), 26-31. Retrieved from http://www.revistasaludmental.mx/index.php/salud_mental/article/view/706/0

King, J., & Kowalchuk, B. (1994). *ISO - 30 Adolescent: Inventory of Suicide Orientation - 30*. Minneapolis, Minnesota: NCS-Pearson.

Lévy, J., & Varela, J. (2006). *Modelización con estructuras de covarianzas en ciencias sociales*. España: Cristina Seco.

O'Connor, R., & Kirtley, O. (2018). The integrated motivational–volitional model of suicidal behaviour. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *373*(1754), 20170268. doi: 10.1098/rstb.2017.0268

Olvera, O. (2014). *Propiedades psicométricas del test de creencias irracionales en estudiantes de psicología de la Facultad de Estudios Superiores Zaragoza*. [Tesis de licenciatura, Universidad Nacional Autónoma de México]. Repositorio Institucional de la UNAM. Retrieved from https://repositorio.unam.mx/contenidos/propiedades-psicometricas-del-test-de-creencias-irracionales-en-estudiantes-de-psicologia-de-la-facultad-de-estudio-337470?c=Elnzpb&d=false&q=*:*&i=2&v=1&t=search_0&as=2

Organización Mundial de la Salud [OMS]. (2021). *Depresión*. Retrieved from https://www.who.int/es/news-room/fact-sheets/detail/depression

Quimbiulco, M., & Castro, A. (2017). *Aspectos psicosociales y creencias irracionales en pacientes con intento de suicidio atendidos en el servicio de salud mental del Hospital Carlos Andrade Marín*. [Tesis de Licenciatura, Universidad Central del Ecuador]. Repositorio digital de la Universidad Central del Ecuador. Retrieved from http://www.dspace.uce.edu.ec/handle/25000/15257

Ruiz, M., Díaz, M., & Villalobos, A. (2012). *Manual de técnicas de intervención cognitivo conductuales*. Bilbao: España: Desclée de Brouwer.

Secretaría de Salud. (2020). *Salud mental*. Retrieved from http://data.salud.cdmx.gob.mx/portal/index.php/programas-y-acciones/309#:~:text=Poblaci%C3%B3n%20Objetivo&text=Estudios%20realizados%20por%20la%20OMS,de%20discapacidad%20a%20nivel%20mundial.&text=La%20Secretaria%20de%20Salud%20Federal,adultos%20j%C3%B3venes%20en%20edad%20productiva

Stephenson, E., Watson, P., Chen, Z., & Morris, R. (2018). Self-compassion, self-esteem, and irrational beliefs. *Current Psychology*, *37*(4), 809-815. doi: 10.1007/s12144-017-9563-2

Turecki, G., Brent, D., Gunnell, D., O'Connor, R., Oquendo, M., Pirkis, J., & Stanley, B. (2019). Suicide and suicide risk. *Nature Reviews Disease Primers*, *5*, 74. doi: 10.1038/s41572-019-0121-0

Valdés, K., & González, J. (2019). Análisis Confirmatorio de la Escala de Orientación Suicida ISO-30 en una muestra de adolescentes de Coahuila, México. *Revista de Psicología y Ciencias del Comportamiento de la Unidad Académica de Ciencias Jurídicas y Sociales*, *10*(2), 11-29. doi: 10.29059/rpcc.20191126-89

Zou, Y., Li, H., Shi, C., Lin, Y., Zhou, H., & Zhang, J. (2017). Efficacy of psychological pain theory–based cognitive therapy in suicidal patients with major depressive disorder: A pilot study. *Psychiatry Research*, *249*, 23-29. doi: 10.1016 / j.psychres.2016.12.046

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An assessment of mental health of Mexican and Colombian medical students during the COVID-19 pandemic

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ABSTRACT

Introduction. The COVID-19 pandemic caused the cessation of academic activities from the face-to-face format to confinement and virtual classes, in which little is studied about its effect on mental health. **Objective.** Determine levels of depression, anxiety, and stress in medical students in Mexico and Colombia during the COVID-19 pandemic. Furthermore, depression, anxiety, and stress were compared by gender, education status, and country. **Method.** A cross-sectional study was carried out with 426 medical students. Data was collected using an online survey containing the Depression, Anxiety, Stress Scale (DASS-21) questionnaire. **Results.** Overall scores for depression, anxiety, and stress were 6.7 ± 1.2, 8.8 ± 1.2, and 5.6 ± 1.2, respectively. Females had significantly higher overall scores for depression (.24-fold increase), anxiety (.25-fold increase), and stress (.40-fold increase) than males ($p \leq .01$). The risk for anxiety and stress by school year showed that basic years were associated with higher scores than advanced years (.25 and .38-fold increase, respectively). For females, starting medical school did show an increased risk of depression when compared to male students in their basic years (.38-fold increase). Lastly, students from Mexico had an increased risk for depression and anxiety ($p \leq .022$ and $p \leq .004$, respectively) but not for stress ($p \leq .402$), when compared to students from Colombia. **Discussion and conclusion.** Significant anxiety and depression were observed in medical students from Mexico and Colombia. Factors associated with an increased risk of depression and anxiety are students in their basic years as well as being female.

Keywords: COVID-19, México, Colombia, DASS-21, depression, anxiety, stress.

RESUMEN

Introducción. La pandemia de COVID-19 provocó el cese de las actividades académicas desde el formato presencial al confinamiento de las clases virtuales, de las que poco se ha estudiado sobre su efecto en la salud mental. **Objetivo.** Determinar los niveles de depresión, ansiedad y estrés en estudiantes de medicina de México y Colombia durante la pandemia de COVID-19; además de comparar depresión, ansiedad y estrés por género, nivel educativo y país. **Método.** Se realizó un estudio transversal con 426 estudiantes de medicina. Los datos se recopilaron mediante una encuesta en línea que contenía el cuestionario DASS-21. **Resultados.** Las puntuaciones generales de depresión, ansiedad y estrés fueron 6.7 ± 1.2, 8.8 ± 1.2 y 5.6 ± 1.2, respectivamente. Las mujeres tuvieron puntajes generales significativamente más altos para depresión (.24-fold increase), ansiedad (.25-fold increase) y estrés (.40-fold increase). El riesgo de ansiedad y estrés por año escolar mostró que los años básicos se asociaron con puntajes más altos que los estudiantes en años los avanzados (.25 y .38-fold increase). Para las mujeres, cursar años básicos mostró un mayor riesgo de depresión en comparación con los estudiantes varones (.38-fold increase). Por último, los estudiantes mexicanos tuvieron un mayor riesgo de depresión y ansiedad ($p \leq .022$ y $p \leq .004$, respectivamente) pero no de estrés ($p \leq .402$) en comparación con los estudiantes Colombianos. **Discusión y conclusión.** Se observó ansiedad y depresión significativas en estudiantes de medicina mexicanos y colombianos. Los factores asociados a un mayor riesgo de depresión y ansiedad fueron; ser estudiante en años básicos además de ser mujer.

Palabras clave: COVID-19, México, Colombia, DASS-21, depresión, ansiedad, estrés.

INTRODUCTION

Before the COVID-19 pandemic, in Mexico and Colombia, between 9 to 10% of the general population suffered from an affective disorder at some point in their lives (Berenzon, Lara, Robles, & Medina-Mora, 2013; Ministerio de Salud y Protección Social, 2017). In Mexico, it was shown that around 14% of the population presented with depression symptoms, affecting more women (Valencia, 2022), and 31% had some level of anxiety (INEGI, 2021). On the other hand, in Colombia, about 80% of the general population claimed to present with one to three symptoms of depression and 53% suffer from anxiety (Ministerio de Salud y Protección Social, 2017). Interestingly, as shown in Mexico, most mental disorders appear in individuals that are young adults, before the age of 21 (Berenzon et al., 2013; Martínez-Martínez, Muñoz-Zurita, Rojas-Valderrama, & Sánchez-Hernández, 2016), which is similar to Colombia, in which most present in women aged 18-44 years old, some of which attend university. This would suggest that university students are more prevalent to present with a mental disorder.

During university life, students are subjected to various stress-inducing factors that can threaten mental health, such as academic demands, excessive workload, personal life events, and the learning environment (Fares, Al Tabosh, Saadeddin, El Mouhayyar, & Aridi, 2016).

Cheung and collaborators demonstrated that age, gender, study load, and academic performance were factors associated with mental health conditions, such as depression and anxiety (Cheung, Tam, Tsang, Zhang, & Lit, 2020). Moreover, many studies have shown that medical students at the start of their careers presented a greater burden of psychiatric morbidity when compared to students of other disciplines as well as the general population (Fares et al., 2016; Suárez & Fernández, 2020). Indeed, in Mexico and Colombia, medical students were shown to have significant levels of depression (25-50%), anxiety (50-60%), and stress (60-70%; Granados Cosme et al., 2020; Saldaña Orozco, De Loera Soto, & Madrigal Torres, 2017; Pabón, Espinosa, Correa, Ríos, & Gutiérrez, 2018; Suárez & Fernández, 2020). Recently, increased time spent in front of electronic devices and social networks, which can lead to less social interaction, can augment depression and unhappiness among younger generations (Berryman, Ferguson, & Negy, 2018).

On January 30, 2020, the World Health Organization declared COVID-19 as a pandemic (World Health Organization, 2020). Since then, numerous outlets have suggested that the measures taken during this period could affect mental health (Brooks et al., 2020). There was a worldwide increase in the use of social media during the quarantine (Tsao et al., 2021), which is postulated to affect mental health (Karim, Oyewande, Abdalla, Ehsanullah, & Khan, 2020). Previous studies have highlighted the harmful influence of quarantines linked to viral epidemics/pandemics on mental health. For example, in Australia, approximately 34% of horse owners quarantined for several weeks because of an equine influenza outbreak, reported higher psychological distress, compared with around 12% in the general population (Taylor, Agho, Stevens, & Raphael, 2008). Moreover, Brooks and collaborators reported a positive association between the length of the quarantine and post-traumatic stress disorder symptoms, avoidance behaviors, and anger. Furthermore, they pointed out that among hospital staff, being quarantined is a predictor of acute stress disorder and depressive symptoms (Brooks et al., 2020). This is similar to medical students, in which students from a private medical university during the SARS outbreak in 2003 demonstrated that they presented with elevated degrees of anxiety (Loh, Ali, Ang, & Chelliah, 2006). Additionally, medical students presented with higher levels of anxiety during the MERS (Al-Rabiaah et al., 2020) and H1N1 (Swine) flu pandemic (Wheaton, Abramowitz, Berman, Fabricant, & Olatunji, 2012). Therefore, it is expected that the rate of these disorders should increase with the COVID-19 pandemic.

With the worsening of mental health associated with the medical school format, coupled with the cessation of fundamental face-to-face activities and social distancing due to the COVID-19 pandemic, it was postulated that levels of depression, anxiety, and stress could be augmented among medical students. The objective of this study was to determine levels of depression, anxiety, and stress in medical students from Mexico and Colombia during the COVID-19 pandemic. Furthermore, levels of depression, anxiety, and stress were compared by gender, educational level, and country (Mexico versus Colombia).

METHOD

Design of the study

A cross-sessional study design using an Internet interface.

Subjects / description of the sample

The sample population was recruited by using a cluster, volunteer sampling method. The project was first conceived at BUAP, in which other institutions were available via the DELFIN program. The DELFIN program allows students within Mexico as well as Colombia, Costa Rica, Nicaragua, and Peru to participate in research. The project was published within the program, in which potential students contacted the corresponding author. After a virtual meeting, the students were explained to contact only students within their medical school, in which the students were asked to post a general invitation to participate on the university's message board, by e-mail, and by snowball sampling contact. They were to explain that the participant anonymity would be maintained, only known to the corresponding author and selected personnel.

To be included in the study, the participants had to be current, active students, between the ages of 18 to 25 years old, belonging to a medical school, and who were taking their course material in a virtual format during the pandemic. Those exclude were students who did not belong to the medical school (full-time) or those who were taking classes as well as practices in a face-to-face or semi-face-to-face format, taking or started taking any medication that could alter moods, had a traumatic family or personal event that could affect the results other than due to the pandemic, partially or early terminated questionnaires, or a previous diagnosis of a psychopathological disorder.

Places

The participant pool consisted of medical students from different universities in Mexico (Puebla, Chihuahua, State of Mexico, Veracruz, Guerrero, Morelos, Nuevo Leon, Tlaxcala, Oaxaca, Durango, Coahuila, Jalisco, Baja California, Tamaulipas, Sinaloa) and Cartagena, Colombia.

Measurements

The online instrument collected demographic and specific data. The demographic data collected were gender (biological sex), age, country, residency (urban or rural), mask type and usage, school year, and type of work. Problems with work, school, and other (serious) problems, the participants were asked to identify. Lastly, concepts about academic achievement, physical activity, and internet access were also collected.

Developed by Lovibond & Lovibond, the Depression Anxiety Stress Scales-21 (DASS-21) questionnaire proved to be a reliable and consistent instrument that was validated for Spanish-speaking populations (Ruiz, Martín, Falcón, & González, 2017; Yohannes, Dryden, & Hanania, 2019). This instrument, comparable with the Likert technique, measured the states of depression, anxiety, and stress using three different scales containing seven items each with four possible answers: 0. did not apply to me at all, 1. applied to me to some degree or some of the time, 2. applied to me to a considerable degree or a good part of the time, and 3. applied to me very much or most of the time. Items corresponding to depression were questions 3, 5, 10, 13, 16, 17, and 21, for anxiety were questions 2, 4, 7, 9, 15, 19, and 20, and for stress were questions 1, 6, 8, 11, 12, 14, and 18. For specific wording of the DASS-21 questionnaire, see Supplement Table 1.

Procedure

This study carried out between July 2020 and January 2022 using an online questionnaire through health-survey plat-

Table 1
The level of depression, anxiety, and stress for medical students, as determined by the DASS-21 questionnaire, stratified by gender and education level

		Gender[a]			*Year*[c]		
	Rank	*Male*	*Female*	*p-value*[b]	*Advance*	*Basic*	*p-value*[b]
Depression	Overall score	5.8 ± 5.2	7.2 ± 5.3	.007*	6.0 ± 5.0	7.0 ± 5.4	.084
	Normal	77.9 (70.8-83.8)	71.0 (66.2-76.1)	.286	80.0 (72.3-86.9)	70.6 (65.5-76.0)	.204
	Mild	12.3 (7.1-18.2)	13.6 (9.6-17.6)		10.0 (4.6-15.4)	14.5 (10.5-18.2)	
	Moderate	9.7 (5.2-14.3)	14.7 (10.7-18.8)		10.0 (5.4-15.4)	14.2 (10.1-18.6)	
	Severe	0 (N/A)	.7 (0-1.8)		0 (N/A)	.7 (0-1.7)	
	Extremely severe	0 (N/A)	0 (N/A)		0 (N/A)	0 (N/A)	
Anxiety	Overall score	7.6 ± 4.9	9.5 ± 4.4	< .001*	7.5 ± 4.2	9.4 ± 4.8	< .001*
	Normal	57.1 (49.4-64.9)	36.7 (31.3-42.3)	.002*	53.1 (44.6-60.8)	40.2 (34.8-45.6)	.012*
	Mild	12.3 (7.1-18.2)	15.4 (11.4-20.2)		16.9 (10.0-23.8)	13.2 (9.5-17.2)	
	Moderate	21.4 (15.6-28.6)	33.8 (28.3-39.0)		23.8 (16.9-31.5)	31.8 (26.4-36.8)	
	Severe	7.1 (3.2-11.0)	12.1 (8.5-15.8)		6.2 (2.3-10.0)	12.2 (8.8-16.2)	
	Extremely severe	1.9 (0-4.5)	1.8 (.4-3.7)		0 (N/A)	2.7 (1.0-4.7)	
Stress	Overall score	4.5 ± 4.1	6.3 ± 4.5	< .001*	4.5 ± 3.8	6.2 ± 4.6	< .001*
	Normal	96.8 (93.5-99.4)	94.9 (92.3-97.4)	.471	97.7 (94.6-100.0)	94.6 (91.9-97.0)	.317
	Mild	3.2 (.6-6.5)	4.4 (2.2-7.0)		2.3 (0-5.4)	4.7 (2.7-7.1)	
	Moderate	0 (N/A)	.7 (0-1.8)		0 (N/A)	.7 (0-1.7)	
	Severe	0 (N/A)	0 (N/A)		0 (N/A)	0 (N/A)	
	Extremely severe	0 (N/A)	0 (N/A)		0 (N/A)	0 (N/A)	

Notes: Values are either frequency (% ± 95% confidence interval) or mean ± standard deviation.
[a] Gender was based on the participant's biological sex.
[b] p-values were calculated using either the chi-squared test for categorical data (normal, mild, moderate, severe, or extremely severe) or either Student's T test or Mann U test for overall score.
[c] Based participants year of education (semester), they were either classified as basic (school years 1 to 3) or advanced (school years 4 to 6).
* Indicates a significant difference ($p < .05$, two-tailed) between the two genders.

Table 2
The risk of developing depression, anxiety, or stress based on gender and school year

	Gender[a]	Year[b]	Negative[c]	Positive[c]	Odds ratio[d]	95% CI[d]	p-value[d]
Depression	Male	Advance	42	8	1.00	Referent	-
		Basic	78	26	1.69	.74-4.19	.219
	Female	Advance	62	18	1.48	.62-3.80	.387
		Basic	131	61	2.34	1.10-5.51	.026*
Anxiety	Male	Advance	37	13	1.00	Referent	-
		Basic	51	53	2.89	1.42-6.15	.003*
	Female	Advance	32	48	4.15	1.97-9.14	< .001*
		Basic	68	124	5.05	2.59-10.36	< .001*
Stress	Male	Advance	50	0	1.00	Referent	-
		Basic	99	5	5.58	.61-738.33	.148
	Female	Advance	77	3	4.56	.43-618.26	.238
		Basic	181	11	6.40	.81-826.53	.088

Notes: [a] Based participants year of education (semester), they were either classified as basic (school years 1 to 3) or advanced (school years 4 to 6).
[b] Gender was based on the participant's biological sex.
[c] Positive cases were participants identified as either mild, moderate, severe, or extremely severe, whereas negative cases were participants identified as normal.
[d] Odds ratios and 95% confidence intervals were calculated using R logitf package (Firth Logistic regression).
* Indicates a significant result ($p < .05$, two-tailed).

form (https://health-survey-2021.vercel.app/). The online instrument that used to evaluate the participants divided into five different sections that corresponded to 1. invitation to participate, 2. informed consent (identification data and signed photographic consent), 3. general/demographic data, 4. learning difficulties, and 5. the DASS-21 questionnaire. The data and information obtained during this study handled according to Article 14.1 of the Federal Law on Protection of Personal Data. Lastly, study conducted by the CHERRIES guidelines (Eysenbach, 2004; Supplement Table 2).

Statistical analysis

All analyses were carried out with the Statistical Package for the Social Sciences software (SPSS v26.0, Chicago, IL USA) or with R software (Ripley, 2001). The normality of the data assessed by the Shapiro–Wilk test. Differences between groups were determined using the chi-squared test for categorical data whereas, depending on the normality of the data, either Student's T-test or the Mann U test used for continuous data. Due to zero values in the referent group, Firth Logistic Regression was used to determine the odds ratio (OR) and 95% confidence interval (95% CI), to evaluate the level of risk for depression, anxiety, and stress when stratified by gender and school year (basic: school years 1-3 and advanced: school years 4-6). Firth Logistic Regression was performed with R using the logit package. p-values < .05 (two-tailed) were considered statistically significant.

The sample size calculated using: $n = (NZ^2\ p\ [1\text{-}p]) / (e^2\ [N\text{-}1] + Z^2\ p\ [1\text{-}p])$, where n = sample size, N = population of medical students in participating countries, p = probability of occurrence, Z = confidence level critical value and e = maximum estimate error. Note, the number of medical students/graduates is similar for Mexico (11.6 per 100,000 inhabitants) and (11.7 per 100,000 inhabitants) Colombia (OECD, 2022). The population of students enrolled in medical school in Mexico and Colombia is around 15,000 and 6,000, respectively, totaling 21,000. The prevalence rates for depression, anxiety, and stress in medical students can range between 50-60%; therefore, a probability of .5 was used for the largest sample size. A sample size of at least 378 was determined using the following assumptions: N = 21,000, 95% confidence interval (Z = 1.96), e = 5%, and p = .5.

Ethical considerations

All who agreed to participate gave signed photographic consent, by the Declaration of Helsinki. This study was approved by the Ethics Committee of the Vice-Rector's Office for Research and Postgraduate Studies at the Benemérita Universidad Autónoma de Puebla (approval number: Registry number 910, book 2, sheet 156 [SIEP/C.I/136/2022]).

RESULTS

Selection of participants

Of the 566 participants that agreed to participate and completed the survey, 140 were excluded for being < 18 or > 25 years old or did not have photographic-signed consent. Which resulted in 426 students from Mexico and Colombia being assessed (Supplement Table 3). When stratified by school year, 69.5% were in their basic years and 30.5% were in their advanced years, which resulted in a significant difference in the ages of the two groups. However, when

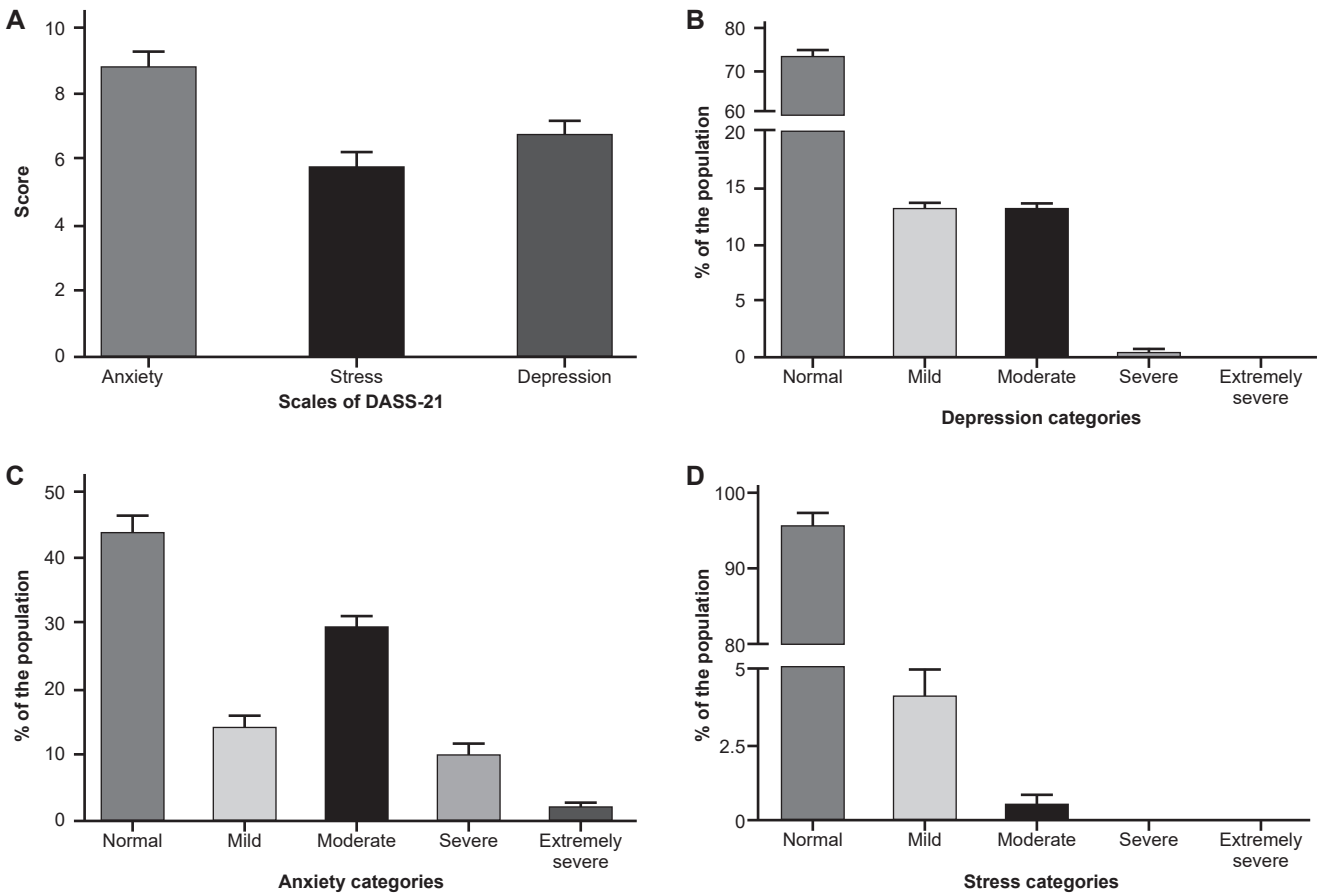

Figure 1. The prevalence and severity of depression, anxiety, and stress among Mexican and Colombian medical students during the COVID-19 Pandemic. **A)** Overall scores for depression (right bar), anxiety (left bar), and stress (center bar). **B)** Depression, **C)** anxiety, and **D)** stress were categorized as normal, mild, moderate, severe and extremely severe. The bar height and lines correspond to the average score and 95% confidence interval.

stratified by gender, 63.8% were female and no difference in age was observed.

Depression, anxiety, and stress among Mexican and Colombian medical students

The average scores for depression, anxiety, and stress using the DASS-21 questionnaire for Mexicans and Colombians were 6.7 ± 1.2, 8.8 ± 1.2, and 5.6 ± 1.2, respectively (Figure 1A). For depression, when the scores were categorized, most of the students were normal with few defined as having significant depression (26.6%, Figure 1B). For anxiety, when the scores were categorized, most of the students presented with some level of anxiety (55.9%, Figure 1C). Interestingly, for stress, a majority of the students were normal (95.5%, Figure 1D).

Using the data for Mexicans and Colombia together, when stratified by gender, females had significantly higher overall scores for depression (.24-fold increase), anxiety (.25-fold increase), and stress (.40-fold increase) than males ($p < .01$, Table 1). Moreover, females presented with higher severity for anxiety than males (63.3% versus 42.9%, respectively, Table 1), an observation not seen with depression or stress. The frequency of the responses to the DASS-21 questionnaire, categorized by school year or gender is shown in Supplement Table 1.

It has been shown that as medical student progress through their education, depression, anxiety, and stress increase; therefore, Mexican and Colombians medical students were stratified by school year (Table 1). Depression's overall score as well as its categories were not affected by the student's school year. However, for anxiety and stress, there was a difference between the overall score for basic and advanced years, in which basic years were associated with higher scores (.25- and .38-fold increase, respectively). When stratified into normal, mild, moderate, and severe, there was no statistical difference in the distribution of stress; however, for anxiety, there was an increase in the prevalence of the moderate form for basic years, with a significant decrease in the mild and severe forms for a student in their advance years.

The risk associated with gender and school year for developing depression, anxiety, and stress was evaluated

Table 3
The risk of developing depression, anxiety, or stress based on the medical students' location (Mexico versus Colombia)

Country	*Negative*[a]	*Positive*[a]	*Odds ratio*[b]	*95% CI*[b]	*p-value*[b]
Depression					
Colombia	64	12	1.00	Referent	-
Mexico	249	101	2.16	1.12-4.18	.022*
Anxiety					
Colombia	45	31	1.00	Referent	-
Mexico	143	207	1.10	1.27-3.48	.004*
Stress					
Colombia	74	2	1.00	Referent	-
Mexico	333	17	1.89	.43-8.35	.402

Notes: [a] Positive cases were participants identified as either mild, moderate, severe, or extremely severe, whereas negative cases were participants identified as normal.
[b] Odds ratios and 95% confidence intervals were calculated using R logitf package (Firth Logistic regression).
* Indicates a significant result ($p < .05$, two-tailed).

(Table 2). For depression, using males in advanced years as the referent, only females in their basic years demonstrated a significant increase in risk. Therefore, being a male doesn't affect developing depression, as well as being a female in her advanced years. However, being a female starting medical school (1-3 years) did show an increased risk for depression, even when compared to male students in their basic years (a .38-fold increase). For Anxiety, when males in their advanced years were compared to males in their basic years, a significant increase in the risk of almost 3-fold was observed. On the other hand, when females in their advanced years were compared to females in their basic years, a .21-fold increase was observed. Stress did not show any significant difference between any of the comparisons. Lastly, due to the different COVID-19 mandates between Mexico and Colombia, the group was stratified by country (Table 3). For Mexico, there was an increased risk for depression and anxiety but not for stress, when compared to Colombia as the referent.

DISCUSSION AND CONCLUSION

Using the DASS-21 questionnaire, significant levels of depression (27%), anxiety (56%), and stress (5%) were determined for Mexican and Colombian medical students. When compared by gender, level of education, and country, females showed significantly higher scores for anxiety and stress than males that are in their basic years of medical training. Moreover, Mexico had an increased risk for depression and anxiety, when compared to Colombia.

Anxiety was the most prevalent psychopathological condition, regardless of sociodemographic variables, such as gender, age, and school year, which suggests that the confinement and lifestyle restrictions caused by the pandemic generated anxiety among this subset of students. For the general population, Shigemura and collaborators demonstrated that overwhelming and sensational news headlines as well as imagery add to anxiety (Shigemura, Ursano, Morganstein, Kurosawa, & Benedek, 2020). It is postulated that rumors and hyped information filled these individuals in the absence of information. Additionally, Rubin and Wessely (2020) proposed that during disease outbreaks, community anxiety can rise following the first death, increased media reporting, and an escalating number of new cases (Rubin & Wessely, 2020). In Mexico and Colombia, these characteristics were met, fostering anxiety in our group. Moreover, mass quarantines are likely to raise anxiety substantially (Rubin & Wessely, 2020). Medical students in Saudi Arabia reported higher levels of anxiety during the MERS pandemic (Al-Rabiaah et al., 2020). Moreover, medical students in South Carolina also reported higher levels of anxiety during the H1N1 flu (Wheaton et al., 2012). Thus, it is reasonable to presume that the effects due to the COVID-19 pandemic are the causes of the increased prevalence and risk of anxiety for these medical students, and a baseline, which is provided here, is necessary to evaluate an effect on their future performance.

Before the COVID-19 pandemic, one of the most recent studies found that the prevalence of depression was 32.7% among medical students in China, whereas the prevalence of anxiety was 27.2% (Mao et al., 2019). As reported for medical students in India, the prevalence of moderate to severe depression was 14.9%, whereas stress was exceedingly high at 83.7% for moderate to very-high levels (Kumar, Kattimani, Sarkar, & Kar, 2017). Here, our values were similar, in which depression was 13.3%; however, severe stress was only 4.5% for the group. This does suggest that the pandemic impacted the levels of depression and stress for our group and other medical students around the world.

Typically, medical students reported that the causes of stress were difficulty in understanding the content, feeling

incompetent in managing the patient, feeling compelled to participate in the scenario, and competition with team members to name a few (Pai, Ram, Madan, Soe, & Barua, 2014). Therefore, it is postulated that any effect the pandemic has had on these medical students will be minimal for their future performance when only considering stress and depression; however, the lack of these stressors could put these medical students at a disadvantage due to inexperience and failure to resolve these stressors. As indicated by Pai and collaborates, repeated training sessions reduce stress, which these students did not receive (Pai et al., 2014).

It was shown that depression and anxiety are more prevalent in females. In a systematic review of medical students from the USA and Canada, they indicated higher rates of psychosocial distress among female students (Dyrbye, Thomas, & Shanafelt, 2006). However, our results show a higher female prevalence for anxiety only in firsts years students, with a significant decrease in advanced years of medical training. This suggests that levels of anxiety decline as the students adapt to the medical school program. In support of this, Brenneisen and collaborators demonstrated that as female students progress through medical school, their Beck Depression Inventory and State-Trait Anxiety Inventory scores decreased (Brenneisen Mayer et al., 2016). They also confirm our results in which female medical students were more prone to have depression and anxiety symptoms than males.

COVID-19 has exacerbated educational inequalities across countries. Numerous studies published during the pandemic have demonstrated a country-dependent difference in levels of depression, anxiety, and stress (Bibi, Lin, Zhang, & Margraf, 2020). In our study, the DASS-21 scores for Colombian and Mexican students were found to be different, where a higher risk of suffering from depression and anxiety was associated with Mexicans. These inequalities in most cases are multifactorial and are related to the school's operating standards, socioeconomics, geographic conditions, and other variables that make it difficult to guarantee equitable coverage for the entire territory and social strata. In Colombia, the COVID-19 restrictions (Ministerio de Salud y Protección Social, 2020) were more severe than in Mexico (Diario Oficial de la Federación, 2020). These different factors have a direct impact on how the two countries went through the pandemic. One interesting occurrence was the country that had more sanitary restrictions had lowers levels of these psychopathologies. This can be related to the concept that people care about not being infected and all the government mandatories gave them a feeling of security.

This study has a few limitations. First, the response rate was lower for advanced-year medical students and may limit the interpretation of the findings. Second, the sample selected for this study was specifically medical students. The results obtained may not apply to students outside of this designation. Third, this study did not examine the psychological impact that COVID-19 has had on all Mexican and Colombian students. Fourth, the regional differences between Mexico and Colombia, as well as the regional differences within each country, were not taken into consideration. Even though the format for most medical programs, such as the number of classes, the order in which the classes are taken, the literature used, and the methods of teaching, are similar between each school, the number of medical schools in Mexico (113 institutions) and Colombia (61 institutions), the potential of socioeconomic and demographical factors could influence the results shown here. For future studies, a more complex sampling methodology should be implemented to be able to assess these factors. Moreover, the type of school, private or public, could affect the association. Here, all schools that participated were public institutions. Fifth, potential sample/selection bias could be present. For the overall sample, the sample size was sufficient but the reason for participating in the study was unknown. Moreover, the representativeness of the sample was not qualified. Within Mexico as well as Colombia and between each country, the demographic and socioeconomic factors do range. However, during the period in which the study occurred, implementation of COVID-19 restrictions did vary between each state in Mexico and Colombia. Nevertheless, the effects of the COVID-19 pandemic restrictions between each state were similar. Lastly, the previous assessments for depression, anxiety, and stress were not available. Here, it was observed that the rate of depression, anxiety, and stress were similar to pre-pandemic levels. However, the influence of the pandemic on depression, anxiety, and stress could not be deduced, as for the difficulty of predicting a pandemic and getting the project's approval. Nevertheless, future studies are being designed in which students are to be followed during their medical school, independent of the events that take place.

A high prevalence of anxiety and depression was observed in medical students from Mexico and Colombia. Females and students early in their medical training were factors associated with an increase in depression and anxiety. This study serves as a baseline analysis for future assessments of these students, which can determine how the COVID-19 pandemic has affected their future performance as clinicians. Lastly, Mexicans were more at-risk to suffer from higher levels of depression and anxiety than Colombians.

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Conflict of interest

The authors declare they have no conflicts of interest.

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REFERENCES

Al-Rabiaah, A., Temsah, M.-H., Al-Eyadhy, A. A., Hasan, G. M., Al-Zamil, F., Al-Subaie, S., ... Somily, A. M. (2020). Middle East Respiratory Syndrome-Corona Virus (MERS-CoV) associated stress among medical students at a university teaching hospital in Saudi Arabia. *Journal of Infection and Public Health*, *13*(5), 687-691. doi: 10.1016/j.jiph.2020.01.005

Berenzon, S., Lara, M. A., Robles, R., & Medina-Mora, M. E. (2013). Depression: state of the art and the need for public policy and action plans in Mexico. *Salud Pública de México*, *55*(1), 74-80.

Berryman, C., Ferguson, C. J., & Negy, C. (2018). Social Media Use and Mental Health among Young Adults. *Psychiatric Quarterly*, *89*(2), 307-314. doi: 10.1007/s11126-017-9535-6

Bibi, A., Lin, M., Zhang, X. C., & Margraf, J. (2020). Psychometric properties and measurement invariance of Depression, Anxiety and Stress Scales (DASS-21) across cultures. *International Journal of Psychology*, *55*(6), 916-925. doi: 10.1002/ijop.12671

Brenneisen Mayer, F., Souza Santos, I., Silveira, P. S., Itaqui Lopes, M. H., de Souza, A. R., Campos, E. P., ... Tempski, P. (2016). Factors associated to depression and anxiety in medical students: a multicenter study. *BMC Medical Education*, *16*(1), 282. doi: 10.1186/s12909-016-0791-1

Brooks, S. K., Webster, R. K., Smith, L. E., Woodland, L., Wessely, S., Greenberg, N., & Rubin, G. J. (2020). The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *The Lancet*, *395*(10227), 912-920. doi: 10.1016/S0140-6736(20)30460-8

Cheung, K., Tam, K. Y., Tsang, M. H., Zhang, L. W., & Lit, S. W. (2020). Depression, anxiety and stress in different subgroups of first-year university students from 4-year cohort data. *Journal of Affective Disorders*, *274*, 305-314. doi: 10.1016/j.jad.2020.05.041

Diario Oficial de la Federación. (2020). *ACUERDO número 23/08/21*. Retrieved from https://www.dof.gob.mx/nota_detalle.php?codigo=5627244&fecha=20/08/2021

Dyrbye, L. N., Thomas, M. R., & Shanafelt, T. D. (2006). Systematic review of depression, anxiety, and other indicators of psychological distress among U.S. and Canadian medical students. *Academic Medicine*, *81*(4), 354-373. doi: 10.1097/00001888-200604000-00009

Eysenbach, G. (2004). Improving the quality of Web surveys: the Checklist for Reporting Results of Internet E-Surveys (CHERRIES). *Journal of Medical Internet Research*, *6*(3), e34. doi: 10.2196/jmir.6.3.e34

Fares, J., Al Tabosh, H., Saadeddin, Z., El Mouhayyar, C., & Aridi, H. (2016). Stress, Burnout and Coping Strategies in Preclinical Medical Students. *North American Journal of Medical Sciences*, *8*(2), 75-81. doi: 10.4103/1947-2714.177299

Granados Cosme, J. A., Gómez Landeros, O., Islas Ramírez, M. I., Maldonado Pérez, G., Martínez Mendoza, H. F., & Pineda Torres, A. M. (2020). Depression, Anxiety and Suicidal Behavior in Medical Training at a University in Mexico. *Investigación en Educación Médica*, *9*(35), 65-74. Retrieved from https://www.medigraphic.com/cgi-bin/new/resumenI.cgi?IDARTICULO=95036

INEGI. (2021). *Resultados de la primera encuesta nacional de bienestar autorreportado (ENBIARE)*. Comunicado de prensa núm. 772/21. Retrieved from: https://www.inegi.org.mx/contenidos/saladeprensa/boletines/2021/EstSociodemo/ENBIARE_2021.pdf

Karim, F., Oyewande, A. A., Abdalla, L. F., Ehsanullah, R. C., & Khan, S. (2020). Social media use and its connection to mental health: asystematic review. *Cureus*, *12*(6), e8627. doi: 10.7759/cureus.8627

Kumar, S. G., Kattimani, S., Sarkar, S., & Kar, S. S. (2017). Prevalence of depression and its relation to stress level among medical students in Puducherry, India. *Industrial Psychiatry Journal*, *26*(1), 86-90. doi: 10.4103/ipj.ipj_45_15

Loh, L.-C., Ali, A. M., Ang, T.-H., & Chelliah, A. (2006). Impact of a spreading epidemic on medical students. *The Malaysian Journal of Medical Sciences: MJMS*, *13*(2), 30-36.

Mao, Y., Zhang, N., Liu, J., Zhu, B., He, R., & Wang, X. (2019). A systematic review of depression and anxiety in medical students in China. *BMC Medical Education*, *19*(1), 327. doi: 10.1186/s12909-019-1744-2

Martínez-Martínez, M., Muñoz-Zurita, G., Rojas-Valderrama, K., & Sánchez-Hernández, J. A. (2016). Prevalence of Depressive Symptoms of Undergraduate Medicine Students from Puebla, Mexico. *Atención Familiar*, *23*(4), 145-149.

Ministerio de Salud y Protección Social. (2017). *Observatorio nacional de salud mental, ONSM Colombia Guía Metodológica Actualización*. Bogotá: Ministerio de Salud. Retrieved from: https://www.minsalud.gov.co/sites/rid/Lists/BibliotecaDigital/RIDE/VS/ED/GCFI/guia-ross-salud-mental.pdf

Ministerio de Salud y Protección Social. (2020). *Decreto 476 de la República de Colombia. Colombia: Presidencia de la República, Secretaría Jurídica de Colombia*. Retrieved from: https://coronaviruscolombia.gov.co/Covid19/docs/decretos/minsalud/113_decreto_476.pdf

Organisation for Economic Co-operation and Development [OECD]. (2022). *Medical Graduates*. Retrieved from https://data.oecd.org/healthres/medical-graduates.htm

Pabón, J. B., Espinosa, J. F. S., Correa, Y. M., Ríos, D. A. V., & Gutiérrez, U. R. (2018). Prevalencia de Sintomatología Depresiva en estudiantes del programa de Medicina de la Universidad de Caldas, Manizales-Colombia. *Revista Médica de Risaralda*, *24*(1), 20-23.

Pai, D. R., Ram, S., Madan, S. S., Soe, H. H., & Barua, A. (2014). Causes of stress and their change with repeated sessions as perceived by undergraduate medical students during high-fidelity trauma simulation. *The National Medical Journal of India*, 27(4), 192-197. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/25668162

Ripley, B. D. (2001). The R project in statistical computing. *MSOR Connections. The Newsletter of the LTSN Maths, Stats & OR Network*, *1*(1), 23-25.

Rubin, G. J., & Wessely, S. (2020). The psychological effects of quarantining a city. *BMJ*, *368*, m313. doi: 10.1136/bmj.m313

Ruiz, F. J., Martín, M. B. G., Falcón, J. C. S., & González, P. O. (2017). The hierarchical factor structure of the Spanish version of Depression Anxiety and Stress Scale-21. *International Journal of Psychology and Psychological Therapy*, *17*(1), 97-105.

Saldaña Orozco, C., De Loera Soto, L. A., & Madrigal Torres, B. E. (2017). Evaluation of stress academic levels of medical students of The South University Center. Case: Ciudad Guzmán. *Ciencia & Trabajo*, *19*(58), 31-34. Retrieved from https://www.scielo.cl/pdf/cyt/v19n58/0718-2449-cyt-19-58-00031.pdf

Shigemura, J., Ursano, R. J., Morganstein, J. C., Kurosawa, M., & Benedek, D. M. (2020). Public responses to the novel 2019 coronavirus (2019-nCoV) in Japan: Mental health consequences and target populations. *Psychiatry and Clinical Neurosciences*, *74*(4), 281-282. doi: 10.1111/pcn.12988

Suárez, V. G., & Fernández, M. d. R. C. (2020). Revolución, saludy humanidad. *Revista Cubana deSalud Pública*, *46*(1), 1-6.

Taylor, M. R., Agho, K. E., Stevens, G. J., & Raphael, B. (2008). Factors influencing psychological distress during a disease epidemic: Data from Australia's first outbreak of equine influenza. *BMC Public Health*, *8*(1), 1-13. doi: 10.1186/1471-2458-8-347

Tsao, S.-F., Chen, H., Tisseverasinghe, T., Yang, Y., Li, L., & Butt, Z. A. (2021). What social media told us in the time of COVID-19: a scoping review. *The Lancet Digital Health*, *3*(3), e175-e194. doi: 10.1016/S2589-7500(20)30315-0

Valencia, P. D. (2022). ¿Es incorrecta la prevalencia de síntomas depresivos presentada en el informe de la Ensanut 2018-19? *Salud Pública de México*, *64*(5), 451-452. Retrieved from https://saludpublica.mx/index.php/spm/article/view/13774

Wheaton, M. G., Abramowitz, J. S., Berman, N. C., Fabricant, L. E., & Olatunji, B. O. (2012). Psychological predictors of anxiety in response to the H1N1 (swine flu) pandemic. *Cognitive Therapy and Research*, *36*(3), 210-218. doi: 10.1007/s10608-011-9353-3

World Health Organization. (2020). *WHO Director-General's opening remarks at the media briefing on COVID-19 - 11 March 2020*. Retrieved from https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020

Yohannes, A. M., Dryden, S., & Hanania, N. A. (2019). Validity and Responsiveness of the Depression Anxiety Stress Scales-21 (DASS-21) in COPD. *Chest*, *155*(6), 1166-1177. doi: 10.1016/j.chest.2018.12.010

APPENDIX

Supplement Table 1
Frequency of responses to the DASS-21 questionnaire for the total cohort and categorized by school year or gender

#	Question content	All	Year[a]			Gender[b]		
			Advanced	Basic	p-value[c]	Male	Female	p-value[c]
1.	I found it hard to wind down.							
	Did not apply	12.9 (9.9-16.0)	20.8 (13.8-28.4)	9.5 (6.1-12.8)	< .001*	24.0 (16.9-31.8)	6.6 (3.7-9.6)	< .001*
	Some of the time	46.5 (42.0-50.9)	47.7 (38.5-56.9)	45.9 (40.2-51.7)		44.2 (36.4-51.9)	47.8 (41.9-53.7)	
	Considerable amount of time	33.8 (29.1-38.5)	30.8 (23.1-38.5)	35.1 (29.7-40.9)		27.3 (20.8-34.4)	37.5 (32.0-43.7)	
	Most of the time	6.8 (4.5-9.2)	.8 (.0-3.1)	9.5 (6.4-12.8)		4.5 (1.3-7.8)	8.1 (4.8-11.4)	
2.	I was aware of dryness of my mouth.							
	Did not apply	40.4 (35.9-45.3)	50.8 (42.3-60.0)	35.8 (30.4-41.9)	.023*	46.1 (38.3-53.9)	37.1 (32.0-43.0)	.020*
	Some of the time	34.7 (30.0-39.7)	31.5 (23.8-40.0)	36.1 (30.4-41.6)		37.7 (30.5-46.1)	33.1 (27.6-38.2)	
	Considerable amount of time	20.2 (16.2-23.9)	13.8 (8.5-20.0)	23.0 (18.2-27.7)		13.0 (7.8-18.2)	24.3 (19.5-29.0)	
	Most of the time	4.7 (2.8-6.8)	3.8 (.8-7.7)	5.1 (3.0-7.8)		3.2 (.6-5.8)	5.5 (2.9-8.1)	
3.	I couldn´t seem to experience any positive feeling at all.							
	Did not apply	34.3 (29.8-38.7)	45.4 (36.9-53.8)	29.4 (24.3-34.8)	.007*	45.5 (37.0-53.9)	27.9 (22.8-33.5)	.002*
	Some of the time	39.7 (34.7-44.4)	36.2 (27.7-44.6)	41.2 (35.8-47.0)		31.2 (23.4-39.0)	44.5 (39.0-50.4)	
	Considerable amount of time	21.4 (17.4-25.4)	16.2 (10.0-23.1)	23.6 (18.6-28.4)		20.1 (14.3-26.6)	22.1 (17.3-27.2)	
	Most of the time	4.7 (2.8-6.8)	2.3 (.0-5.4)	5.7 (3.4-8.4)		3.2 (.6-6.5)	5.5 (2.9-8.5)	
4.	I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion).							
	Did not apply	65.3 (61.3-69.9)	66.9 (59.2-74.6)	64.5 (59.8-69.6)	.174	72.7 (66.2-79.2)	61.0 (55.1-67.3)	.111
	Some of the time	26.8 (22.8-30.8)	29.2 (21.5-37.7)	25.7 (20.9-30.7)		21.4 (14.9-27.3)	29.8 (23.9-35.7)	
	Considerable amount of time	7.0 (4.7-9.4)	3.8 (0.8-7.7)	8.4 (5.4-11.8)		5.2 (1.9-9.1)	8.1 (5.1-11.4)	
	Most of the time	.9 (.2-1.9)	.0 (N/A)	1.4 (.3-2.7)		.6 (.0-1.9)	1.1 (.0-2.6)	
5.	I found it difficult to work up the initiative to do things.							
	Did not apply	20.0 (16.4-23.9)	18.5 (13.1-25.4)	20.6 (15.9-25.0)	.788	27.3 (20.1-34.4)	15.8 (11.4-20.6)	.042*
	Some of the time	40.4 (35.7-45.3)	42.3 (33.8-50.8)	39.5 (33.8-45.3)		37.7 (29.9-45.5)	41.9 (35.7-47.8)	
	Considerable amount of time	28.6 (24.4-33.3)	30.0 (22.3-37.7)	28.0 (22.6-33.4)		25.3 (18.8-32.5)	30.5 (25.3-36.0)	
	Most of the time	11.0 (8.0-14.1)	9.2 (4.6-14.6)	11.8 (8.4-15.5)		9.7 (5.2-14.9)	11.8 (8.1-15.8)	
6.	I tended to over-react to situations.							
	Did not apply	29.1 (24.9-33.6)	30.8 (23.1-40.0)	28.4 (23.0-33.4)	.205	39.0 (31.8-46.8)	23.5 (18.8-29.0)	.002*
	Some of the time	37.1 (32.6-41.8)	42.3 (33.1-50.8)	34.8 (29.4-39.5)		35.7 (27.9-43.5)	37.9 (32.0-43.4)	
	Considerable amount of time	22.5 (18.5-26.5)	19.2 (12.3-26.2)	24.0 (19.3-29.1)		14.9 (9.7-20.1)	26.8 (21.3-32.7)	
	Most of the time	11.3 (8.5-14.6)	7.7 (3.1-12.3)	12.8 (9.5-16.9)		10.4 (5.8-15.6)	11.8 (7.7-15.8)	
7.	I experienced trembling (e.g., in the hands).							
	Did not apply	55.4 (50.7-60.3)	61.5 (53.1-70.0)	52.7 (47.0-58.4)	.003*	63.6 (55.9-71.4)	50.7 (44.9-56.3)	.020*
	Some of the time	29.3 (24.9-33.6)	32.3 (24.6-40.0)	28.0 (23.3-33.1)		27.3 (20.1-35.1)	30.5 (25.0-36.0)	
	Considerable amount of time	11.7 (8.7-14.8)	3.1 (.8-6.2)	15.5 (11.5-19.6)		7.8 (3.9-11.7)	14.0 (9.9-18.4)	
	Most of the time	3.5 (1.9-5.2)	3.1 (.8-6.2)	3.7 (1.7-5.7)		1.3 (.0-3.2)	4.8 (2.6-7.3)	
8.	I felt that I was using a lot of nervous energy							
	Did not apply	24.9 (20.9-29.1)	30.8 (23.1-38.5)	22.3 (17.6-27.0)	.026*	37.7 (29.9-45.5)	17.5 (13.2-22.1)	< .001*
	Some of the time	34.7 (30.0-39.4)	38.5 (30.0-46.9)	33.1 (27.7-38.2)		32.5 (24.7-39.6)	36.0 (30.1-41.9)	
	Considerable amount of time	31.0 (26.3-35.2)	26.2 (18.5-33.1)	33.1 (27.7-38.2)		24.0 (17.5-31.2)	34.9 (29.4-41.2)	
	Most of the time	9.4 (6.8-12.4)	4.6 (1.5-8.5)	11.5 (8.1-15.2)		5.8 (2.6-9.7)	11.4 (7.7-15.1)	
9.	I was worried about situations in which I might panic and make a fool of myself.							
	Did not apply	30.8 (26.5-35.0)	37.7 (30.0-46.2)	27.7 (22.6-33.1)	.041*	39.0 (31.2-46.8)	26.1 (21.0-31.3)	.010*
	Some of the time	28.9 (24.6-33.3)	31.5 (23.8-40.0)	27.7 (23.0-32.8)		30.5 (24.0-37.7)	27.9 (22.4-33.8)	
	Considerable amount of time	26.1 (21.8-30.0)	21.5 (14.6-28.5)	28.0 (23.0-33.1)		20.1 (14.3-26.6)	29.4 (24.3-34.9)	
	Most of the time	14.3 (10.8-17.6)	9.2 (3.8-14.6)	16.6 (12.5-20.6)		10.4 (5.8-15.6)	16.5 (12.5-21.0)	
10.	I felt that I had nothing to look forward to.							
	Did not apply	42.3 (37.8-46.9)	46.9 (39.2-56.2)	40.2 (34.8-45.9)	.550	49.4 (40.9-56.5)	38.2 (32.4-43.8)	.109
	Some of the time	29.8 (25.6-34.0)	29.2 (21.5-36.9)	30.1 (25.0-35.1)		26.0 (19.5-33.8)	32.0 (26.5-37.1)	
	Considerable amount of time	18.8 (15.0-22.5)	16.2 (10.0-22.3)	19.9 (15.2-24.7)		14.9 (9.1-20.8)	21.0 (16.2-26.1)	
	Most of the time	9.2 (6.6-12.2)	7.7 (3.1-12.3)	9.8 (6.8-13.2)		9.7 (5.8-14.3)	8.8 (5.5-12.1)	
11.	I found myself getting agitated.							
	Did not apply	15.0 (11.7-18.5)	16.9 (10.8-23.8)	14.2 (10.5-18.2)	.098	16.2 (10.4-22.7)	14.3 (10.7-18.4)	.397
	Some of the time	40.1 (35.4-45.1)	43.1 (34.6-51.5)	38.9 (33.8-44.3)		43.5 (35.7-51.3)	38.2 (32.7-44.1)	

Supplement Table 1 (continued)

	Considerable amount of time	33.8 (29.3-38.3)	34.6 (26.9-43.1)	33.4 (28.0-38.5)		28.6 (21.4-35.7)	36.8 (30.5-42.6)	
	Most of the time	11.0 (8.0-14.1)	5.4 (2.3-9.2)	13.5 (10.1-17.2)		11.7 (7.1-16.9)	10.7 (7.0-14.3)	
12.	I found it difficult to relax.							
	Did not apply	16.9 (13.6-20.7)	24.6 (17.7-31.5)	13.5 (9.5-17.6)	.011*	21.4 (14.9-27.9)	14.3 (10.3-18.4)	.151
	Some of the time	37.1 (32.9-41.5)	38.5 (30.8-46.2)	36.5 (31.1-41.9)		39.0 (31.2-46.8)	36.0 (30.5-41.9)	
	Considerable amount of time	32.4 (27.9-36.8)	28.5 (21.5-36.2)	34.1 (28.4-39.9)		27.9 (20.8-35.0)	34.9 (29.1-40.8)	
	Most of the time	13.6 (10.6-16.7)	8.5 (3.8-13.8)	15.9 (12.2-20.3)		11.7 (6.5-16.9)	14.7 (10.7-18.1)	
13.	I felt downhearted and blue.							
	Did not apply	24.6 (20.9-28.6)	30.8 (23.1-39.2)	22.0 (17.2-26.7)	.282	33.1 (26.0-40.3)	19.9 (15.1-24.6)	.001*
	Some of the time	40.4 (35.7-45.1)	37.7 (29.2-46.2)	41.6 (35.5-47.0)		42.9 (35.1-50.6)	39.0 (32.7-44.5)	
	Considerable amount of time	22.1 (18.3-26.1)	20.0 (13.1-26.9)	23.0 (18.2-28.0)		13.6 (8.4-19.5)	26.8 (21.7-32.0)	
	Most of the time	12.9 (10.1-16.2)	11.5 (6.2-16.9)	13.5 (9.8-17.2)		10.4 (5.8-15.6)	14.3 (10.3-18.4)	
14.	I was intolerant of anything that kept me from getting on with what I was doing.							
	Did not apply	41.5 (36.9-46.2)	53.1 (44.6-62.3)	36.5 (31.1-42.2)	.003*	52.6 (44.8-61.7)	35.3 (29.8-40.8)	.004*
	Some of the time	39.0 (34.0-43.4)	36.2 (28.5-44.6)	40.2 (34.8-45.6)		29.9 (22.1-37.0)	44.1 (38.2-50.4)	
	Considerable amount of time	14.1 (11.0-17.4)	8.5 (4.6-13.1)	16.6 (12.2-21.3)		11.7 (2.6-6.5)	15.4 (11.0-20.2)	
	Most of the time	5.4 (3.3-7.7)	2.3 (.0-5.4)	6.8 (4.1-9.5)		5.8 (1.9-2.6)	5.1 (2.9-8.1)	
15.	I felt I was close to panic.							
	Did not apply	53.8 (49.1-58.9)	57.7 (50.0-66.2)	52.0 (46.6-57.1)	.085	65.6 (57.8-73.4)	47.1 (41.2-53.3)	< .001*
	Some of the time	30.0 (25.8-34.3)	32.3 (24.6-40.8)	29.1 (24.0-34.1)		24.7 (18.2-31.8)	33.1 (27.6-38.6)	
	Considerable amount of time	12.7 (9.6-16.0)	9.2 (4.6-13.8)	14.2 (10.5-18.6)		5.2 (1.9-9.1)	16.9 (12.5-21.7)	
	Most of the time	3.5 (1.9-5.4)	.8 (.0-2.3)	4.7 (2.4-7.1)		4.5 (1.3-8.4)	2.9 (1.1-5.1)	
16.	I was unable to become enthusiastic about anything.							
	Did not apply	48.8 (43.9-53.5)	56.2 (47.7-65.4)	45.6 (40.2-51.0)	.120	56.5 (49.4-64.3)	44.5 (39.0-50.7)	.109
	Some of the time	31.7 (27.2-36.1)	28.5 (20.8-36.2)	33.1 (27.7-38.9)		26.0 (18.8-33.1)	34.9 (29.0-40.4)	
	Considerable amount of time	14.3 (11.3-17.8)	13.1 (7.7-20.0)	14.9 (10.8-19.3)		12.3 (7.1-17.5)	15.4 (11.4-19.9)	
	Most of the time	5.2 (3.3-7.5)	2.3 (.0-5.4)	6.4 (3.7-9.5)		5.2 (1.9-9.1)	5.1 (2.6-7.7)	
17.	I felt I wasn´t worth much as person.							
	Did not apply	48.1 (43.2-53.1)	51.5 (43.1-60.8)	46.6 (40.9-52.4)	.683	58.4 (50.6-66.2)	42.3 (36.8-48.2)	.008*
	Some of the time	26.8 (22.5-30.8)	26.9 (19.2-34.6)	26.7 (21.3-32.1)		24.0 (17.5-31.2)	28.3 (23.2-33.8)	
	Considerable amount of time	14.1 (10.8-17.6)	11.5 (6.2-16.9)	15.2 (11.5-19.3)		9.1 (4.5-13.6)	16.9 (12.5-21.7)	
	Most of the time	11.0 (8.2-13.8)	10.0 (5.4-15.4)	11.5 (7.8-15.2)		8.4 (4.5-13.0)	12.5 (8.8-16.5)	
18.	I felt that I was rather touchy.							
	Did not apply	19.7 (16.2-23.7)	24.6 (17.7-32.3)	17.6 (13.5-22.0)	.040*	29.9 (22.7-37.6)	14.0 (9.9-18.4)	< .001*
	Some of the time	38.5 (33.8-42.7)	40.8 (32.3-50.0)	37.5 (31.8-42.9)		39.0 (31.8-46.8)	38.2 (32.7-43.8)	
	Considerable amount of time	27.5 (23.5-31.9)	26.9 (18.5-34.6)	27.7 (22.3-32.8)		18.8 (12.4-24.7)	32.4 (27.2-37.9)	
	Most of the time	14.3 (11.3-17.6)	7.7 (3.8-12.3)	17.2 (12.8-22.0)		12.3 (7.1-18.8)	15.4 (11.4-19.9)	
19.	I was aware of the action of my heart in the absence of physical exertion.							
	Did not apply	42.5 (38.0-47.2)	50.8 (41.5-59.2)	38.9 (33.4-44.3)	.031*	50.0 (42.2-57.1)	38.2 (32.4-43.8)	.027*
	Some of the time	33.6 (28.9-37.8)	33.8 (25.4-42.3)	33.4 (28.0-38.5)		33.8 (26.0-40.9)	33.5 (28.3-39.3)	
	Considerable amount of time	16.0 (12.4-19.5)	10.8 (5.4-16.9)	18.2 (13.9-22.6)		11.0 (6.5-16.2)	18.8 (14.3-23.5)	
	Most of the time	8.0 (5.6-10.8)	4.6 (1.5-8.5)	9.5 (6.4-12.8)		5.2 (1.9-9.1)	9.6 (6.3-13.2)	
20.	I felt scared without any good reason.							
	Did not apply	43.2 (38.5-48.4)	53.1 (44.6-61.5)	38.9 (33.1-44.3)	.027*	50.6 (42.9-58.4)	39.0 (33.5-44.9)	.051
	Some of the time	31.7 (27.2-36.4)	29.2 (21.5-36.9)	32.8 (27.7-38.2)		29.9 (22.7-37.0)	32.7 (26.8-39.0)	
	Considerable amount of time	18.1 (14.3-21.8)	13.8 (7.7-20.0)	19.9 (15.5-24.7)		12.3 (7.1-18.2)	21.3 (16.5-26.5)	
	Most of the time	7.0 (4.7-9.6)	3.8 (0.8-6.9)	8.4 (5.4-11.5)		7.1 (3.2-11.7)	7.0 (4.0-9.9)	
21.	I felt that life was meaningless.							
	Did not apply	62.4 (58.2-66.7)	64.6 (56.9-73.1)	61.5 (55.7-66.9)	.777	65.6 (58.4-72.7)	60.7 (54.8-66.2)	.524
	Some of the time	20.7 (16.7-24.6)	17.7 (10.8-24.6)	22.0 (17.6-27.0)		16.9 (11.0-23.4)	22.8 (18.0-27.6)	
	Considerable amount of time	9.9 (6.8-12.9)	10.8 (5.4-16.2)	9.5 (6.1-12.8)		9.7 (5.2-14.9)	9.9 (6.6-13.6)	
	Most of the time	7.0 (4.7-9.9)	6.9 (3.1-11.5)	7.1 (4.4-10.1)		7.8 (3.9-12.3)	6.6 (3.7-9.9)	

Notes: Values are frequency ± 95% confidence interval.
[a] Based participants year of education (semester), they were either classified as basic (school years 1 to 3) or advanced (school years 4 to 6).
[b] Gender was based on the participant's biological sex.
[c] *p*-values were calculated using the chi-squared test.

Supplement Table 2
The Checklist for Reporting Results of Internet E-Surveys (CHERRIES)

Design	*Checklist Item*	*Explanation*
Design	Describe survey design	The target population included a convenience sample of medical students from 1st to 10th semester who were students of the Facultad de Medicina Benemérita Universidad Autónoma de Puebla, México and Universidad del Sinú de Cartagena, Colombia.
IRB (Institutional Review Board) approval and informed consent process	IRB approval	The study was registered with Benemérita Universidad Autónoma de Puebla (approval number: Registry number 910, book 2, sheet 156 [SIEP/C.I/136/2022], and November 8, 2021) and approved as a minimal risk study by the Human Research Ethics Committee (HREC).
	Informed consent	Participants, who clicked on the web-link read a more detailed information statement describing the significance of the study and consented electronically before participation. Informed consent has all the requirements.
	Data protection	Responses were password protected and only the research team had access to the login details.
Development and pre-testing	Development and testing	The survey was created with the selection of instruments according to the objective of this project. The survey was modified and adapted to an online platform designed by a student in computer engineering at Tecnológico de Monterrey (Puebla). A pilot test was conducted with the participation of 12 volunteers to define times, grammar, legibility of each of the sentences.
Recruitment process and description of the sample having access to the questionnaire	Open survey versus closed survey	Open survey limited to a single response per person. An email-linked ID is generated, making it impossible to access more than once.
	Contact mode	The contact is made through section representatives who send the survey invitation to their peers (approximately 40 people), once they answer the survey, an ID is generated, and this is provided to the section representatives who send the IDs to the research team.
	Advertising the survey	An invitation in JPG format (image) containing university logos, a brief explanation of the project was created and distributed via e-mail to section representatives. Users can access it with a phone, tablet, computer, etc. through a QR code for convenience.
Survey administration	Web/E-mail	The Survey was accessible via google https://health-survey-2021.web.app/. The responses were automatically captured by the website and then accessible online or an Excel spreadsheet for download.
	Context	Because it was an event aimed at medical students, an exclusive website was created. Participants are not influenced by advertising.
	Mandatory/voluntary	Participation in the survey was voluntary.
	Incentives	As an incentive to participate, an agreement was established with the Psychiatry Department, where participants with levels above the upper limit of depression, anxiety or stress will be channeled to receive support.
	Time/date	Data was collected from September 2020 to July 2021.
	Randomisation of items or questionnaires	Instruments appear randomly to prevent predisposition to responses.
	Adaptive questioning	Dynamic answers were created in the IPAQ-SF instrument with a drop-down menu that opens the next relevant section based on your answer, to avoid the unnecessary projection of questions.
	Number of items	85 items in total. 1st Screen (Welcome) - 1 item; 2nd Screen (Informed consent) - 1 item; 3rd Screen (ID request and sing) - 3 items; 4th Screen (General Data) - 13 items; 5th Screen (DASS 21) - 21 items; 6th Screen (IPAQ SF) - 3 items; 7th Screen - 10 items; 8th Screen - 8 items; 9th Screen - 8 items; 10th Screen - (ID Survey and End).
	Number of screens (pages)	The questionnaire was distributed over ten different screens.
	Completeness check	Each screen has to be completed to be allowed to continue the next screen. If they are questions not answered, a notice will appear “Please answer the questions”. All items provide a “not applicable” option.
	Review step	The respondents were able to change their answers at any moment during the survey. They just have to swipe up to get back to the question and select the new option.

Supplement Table 2 (continued)

Design	*Checklist Item*	*Explanation*
Response rates	Unique site visitor	The survey was limited to only a unique visitor, this was determined through the register of email-ID that only allowed one try.
	View rate (ratio of unique survey visitors/unique site visitors)	Only the people that completed the full survey were counted. For statistical analysis, the page views and number of unique site visitors were not taken into account.
	Participation rate (ratio of unique visitors who agreed to participate/ unique first survey page visitors)	Unable to calculate the participation rate as the number of people who visited the first page of the survey was not recorded (ie. the unique first survey page visitors).
	Completion rate (ratio of users who finished the survey/users who agreed to participate)	691:566
Preventing multiple entries from the same individual	Cookies used	Cookies were not used.
	IP check	The survey did not register the IP address, so we used the email to identify potential duplicate entries from the same user.
	Log file analysis	The survey registers the respondents based on the information that they provide. The email and Student-ID can be used just once.
	Registration	The survey registers the respondents based on the information that they provide. The email and Student-ID can be used just once. At the end of the survey, an ID-Register will be provided to the respondent and an email will be sent to confirm the right register of the student.
Analysis	Handling of incomplete questionnaires	For statistical analysis of the data, only completed questionnaires were analyzed. The uncompleted questionnaires were archived in the database for further study.
	Questionnaires submitted with an atypical time-stamp	The survey did not have a time limit to be answered. Average response time was 15- 20 minutes. Furthermore, we did not find any surveys/results with an atypical timestamp.
	Statistical correction	None. Since the goal was students attending medical, no complex sampling was performed. Therefore, all analysis were done under simple random sampling.

Supplement Table 3
Characteristics of the total group as well as categorized by school year and gender

		Year[a]			*Gender*[b]		
Category	Total	Advanced	Basic	*p*- value[c]	Male	Female	*p*-value[c]
Sex (Male/Female)	426 (154/272)	130 (50/80)	296 (104/192)	.511	154	272	-
Age (years)	20.3 ± 1.7	22.1 ± 1.0	19.5 ± 1.3	< .001*	20.4 ± 1.6	20.2 ± 1.7	.343
Residency							
Urban	78.9 (74.9-82.6)	80.0 (72.3-86.0)	78.4 (73.6-83.1)	.706	81.2 (75.3-87.0)	77.6 (72.4-82.7)	.382
Rural	21.1 (17.4-25.1)	20.0 (13.1-27.7)	21.6 (16.9-26.4)		18.8 (13.0-24.7)	22.4 (17.3-27.6)	
Country (state)							
Colombia	76	22	54	.743	31	45	.353
Mexico	350	108	242		123	227	
Puebla	256	67	189		95	161	
Chihuahua	17	12	5		7	10	
State of Mexico	7	4	3		2	5	
Veracruz	10	2	8		1	9	
Guerrero	7	4	3		1	6	
Chiapas	4	4	0		0	4	
Morelos	4	1	3		1	3	
Nuevo León	19	6	13		7	12	
Tlaxcala	5	2	3		3	2	
Oaxaca	2	1	1		0	2	
Durango	1	1	0		0	1	
Coahuila	4	4	0		1	3	
Jalisco	7	0	7		3	4	
Baja California	4	0	4		1	3	
Tamaulipas	2	0	2		1	1	
Sinaloa	1	0	1		0	1	

Notes: Values are either number (n), frequency (% ± 95% confidence interval) or mean ± standard deviation.
[a] Based participants year of education (semester), they were either classified as basic (school years 1 to 3) or advanced (school years 4 to 6).
[b] Gender was based on the participant's biological sex.
[c] *p*-values were calculated using either the chi-squared test for categorical data or either Student's T test or Mann U test for continuous data.
* Indicates a significant difference ($p < .05$, two-tailed) between the two groups.

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Association between physical activity and affects in college students during the COVID-19 pandemic: A cross-sectional study

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ABSTRACT

Introduction. The COVID-19 pandemic has negatively impacted physical and mental health worldwide. It is essential to continue exploring the population's psychological manifestations and the pandemic's impact on lifestyles (physical activity, quality of sleep). **Objective.** This research aimed to describe the relationship between affect (positive and negative) and physical activity (PA) in college students during the COVID-19 pandemic. **Method.** A cross-sectional survey was conducted on health sciences students from three universities in Mexico and Colombia. PA was assessed using the short version of the International Physical Activity Questionnaire (IPAQ-S), and affects were measured using the PANAS index. A logistic regression model was used to assess the association between PA and affect. **Results.** We included 430 participants between 16 and 40 years. We found no differences between the male and female participants regarding age, weight (BMI), PA, or the number of hours of sitting per day. The monthly consumption of alcohol and tobacco was more frequent in males ($p < .05$), and women expressed having worse sleep quality ($p < .05$). Adjusting for the number of hours spent sitting per day, gender, BMI, age, sleep quality, smoking and alcohol consumption habits, participants reported having more positive affect when they engaged in greater PA. No association was found between PA and negative affect. **Discussion and conclusion.** Prioritizing mental health and assessments that determine the late impact of the COVID-19 pandemic on psychological well-being is critical. Promoting PA in university communities is considered a priority to positively impact students' mental health and provide tools to facilitate coping.

Keywords: Wellness, mental health, physical activity, health promotion, youth.

RESUMEN

Introducción. La pandemia de COVID-19 impactó negativamente la salud tanto física como mental a lo largo del mundo. Es importante identificar las manifestaciones psicológicas de la población y el impacto de la pandemia en los estilos de vida (actividad física, calidad del sueño). **Objetivo.** Describir la relación entre el afecto (positivo y negativo) y la actividad física (AF) en estudiantes universitarios durante la pandemia de COVID-19. **Método.** Se realizó una encuesta transversal a estudiantes de ciencias de la salud pertenecientes a tres instituciones de educación superior en México y Colombia. La AF se evaluó mediante la versión corta del Cuestionario Internacional de Actividad Física (IPAQ-S), y los afectos se midieron mediante el Índice PANAS. Se utilizó un modelo de regresión logística para evaluar la asociación entre AF y afectos. **Resultados.** Se incluyeron 430 participantes entre 16 y 40 años. No encontramos diferencias entre hombres y mujeres en cuanto a edad, peso (IMC), nivel de AF ni el número de horas sentados por día, sin embargo, el consumo mensual de alcohol y tabaco fueron más frecuentes en hombres ($p < .05$) y las mujeres expresaron tener peor calidad de sueño ($p < .05$). Al ajustar por la cantidad de horas que pasaban sentados por día, el género, IMC, edad, calidad del sueño y los hábitos de consumo de tabaco y alcohol, los participantes expresaron tener más afectos positivos cuando realizaban mayor AF, sin embargo, no encontramos asociación entre AF y los afectos negativos. **Discusión y conclusión.** Es fundamental priorizar la salud mental y las evaluaciones que determinan el impacto tardío de la pandemia de COVID-19 en el bienestar psicológico. Se considera necesario promover la AF en las comunidades universitarias para impactar positivamente en la salud mental de los estudiantes y brindar herramientas que faciliten el afrontamiento.

Palabras clave: Bienestar, salud mental, ejercicio, promoción de la salud, jóvenes.

INTRODUCTION

The social distancing measures imposed since 2020 by the coronavirus disease 2019 (COVID-19) pandemic have negatively impacted the physical and mental health of the world population (Stanton et al., 2020). Confinement and restrictions on mobility changed routines, PA levels decreased (vigorous, moderate, and walking), and daily sitting time increased by more than 28% (Ammar et al., 2020). The daily step count decreased worldwide after COVID-19 was declared a global pandemic (Tison et al., 2020). However, before the pandemic, PA reports on college students already showed low adherence to recommendations globally (Blake, Stanulewicz, & Mcgill, 2017). Latin America showed the same trend, especially among women (Concha-Cisternas et al., 2018). Physical inactivity is the fourth leading risk factor for mortality worldwide (6% of deaths globally) and is directly associated with overweight and obesity (Bull et al., 2020).

The association between PA and mental health has been widely explained (Lubans et al., 2016). During the pandemic, negative emotions and cognitive distress were evident, which appeared to be lower in people who engaged in regular PA (Zhang, Zhang, Ma, & Di, 2020). Previous studies have shown that PA reduces anxiety and stress symptoms and increases well-being (Mikkelsen, Stojanovska, Polenakovic, Bosevski, & Apostolopoulos, 2017). Emotional well-being refers to a state of mind that allows people to balance all aspects of life: physical, mental, emotional, and spiritual. This balance facilitates coping with pressures, directing decision-making toward achieving goals through a dialogue between needs and desires (Asún, Palma, Aceituno, & Duarte, 2021). Likewise, emotional states promote "healthy" and "unhealthy" behaviors and can support the initiation and maintenance of a PA routine (Schultchen et al., 2019). Positive affect can facilitate the conversion of intentions to practice PA into reality and increase its frequency and duration (Ries & Sevillano, 2011).

The evolution of the pandemic has allowed the implementation of a hybrid educational model with face-to-face and online activities that mean fewer restrictions on mobility (Contreras et al., 2022). In this sense, it is essential to continue exploring the psychological manifestations and the impact on lifestyles (PA, sleep quality), in the context of reopening face-to-face spaces, especially in young adults considered a risk group for mental disorders (Auerbach et al., 2016). Thus, this research aims to describe the relationship between affect (positive and negative) and PA in college students during the COVID-19 pandemic.

METHOD

Study design

This study is a cross-sectional survey. The report was made following the STROBE guidelines for cross-sectional studies.

Subjects

An electronic survey was conducted among health sciences students from three universities in Mexico and Colombia between August 2021 and March 2022. The inclusion criteria were the following: a) regular first-year Physiotherapy students from the Universidad Nacional Autónoma de México, Nursing from the Universidad Javeriana and Medicine from the Fundación Universitaria San Martín; b) both sexes. The sampling was non-probabilistic; there were no elimination criteria, in addition to not completing the entire questionnaire.

Due to epidemiological restrictions, the students attended their academic activities in a mixed mode (live/classroom or online), so the survey was sent to them electronically through Google Forms. It was impossible to obtain written informed consent, so participants were provided with an electronic form before participating in the survey. Anonymized survey data was then entered into a database following the Privacy Policy of the participating institutions. Data on age, sex, weight, height, alcohol, smoking, PANAS Index, Pittsburgh Sleep Quality Index (PSQI), and the seven items of the short version of the International Physical Activity Questionnaire (IPAQ-S) were collected.

Measurements

Physical Activity (PA)

PA was measured using the short version of the International Physical Activity Questionnaire (IPAQ-S). This questionnaire has been widely used and validated in at least 12 countries, showing adequate concurrent and criterion validity (Craig et al., 2003). This instrument provided information on the time spent walking in vigorous- and moderate-intensity and sedentary activity. Total weekly PA expressed in METS (MET min/week) was calculated as duration × frequency per week × MET intensity. MET intensity was estimated based on the official IPAQ guidelines for adults aged 18-65: vigorous PA = 8.0 METS, moderate PA = 4.0 METS, and walking = 3.3 METS. PA was defined into three categories (low, moderate, and high; IPAQ, 2002). In addition, we added an item to explore the perception of change between the level of PA before and during the pandemic (Do you think your level of PA before and during the COVID-19 pandemic decreased, did not change or increased?).

Positive and Negative Affect

Positive and negative affect were assessed using the PANAS Index. This tool includes 20 items, ten of which evaluate positive affect and ten negative affect. The items consist of words that describe different feelings and emotions. The participant rates these emotions according to the degree to which they experience them on a five-point Likert-type scale, where one means "very little or not at all" and five

means "extremely." High positive affect is associated with a state of well-being, joy, and pleasurable engagement. In opposition, negative affect is characterized by discomfort, frustration, and lethargy (Watson, Clark, & Tellegen, 1988).

The Spanish version of this scale has shown high internal consistency, with alphas from .85 to .90 for positive affect and .81 to .85 for negative affect (González & Valdez, 2015).

Sleep Quality

Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI). This self-administered questionnaire includes seven sleep components: subjective sleep quality, latency, duration, efficiency, disturbance, use of sleep medications, and daytime dysfunction. The score of components ranges from 0 to 3, and the total score varies from 0 (no difficulty) to 21 (problems in all areas). A higher score indicates poorer sleep quality with a cut-off point of 5 to distinguish "good sleep quality" from "poor sleep quality" (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989).

This scale has been widely used in the clinical and research area and was validated in a Latin American population older than 18 years with an adequate reliability coefficient (.78; Escobar-Córdoba & Eslava-Schmalbach, 2005) and significant correlation coefficients (.53 to .77) between the components and the total score (Jiménez-Genchi, Monteverde-Maldonado, Nenclares-Portocarrero, Esquivel-Adame, & de la Vega-Pacheco, 2008).

Statistical analysis

Quantitative variables were presented according to their distribution, as mean ± standard deviation (SD) or median (interquartile range), and qualitative variables by absolute and relative frequencies. A logistic regression model was used to explore the association between PA and the probability of having a medium/low positive affect score or a high negative affect score (the highest tertile compared to the middle and low tertiles combined), following the methodology of Pasco et al. (2011). The covariates were gender, Body Mass Index (BMI), hours spent sitting in a day, sleep quality, smoking, and alcohol consumption, which were previously reported in other studies (McMahon et al., 2017). A 95% CI and $p \leq .05$ were considered statistically significant. Data were analyzed in Stata version 14 (Stata Corp, College Station, Tex, USA).

Ethical considerations

The protocol was approved by the Ethics and Research Committees of the Hospital Infantil de México Federico Gómez (HIM-2021-008).

Table 1
Characteristics of the participants (n = *430)*

Variable	*Total* n *(%)*	*Female* n *(%)*	*Male* n *(%)*	*p-value**
Age (Years), *Median* (IQR)	19 (18, 21)	19 (18, 20)	19 (18, 21)	.20**
BMI (Kg/m²)				.78
Underweight	20 (4.6)	14 (5)	6 (4)	
Normal	312 (72.6)	205 (73.5)	107 (70.9)	
Overweight	82 (19.1)	51 (18.3)	31 (20.5)	
Obese	16 (3.7)	9 (3.2)	7 (4.6)	
Physical activity categories (IPAQ)				.25
High	116 (27)	68 (24.4)	48 (31.8)	
Moderate	211 (49.1)	142 (50.9)	69 (45.7)	
Low	103 (23.9)	69 (24.7)	34 (22.5)	
Hours sitting/day				.35
Less than 8 hours	189 (43.9)	118 (42.3)	71 (47.1)	
More than 8 hours	241 (56.1)	161 (57.7)	80 (52.9)	
Alcohol				.03
Never	157 (36.5)	114 (40.9)	43 (28.5)	
Monthly or less	202 (47)	124 (44.4)	78 (51.6)	
More than 2 times a month	71 (16.5)	41 (14.7)	30 (19.9)	
Smoked				.00
No	284 (66)	205 (73.5)	79 (52.3)	
Yes	146 (34)	74 (26.5)	72 (47.7)	
Sleep Quality score (PSQI)				.04
Good sleep quality	75 (17.4)	41 (14.7)	34 (22.5)	
Poor sleep quality	355 (82.6)	238 (85.3)	117 (77.5)	

* Pearson chi².
** Mann-Whitney test; IQR: Interquartile range; BMI: Body Mass Index.

Table 2
PANAS affects scores by level of PA (n = 430)

	PANAS Score, Median (IQR)	
	Positive affect	*Negative affect*
Total (*n* = 430)	31 (24, 36)	20 (16, 27)
High PA	34 (27.5, 38.5)	20 (15, 24.5)
Moderate PA	30 (24, 36)	20 (16, 28)
Low PA	28 (23, 34)	21 (17, 27)
p-value*	< .001	.38

* Kruskall-Wallis test; IQR: Interquartile range.

RESULTS

The final analysis included 430 participants between 16 and 40 years, and 64.9% were female. The response rate was 73% among students who were invited to participate.

The characteristics of the population are shown in Table 1. It was observed that most participants were in a normal BMI category (72.6%) and performed moderate PA, with no differences between sex. However, women reported sitting more than eight hours per day more frequently. Regarding the PA change after the pandemic's onset, 59.8% of participants considered that their PA level decreased, and only 24.4% reported that it increased. The remaining 15.8% reported that it did not change.

Additionally, it was observed that smoking and alcohol were higher in men than women, while poor sleep quality was higher in women.

The positive affect score was higher for more physically active students ($p < .001$). In negative affect, no statistically significant differences were observed between PA categories (Table 2).

Logistic regression results showed that PA was associated with positive affect. The adjusted model showed that people who perform moderate PA are more likely to have a medium/low score of positive affect than those who perform high PA (OR = 2.5; 95% CI [1.5, 4.2]; $p < .001$). The effect increased in participants performing low PA (OR = 3.2; 95% CI [1.7, 6.1]; $p < .001$; Table 3). We performed the analysis adjusting for the type of university (public or private) the students belong to, and the coefficients remain similar (data not shown).

No significant association was observed between PA with negative affect ($p > .05$; Table 4).

DISCUSSION AND CONCLUSION

This result suggests that there is a trend for college students to express fewer positive emotions when they perform less PA. This association was independent of the hours of sitting per day, gender, BMI, age, sleep quality, smoking, and alcohol consumption habits. These findings are consistent with previous studies showing that people who practice some sport or have a higher level of PA obtain better physical and psychological benefits (Duclos-Bastías, Vallejo-Reyes, Giakoni-Ramírez, & Parra-Camacho, 2021).

Table 3
Association between PA level and medium/low positive affect

	Unadjusted model		*Adjusted model**	
PA categories (IPAQ)	*OR (95 % CI)*	*p-value*	*OR (95 % CI)*	*p-value*
High	Ref		Ref	
Moderate	2.2 (1.3 – 3.5)	< .001	2.5 (1.5 – 4.2)	< .001
Low	2.8 (1.6 – 5.0)	< .001	3.2 (1.7 – 6.1)	< .001

Notes: Medium / Low Positive Score: < 75th Percentile PANAS Positive Affect Score.
* Adjusted model for Age (years), Sex, BMI category (underweight / normal / overweight / obese), hours sitting / day, Sleep quality (good sleep / bad sleep), smoked (yes / no), frequency of alcohol (Never / monthly or less / more than two times a month); OR: Odds ratio; CI: Confidence interval.

Table 4
Association between level of PA and high negative affect

	Unadjusted model		*Adjusted model**	
PA categories (IPAQ)	*OR (95 % CI)*	*p-value*	*OR (95 % CI)*	*p-value*
High	Ref		Ref	
Moderate	1.5 (.9 – 2.5)	.12	1.5 (.9 – 2.6)	.11
Low	1.7 (1 – 3.1)	.05	1.8 (.9 – 3.2)	.06

Notes: High Negative Score: > 75 th Percentile PANAS Negative Affect Score.
* Adjusted model for Age (years), Sex, BMI category (underweight / normal / overweight / obese), hours sitting/day, Sleep quality (good sleep / bad sleep), smoked (yes / no), frequency of alcohol (Never / monthly or less / more than two times a month); OR: Odds ratio; CI: Confidence interval.

The participants' sociodemographic characteristics were similar to other research, with a predominance of the female gender, age close to 19 years, normal nutritional status, and poor sleep quality (Fennell, Eremus, Puyana, & Sañudo, 2022).

However, unlike what Salgado Espinosa and Cepeda-Gaytan (2021) reported, whose participants registered an increase in PA during the pandemic, our study showed the opposite. The rigor of social distancing and isolation was different worldwide, so students' perceived barriers to PA might vary (Miguel Román, 2020). Local circumstances due to the closure of recreational facilities, restrictions on outdoor activities, and government guidelines and regulations particular to each country were determinants (Bielec & Omelan, 2022).

We found that positive affect scores in our sample appear to be higher than those reported in earlier stages of the pandemic in similar age populations (Markofski, Jennings, Hodgman, Warren, & LaVoy, 2022). This makes evident the adaptability of emotional states to contexts (Cano-Vindel & Miguel-Tobal, 2001), considering that our study was conducted late in the pandemic when knowledge about the virus and the beginning of the vaccination process reduced mobility restrictions worldwide.

Concerning negative affect, we did not observe an association with PA. A study conducted during the first months of the COVID-19 pandemic in US children showed that sedentary behaviors and screen time were positively correlated with negative affect ($p < .05$, $p < .01$, respectively; Alves, Yunker, DeFendis, Xiang, & Page, 2020). However, a Brazilian study reported that during confinement and at the onset of the pandemic, people who began exercising during the quarantine period more frequently reported negative emotions. This finding suggests that the benefits of PA on mental health can only be observed with consistent, planned, and directed PA routines; otherwise, it could become an additional stressor that exacerbates negative emotions (Marques de Abreu, de Souza, Viana-Meireles, Landeira-Fernandez, & Filgueiras., 2022).

Evidence suggests a U-shaped relationship between PA and some indicators of negative affect, such as anxiety and depression, in which insufficient or excessive PA is associated with more negative emotions (Zhang et al., 2020). Some recommendations suggest an average of 60 min of moderate to vigorous intensity daily PA to generate visible health benefits (Wicker & Frick, 2017). However, it is still challenging to determine the optimal dose associated with better outcomes (Chaput et al., 2020).

Our results confirm the association between PA and positive affect described during (Zach, Fernandez-Rio, Zeev, Ophir, & Eilat-Adar, 2021) and before the COVID-19 pandemic (Pasco et al., 2011). This association is determined by the ability of PA to promote positive emotional states related to interest, motivation, enthusiasm, and alertness. In addition to the widely described benefits that regular PA has on physical health (Kontostoli et al., 2023), given the global context, it is essential for the mental health of our college students to promote an active lifestyle. Regular PA may contribute to the proper management of stress, adaptation in times of uncertainty, and the promotion of positive emotional states that allow them to continue to cope with the changes that the COVID-19 pandemic has brought into routines.

Thus, the motivational properties of emotions are determinants in "healthy" behaviors such as moderate physical exercise, a balanced diet, rest, and leisure. Also, the affects can promote "unhealthy" behaviors associated with chronic diseases, such as alcohol abuse, smoking, and sedentary lifestyles (Cano-Vindel & Miguel-Tobal, 2001). In addition, emotions influence the health-disease process through their relationship with various physiological systems when sustained over time and poorly self-regulated (Piqueras Rodríguez, Ramos Linares, Martínez González, & Oblitas Guadalupe, 2009). For example, anger as an emotional state has been associated with multiple cardiovascular diseases, and sadness is considered a precursor of depression as a pathology (Cano-Vindel & Miguel-Tobal, 2001).

Our study has several limitations. The study design does not allow us to define a causal association. Likewise, self-reporting in the variables of interest introduces a bias we cannot control. On the other hand, additional mental health measurements such as depression and anxiety were not assessed, limiting the overall impact that PA has on well-being beyond emotional states.

However, taking into account the global context and mental health care needs, this study provides an initial overview of the emotional responses of our college students at a specific moment of the COVID-19 pandemic. Considering a preventive approach, it is essential to reinforce in our environment the promotion of PA and healthy lifestyles, which promote better mental health.

Our study suggests that the association between PA and positive affect is independent of the number of hours of sitting per day, gender, BMI, age, sleep quality, smoking and alcohol consumption habits. We found no association with negative affect and we suggest more objective measurements to explore this relationship over time. It is critical to prioritize mental health and assessments that determine the late impact of the COVID-19 pandemic on psychological well-being, especially in young adults. Likewise, promoting PA in college communities is considered a priority to positively impact students' mental health and provide tools to facilitate coping.

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Conflict of interest

The authors declare they have no conflicts of interest.

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REFERENCES

Alves, J. M., Yunker, A. G., DeFendis, A., Xiang, A. H., & Page, K. A. (2020). Associations between Affect, Physical Activity, and Anxiety Among US Children During COVID-19. *MedRxiv : The Preprint Server for Health Sciences*, 2020.10.20.20216424. doi: 10.1101/2020.10.20.20216424

Ammar, A., Brach, M., Trabelsi, K., Chtourou, H., Boukhris, O., Masmoudi, L., … Hoekelmann, A. (2020). Effects of COVID-19 home confinement on eating behaviour and physical activity: Results of the ECLB-COVID19 international online survey. *Nutrients*, *12*(6), 1583. doi: 10.3390/nu12061583

Asún, R., Palma, I., Aceituno, R., & Duarte, F. (2021). El impacto emocional de la pandemia en los jóvenes: Sociabilidad, conflictos, y política. *Revista de Sociología*, *36*(1), 6-24. doi: 10.5354/0719-529x.2021.64423

Auerbach, R. P., Alonso, J., Axinn, W. G., Cuijpers, P., Ebert, D. D., Green, J. G., … Bruffaerts, R. (2016). Mental disorders among college students in the World Health Organization World Mental Health Surveys. *Psychological Medicine*, *46*(14), 2955-2970. doi: 10.1017/S0033291716001665

Bielec, G., & Omelan, A. (2022). Physical Activity Behaviors and Physical Work Capacity in University Students during the COVID-19 Pandemic. *International Journal of Environmental Research and Public Health*, *19*(2), 891. doi: 10.3390/ijerph19020891

Blake, H., Stanulewicz, N., & Mcgill, F. (2017). Predictors of physical activity and barriers to exercise in nursing and medical students. *Journal of Advanced Nursing*, *73*(4), 917-929. doi: 10.1111/jan.13181

Bull F. C., Al-Ansari, S. S., Biddle, S., Borodulin, K., Buman, M. P., Cardon, G., ... Willumsen, J. F. (2020). World Health Organization 2020 guidelines on physical activity and sedentary behaviour. *British Journal of Sports Medicine*, *54*(24), 1451-1462. doi: 10.1136/bjsports-2020-102955

Buysse, D. J., Reynolds, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh sleep quality index: A new instrument for psychiatric practice and research. *Psychiatry Research*, *28*(2), 193-213. doi: 10.1016/0165-1781(89)90047-4

Cano-Vindel, A., & Miguel-Tobal, J. J. (2001). Emociones y Salud. *Ansiedad y Estrés*, *7*(2-3), 111-121. Retrieved from https://www.researchgate.net/publication/230577062

Chaput, J. P., Willumsen, J., Bull, F., Chou, R., Ekelund, U., Firth, J., … Katzmarzyk, P. T. (2020). 2020 WHO guidelines on physical activity and sedentary behaviour for children and adolescents aged 5–17 years: summary of the evidence. *International Journal of Behavioral Nutrition and Physical Activity*, *17*(1), 1-9. doi: 10.1186/s12966-020-01037-z

Concha-Cisternas, Y., Guzmán-Muñoz, E., Valdés-Badilla, P., Lira-Cea, C., Petermann, F., & Celis-Morales, C. (2018). Factores de riesgo asociados a bajo nivel de actividad física y exceso de peso corporal en estudiantes universitarios. *Revista Médica de Chile*, *146*(8), 840-849. doi: 10.4067/s0034-98872018000800840

Contreras, C. P., Pérez Piñon, M. T., Picazo, D., & Pérez Piñon, D. (2022). En tiempos de pandemia: de la educación presencial al entorno virtual y de regreso. *Ciencia Latina Revista Científica Multidisciplinar*, *6*(1), 1821-1834. doi: 10.37811/cl_rcm.v6i1.1612

Craig, C. L., Marshall, A. L., Sjöström, M., Bauman, A. E., Booth, M. L., Ainsworth, B. E., … Oja, P. (2003). International physical activity questionnaire: 12-Country reliability and validity. *Medicine & Science in Sports & Exercise*, *35*(8), 1381-1395. doi: 10.1249/01.MSS.0000078924.61453.FB

Duclos-Bastías, D., Vallejo-Reyes, F., Giakoni-Ramírez, F., & Parra-Camacho, D. (2021). Impact of COVID-19 on Sustainable University Sports: Analysis of Physical Activity and Positive and Negative Affects in Athletes. *Sustainability*, *13*(11), 6095. doi: 10.3390/su13116095

Escobar-Córdoba, F., & Eslava-Schmalbach, J. (2005). Validación colombiana del índice de calidad de sueño de Pittsburgh. *Revista de Neurología*, *40*(3), 150-155. doi: 10.33588/rn.4003.2004320

Fennell, C., Eremus, T., Puyana, M. G., & Sañudo, B. (2022). The Importance of Physical Activity to Augment Mood during COVID-19 Lockdown. *International Journal of Environmental Research and Public Health*, *19*(3), 1270. doi: 10.3390/ijerph19031270

González, N., & Valdez, J. L. (2015). Validez de las escalas de afecto positivo y negativo (PANAS) en niños. *Liberabit*, *21*(1), 37-47.

IPAQ, G. (2002). *Cuestionario Internacional de Actividad Física. Formato telefónico Corto- Últimos 7 días*. Retrived from https://sites.google.com/site/theipaq/background

Jiménez-Genchi, A., Monteverde-Maldonado, E., Nenclares-Portocarrero, A., Esquivel-Adame, G., & de la Vega-Pacheco, A. (2008). Confiabilidad y análisis factorial de la versión en español del índice de calidad de sueño de Pittsburgh en pacientes psiquiátricos. *Gaceta Médica de México*, *144*(6), 491-496. Retrieved from www.anmm.org.mx

Kontostoli, E., Jones, A. P., Pearson, N., Foley, L., Biddle, S. J. H., & Atkin, A. J. (2023). The Association of Contemporary Screen Behaviours with Physical Activity, Sedentary Behaviour and Sleep in Adolescents: a Cross-sectional Analysis of the Millennium Cohort Study. *International Journal of Behavioral Medicine*, *30*(1), 122-132. doi: 10.1007/s12529-022-10077-7

Lubans, D., Richards, J., Hillman, C., Faulkner, G., Beauchamp, M., Nilsson, M., … Biddle, S. (2016). Physical Activity for Cognitive and Mental Health in Youth: A Systematic Review of Mechanisms. *Pediatrics*, *138*(3), e20161642. doi: 10.1542/peds.2016-1642

Markofski, M. M., Jennings, K., Hodgman, C. F., Warren, V. E., & LaVoy, E. C. (2022). Physical activity during the SARS-CoV-2 pandemic is linked to better mood and emotion. *Stress and Health*, *38*(3), 490-499. doi: 10.1002/smi.3111

Marques de Abreu, J., de Souza, R. A., Viana-Meireles, L. G., Landeira-Fernandez, J., & Filgueiras, A. (2022). Effects of physical activity and exercise on well-being in the context of the Covid-19 pandemic. *PLoS One*, *17*(1), e0260465. doi: 10.1371/journal.pone.0260465

McMahon, E. M., Corcoran, P., O'Regan, G., Keeley, H., Cannon, M., Carli, V., … Wasserman, D. (2017). Physical activity in European adolescents and associations with anxiety, depression and well-being. *European Child & Adolescent Psychiatry*, *26*(1), 111-122. doi: 10.1007/s00787-016-0875-9

Miguel Román, J. A. (2020). La educación superior en tiempos de pandemia: una visión desde dentro del proceso formativo. *Revista Latinoamericana de Estudios Educativos (México)*, *L*(Especial), 13-40. doi: 10.48102/rlee.2020.50.ESPECIAL.95

Mikkelsen, K., Stojanovska, L., Polenakovic, M., Bosevski, M., & Apostolopoulos, V. (2017). Exercise and mental health. *Maturitas*, *106*, 48-56. doi: 10.1016/j.maturitas.2017.09.003

Pasco, J. A., Jacka, F. N., Williams, L. J., Brennan, S. L., Leslie, E., & Berk, M. (2011). Don't worry, be active: Positive affect and habitual physical activity. *Australian & New Zealand Journal of Psychiatry*, *45*(12), 1047-1052. doi: 10.3109/00048674.2011.621063

Piqueras Rodríguez, J. A., Ramos Linares, V., Martínez González, A. E., & Oblitas Guadalupe, L. A. (2009). Emociones negativas y su impacto en la salud mental y física. *Suma Psicológica*, *16*(2), 85-112.

Ries, F., & Sevillano, J. M. (2011). Relación de las emociones y la actividad física dentro de la teoría de la conducta planificada (Relation of emotions and physical activity within the theory of planned behavior). *Revista Internacional de Ciencias del Deporte*, *24*(7), 158-173. doi: 10.5232/ricyde2011.02401

Salgado Espinosa, M. L., & Cepeda-Gaytan, L. A. (2021). Alimentación, estados afectivos y actividad física en estudiantes universitarios mexicanos durante la pandemia por COVID-19. *Revista Espade Comunicacien Salud*, *12*(2), 151-164. doi: 10.20318/recs.2021.6231

Schultchen, D., Reichenberger, J., Mittl, T., Weh, T. R. M., Smyth, J. M., Blechert, J., & Pollatos, O. (2019). Bidirectional relationship of stress and affect with physical activity and healthy eating. *British Journal of Health Psychology*, *24*(2), 315-333. doi: 10.1111/bjhp.12355

Stanton, R., To, Q., Khalesi, S., Williams, S., Alley, S., Thwaite, T., Fenning, A., & Vandelanotte, C. (2020). Depression, anxiety and stress during COVID-19: Associations with changes in physical activity, sleep, tobacco and alcohol use in Australian adults. *International Journal of Environmental Research and Public Health*, *17*(11), 1-13. doi: 10.3390/ijerph17114065

Tison, G., Avram, R., Kuhar, P., Abreau, S., Marcus, G. M., Pletcher, M. J., & Olgin, J. E. (2020). Worldwide Effect of COVID-19 on Physical Activity: A Descriptive Study. *Annals of Internal Medicine*, *173*(9), 767-770. doi: 10.7326/M20-2665

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and Validation of Brief Measures of Positive and Negative Affect: The PANAS Scales. *Journal of Personality and Social Psychology*, *54*(6), 1063-1070. doi: 10.1037/0022-3514.54.6.1063

Wicker, P., & Frick, B. (2017). Intensity of physical activity and subjective well-being: An empirical analysis of the WHO recommendations. *Journal of Public Health (United Kingdom)*, *39*(2), e19-e26. doi: 10.1093/pubmed/fdw062

Zach, S., Fernandez-Rio, J., Zeev, A., Ophir, M., & Eilat-Adar, S. (2021). Physical activity, resilience, emotions, moods, and weight control, during the COVID-19 global crisis. *Israel Journal of Health Policy Research*, *10*(1), 52. doi: 10.1186/s13584-021-00473-x

Zhang, Y., Zhang, H., Ma, X., & Di, Q. (2020). Mental health problems during the COVID-19 pandemics and the mitigation effects of exercise: A longitudinal study of college students in China. *International Journal of Environmental Research and Public Health*, *17*(10), 3722. doi: 10.3390/ijerph17103722

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Adaptation of the Psychological Wellbeing Scale in Mexican medical students

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ABSTRACT

Introduction. The Ryff Scale of Psychological Well-Being is the most widely used instrument for assessing the eudemonic perspective of well-being. Although it has been adapted for the Spanish population, it has not been modified for health science students in the Mexican population. **Objective.** Adapt and obtain the psychometric properties of this scale for medical students in the Mexican population. **Method.** The study was conducted with 1,974 undergraduate students, 1,551 from the UNAM Medicine Faculty and 423 from the La Salle University Mexican School of Medicine. The analysis was undertaken using the IBM SPSS Statistics 21 and AMOS 21 SPSS programs. **Results.** An instrument with a robust structure derived from the exploratory and confirmatory factor analyses carried out was obtained, with satisfactory explained variance, adequate internal consistency obtained through the Cronbach's alpha coefficient, and appropriate discrimination. **Discussion and conclusion.** Our adaptation is a suitable version for Mexican medical students with four final dimensions; purpose in life, personal rejection and self-acceptance, personal control, and personal growth.

Keywords: Psychological well-being, medicine, students, public schools, private schools.

RESUMEN

Introducción. La Escala de Bienestar Psicológico de Carol Ryff es la más utilizada para evaluar la perspectiva eudaimónica de bienestar. Si bien se ha adaptado para población española no se ha adaptado para estudiantes de ciencias de la salud de población mexicana. **Objetivo.** Realizar adaptación y obtener propiedades psicométricas de esta escala para estudiantes de medicina de población mexicana. **Método.** El estudio se desarrolló con 1974 estudiantes de pregrado, 1551 de la Facultad de Medicina de la UNAM y 423 de la Escuela Mexicana de Medicina de la Universidad La Salle. El análisis desarrollado se realizó mediante el programa IBM SPSS Statistics 21 y AMOS 21 de SPSS. **Resultados.** Se obtuvo un instrumento con una estructura sólida derivada de los análisis factoriales exploratorios y confirmatorios desarrollados, con una varianza explicada satisfactoria, una consistencia interna obtenida mediante el coeficiente alfa de Cronbach adaptada y una discriminación favorable. **Discusión y conclusión.** El artículo es una adaptación del instrumento adecuada para estudiantes de medicina mexicanos con cuatro dimensiones finales; proyecto de vida, rechazo personal y auto aceptación, control personal y crecimiento personal.

Palabras clave: Bienestar psicológico, medicina, estudiantes, escuelas públicas, escuelas privadas.

INTRODUCTION

Psychological well-being is a critical element in students' performance, particularly in higher education. In the context of a medical degree, which is academically demanding, it can be a determining factor. The Ryff Psychological Well-Being Scale is the most widely used instrument for assessing the eudemonic perspective of well-being. Although it has been adapted for the Spanish population (Díaz et al, 2006), it has not been modified for health science students from the Mexican population.

In this regard, Freire, MarFerradás, Núñez, and Valle (2018) define psychological well-being as the acquisition of values that enable our self-fulfillment. It is a construct based on the Aristotelian conception of happiness, understood as the achievement of excellence or perfection in oneself, according to individual capabilities and potential.

Ryan and Deci (2001) identify two main strands in the literature: the hedonic tradition, associated with happiness, and the eudemonic tradition, linked to the development and expression of human potential, characterized by feeling positive and thinking constructively about oneself. The latter is characterized by its subjective, experiential, and relational nature, in which specific aspects of physical, mental, and social functioning are interrelated.

Psychological well-being (Cuadros, 2019) makes a person aware of their potential and enables them to cope with the concerns of life and undertake everyday tasks successfully, contributing to their community with a sense of reciprocity and self-fulfillment and acceptance.

Medina (2015) defines it as "functioning or doing well" as opposed to just "feeling well". In 1989, Ryff proposed the Psychological Well-Being (PWB) scale in a study conducted with 321 subjects, in which she proposed a final structure, in a Likert question format evaluating six dimensions; 1. Self-acceptance, 2. Environmental mastery, 3. Positive relations with others, 4. Personal growth, 5. Autonomy, and 6. Purpose in life. These dimensions are characterized as follows (Ryff & Keyes, 1995):

- *Self-acceptance*: people are characterized by a positive attitude towards themselves, accepting the different aspects of their personality, including negative ones, and feeling good about their past.
- *Environmental mastery*: refers to the management of the opportunities and demands of the environment to satisfy one's capacities and needs, obtaining a greater sense of control over the world and its environment.
- *Positive relationships*: characterized by quality relationships with others and support networks, which are satisfactory, warm and based on trust. In addition, people care about the well-being of others and empathize with them.
- *Personal growth*: consists of utilizing one's talents, abilities and potentialities, which enable a person to grow in the midst of difficulties. They are also open to new experiences.
- *Autonomy*: the feeling of choosing for yourself, and making your own decisions, even if they differ from the general consensus. People can resist social pressure and regulate their behavior by being more independent.
- *Purpose in life*: a person gives purpose and meaning to their life based on objectives and goals.

Growing interest in measuring psychological well-being has led to parts of the world adapting this scale with various samples and countries. Particularly with students, this has required both translating the scale into Spanish and adapting it, with an emphasis on specific dimensions depending on the social context of the subjects (Bahamón, Alarcón-Vásquez, Cudris Torres, Trejos-Herrera, & Campo Aráuz, 2019; Loera-Malvaez, Balcázar-Nava, Trejo-González, Gurrola-Peña, & Bonilla-Muñoz, 2008; Millán de Lange, García-Álvarez, & D'Aubeterre López, 2014; Véliz-Burgos, 2012; Medina-Calvillo, Gutiérrez-Hernández, & Padrós-Blázquez, 2013; Díaz et al., 2006; Lindfors, Berntson, & Lundberg, 2006; Kishida et al., 2004; van Dierendonck, 2004).

Given the goal of adapting the scale to Mexican medical students, the study conducted by Díaz et al. (2006) and undertaken by the universities of Madrid and Rotterdam with 467 students is of interest. The two institutions adopted the van Dierendonck version of the psychological well-being scales proposed by Carol Ryff. Since a satisfactory fit was not obtained with the six original dimensions, it was reduced to twenty-nine items that allowed a better fit of the model (van Dierendonck, 2004).

Aranguren and Irrazabal (2015) subsequently conducted a psychometric analysis of the scale adapted by van Dierendonck, and the scale adapted by Diaz and collaborators, in 396 Argentine students, since the original version proved unsuitable for either population. A twenty-nine-item proposal was designed, comprising three dimensions: autonomy, positive relationships with others and competence, with an adequate fit and reliability values.

Pineda and collaborators evaluated the psychometric quality of a thirty-nine-item version used with a sample of 727 Colombian young adults. They obtained adequate psychometric values and found that the instrument was sensitive enough to discriminate between the results obtained based on educational attainment, gender, and socioeconomic status in several of the dimensions of the scale (Pineda Roa, Castro Muñoz, & Chaparro Clavijo, 2018).

More recently, Meier and Oros adapted the version modified by Diez and collaborators in two stages: first with eighty adolescents to determine the linguistic coherence be-

tween Spain and Argentina and second with 825 adolescents to determine its psychometric quality. They obtained a twenty-item structure with four factors: a) Self-acceptance, b) Personal Growth and Purpose in Life, c) Autonomy and d) Positive Relationships with Other People (Meier & Oros, 2019).

In Mexico, Dominguez and collaborators used the original version of the Ryff Psychological Well-Being Scale with 1,700 students from Veracruz, analyzed the different structures proposed in the literature, and only reported a better fit in a one-dimensional model (Dominguez-Lara et al., 2019).

Psychological well-being is one of the main elements linked to academic performance as reported in various studies, in that it is a multidimensional phenomenon with extra-academic aspects that impact students (Cuadros, 2019; Dominguez-Lara & Navarro-Loli, 2018).

It is also a determining factor in the achievement of the personal and professional goals of university students and their best academic performance (Cuadros, 2019; Correa Reyes, Cuevas Martínez, & Villaseñor Ponce, 2017).

Due to the above and in the context of medical degrees, it is important to have an instrument specifically adapted for its assessment. From the moment they begin their degree course, high school students face major challenges and are forced to adapt. Although they are usually high-performing students, many of them drop out or fall behind in the first two years of their degree because of the demands and academic workload involved. Unlike other professions, the atypical conditions of training in clinical settings have a major impact on the psychological well-being of students during the clinical cycle, undergraduate internship and graduation, and even during their social service.

The objective of this study is therefore to adapt the Psychological Well-Being Scale in the version modified by Díaz and collaborators for students pursuing a bachelor's degree in medicine at the medical faculty of the National Autonomous University of Mexico (Universidad Nacional Autónoma de México, UNAM) and the Mexican School of Medicine at La Salle University.

METHOD

Study design

This is a non-experimental study, designed to adapt and validate the Psychological Well-Being Scale for undergraduate medical students through a pilot administration of the scale.

Subjects/sample description

The project involved the administration of 1,974 instruments to undergraduate students, 1,551 enrolled at UNAM and 423 at La Salle University, obtained through convenience sampling.

Sites

UNAM Faculty of Medicine and Mexican Faculty of Medicine of La Salle University.

Measurements

The scale was administered through Google Forms for both institutions, using student ID numbers and emails as controls to avoid duplicating data.

At the end of the institutional evaluation processes undertaken in 2021 and 2022, the purpose of the study was explained to students, who were told that answering it was optional and that anyone who wished could answer it. They were sent the Google Form link, in which test results were concentrated for their subsequent analysis.

Statistical analysis

Once the scales had been administered, they were concentrated for analysis using the IBM SPSS Statistics 21 program and SPSS AMOS 21. The descriptive statistics of the characteristic variables of the evaluated sample were determined, and the adjustment and psychometric structure of the scale identified through two factor analyses, one exploratory and one confirmatory. The resulting structure was used to determine internal consistency using Cronbach's Alpha for the instrument as a whole and for each resulting dimension, discriminating between them using the Student's t-test.

Ethical considerations

The identity of the subjects was respected and data use was indirect. The protocol is supported by the Ethics and Research Commission of the Research Division of the Faculty of Medicine, registration number FM/DI/114/2020.

RESULTS

The instrument was answered by 1,974 students, 63.7% of whom were women and 36.3% men, with a mean age of 23.6 ± 1.75 years, within an age range of seventeen to twenty-seven. Cronbach's alpha coefficient was calculated to determine the reliability of the instrument, with a standardized value of α equal to .89 being obtained for the instrument as a whole.

An exploratory factor analysis of principal components with Varimax rotation was subsequently performed to determine its structure. The use of orthogonal rather than oblique rotation is due to the fact that as a construct, psychological well-being has various dimensions, characterized by a set of indicators that would theoretically be assumed to be independent of each other.

Table 1
Structure of the instrument

Previous structure	Item No.	Item	Factor 1	2	3	4	Cronbach's Alpha	Discrimination
3	13	I have a plan for what I want to do with my life over the next few years	.889				.893	r < .01
3	14	I have a life plan that gives direction and guides my actions	.882					
3	12	I have clear goals about what I want to do with my life	.867					
3	15	I have set myself several goals	.806					
1	6	If I work hard, I achieve what I want	.617					
5	22	It is important to make plans to achieve what I want	.549					
6	25	I hate my way of being	7	.776			.689	r < .01
4	19	I hate my flaws		.761				
6	26	I would like to have another character		.737				
6	24	I hate my character		.723				
4	16	I love myself with all my flaws		-.684				
4	18	I would like to have a different body		.672				
4	17	I accept my flaws		-.669				
7	28	I can control my impulses			.902		.859	r < .01
7	27	I can control my behavior even if I am annoyed			.871			
7	29	I can easily control my character			.864			
1	3	I am interested in improving my skills				-.856	.887	r < .01
1	2	I am open to new experiences that will contribute to my personal training				-.851		
1	4	I have an attitude of openness to knowledge and innovation				-.848		
1	1	I am interested in acquiring new skills				-.827		
1	5	I study to know more and cope with the challenges of life				-.755		
2	9	I find it hard to relate to people	Items not grouped into any factor					
2	8	I find it difficult to make new friends						
5	21	Deciding on your purpose in life is a waste of time						
5	20	Planning for the future is a waste of time.						
2	10	I have good relationships with my colleagues						
2	11	I get along well with my classmates						
2	7	I easily get along with people my age						
5	23	If I strive to attain my goals, I will achieve them						

Note: The table shows the dimensions obtained from the adaptation of the instrument with their respective associated psychometric values.

An analysis of the correlation matrix yielded low to moderate correlations, showing that there was no collinearity between the items. The values of the fit to the structure obtained were adequate, with a KMO of .902, which was significant. Regarding communalities, it was observed that the proportion of explained variance for each item was greater than .40, except for item 23: "If I strive to achieve my goals, I will achieve them," which only achieved .34, which is why it was removed from the proposed version.

The values of the reproduced correlation matrix, determined by the factor solution, are a reliable indicator that the resulting model was good, and that there were an appropriate number of factors when 100% of the results of the extraction of each statement were reproduced, yielding residuals equal to zero.

In regard to total explained variance, the first four factors were taken into account with a percentage of 54.89%, with the values for each dimension being 30.52%, 11.42%, 7.57% and 5.37% respectively. A four-dimensional structure was obtained, as can be seen in Table 1, showing the dimensions, component items, and factor loads of reliability and discrimination by factor. Items 7, 8, 9, 10, 11, 20, and 21 are not integrated into any factor.

Discrimination was determined by establishing a cut-off point at the .33 and .66 percentiles. A lower group was obtained in which 651 records were located, with an average of 52.81 ± 5.03 points over the raw score, and a higher group, comprising 742 records, with a mean of 69.27 ± 3.22. Both groups were contrasted using a Student's t-test, with a significant discrimination of the instrument of [t = -67.18, r < .01] being found. When discrimination was analyzed for each dimension and each of the twenty-one statements comprising the adapted version of the instrument, significant discrimination was found with r < .01 for each of them.

A confirmatory factor analysis was undertaken using a structural equations model developed with AMOS, obtain-

Table 2
Adjustments to the adapted version in Mexican students enrolled in the Medical Degree Course for Surgeons

Original factor	*Previous structure*	*Factor obtained*	*Item*	*Resulting modifications*
Purpose in life	3	13	I have a plan for what I want to do with my life for the next few years	The original factor of purpose in life is maintained and is enriched with two items from factors one and five that talk about effort directed towards achievement and achievement associated with planning, which is conceptually consistent (it goes from being factor 3 to 1 in the adapted version).
	3	14	I have a life plan that gives direction to and guides my actions	
	3	12	I have clear goals about what I want to do with my life	
	3	15	I have set myself several goals	
	1	6	If I strive hard, I achieve what I want	
	5	22	To achieve what I want, it is important to make plans	
Personal rejection	6	25	I hate my way of being	Factors 4 and 6 in the original version are combined into a single one in this adapted version, which is consistent as they are complementary, merging elements of personal rejection and self-acceptance.
	4	19	I hate my flaws	
	6	26	I would like to have another character	
	6	24	I hate my character	
Self-acceptance	4	16	I love myself with all my flaws	
	4	18	I would like to have a different body	
	4	17	I hate my flaws	
Personal control	7	28	I can control my impulses	Factor 7 of personal control remains intact, becoming factor 3 in the adapted version.
	7	27	I control my behavior, even if I am upset	
	7	29	I easily control my character	
Personal growth	1	3	I am interested in honing my skills	The original structure is maintained for this dimension except for one item that is incorporated into factor 1 resulting from the purpose in life (it goes from being factor 1 to factor 3 in the new structure).
	1	2	I am open to new experiences that will contribute to my personal development	
	1	4	I have an open attitude to knowledge and innovation	
	1	1	I am interested in acquiring new skills	
	1	5	I study to know more and cope with the challenges of life	
Positive relationships with others, original factor 2 and plans for the future, original factor 5	2	9	I have difficulty relating to people	The factor 2 items of positive relationships with others are not grouped together nor do they have loads in any of the dimensions obtained. Factor 5, comprising plans for the future, except for one item recovered in factor 1, does not present loads or grouping as an independent factor either.
	2	8	I find it difficult to make new friends	
	5	21	Finding your life's purpose is a waste of time	
	5	20	Planning for the future is a waste of time.	
	2	10	I have good relationships with my colleagues	
	2	11	I get along well with my classmates	
	2	7	I get along easily with people my age	
	5	23	If I strive to achieve my goals, I will attain them	

Note: The table shows items in the original version and the way they are grouped together in the adapted version with the description of the associated changes in the dimensions obtained from the adaptation of the instrument.

ing a Chi^2 value of 4.12 ($r < .01$). The items comprising each dimension achieved significant standardized regression weights, ranging from .571 to .978. The value of the root mean square error of approximation, RMSEA, was considered since, according to Hair, Anderson, Tatham, and Black (2007), it corrects the tendency of the Chi^2 value to reject models with a large n. It has an expected goodness of fit value with the population, obtaining a value of .033 (which is acceptable, since it is less than .08) while the normal fit index (NFI) obtained was .912 (which is adequate, since it is close to 1).

When the version obtained was contrasted with the original structure proposed by Díaz et al. (2006) in the items comprising each factor, the following changes were observed for the adapted version, as shown in table 2.

DISCUSSION AND CONCLUSION

It is important to note that any assessment instrument must be suitable for the target population. Hence the importance of adapting, adjusting or validating the instruments according to the needs of the different protocols, and to ensure that they comply with certain psychometric standards that guarantee their impact on the target population, in this case medical students.

This is borne out by the various versions derived from the construction of the Ryff Psychological Well-Being Scale, foremost among which are the following:

- Vera analyzed the original structure of the instrument, obtaining factorial structures where only the first-order analysis fits the six dimensions in the original proposal, which, as he explained, could be

associated with the types of samples and populations used. The study was conducted with 1,646 people aged between 18 and 90 (Vera-Villarroel, Urzua, Silva, Pavez, & Celis-Atenas, 2013).

- Medina et al. used the thirty-nine-item version with 447 Mexican students and 256 subjects from the general population, noting that the scale did not adapt to the six dimensions proposed, even though the data obtained show an adequate fit (Medina-Calvillo et al., 2013).
- Valenzuela analyzed the factor structure of a Spanish version produced by Diaz and collaborators with 1,060 university students. He used confirmatory factorial analysis to show that the model did not fit the data, since it failed to validate the originally proposed six-dimensional structure, and only obtained two dimensions: personal growth, and self-acceptance (Medina, 2015).

Having a scale with these characteristics is important, since psychological well-being affects the variables directly related to student performance, such as stress, coping, motivation, life satisfaction, social well-being, and depression (Moreta, Gabior, & Barrera, 2017; Correa Reyes et al., 2017; Matalinares et al., 2016).

Although there are multiple proposals, the fact that every instrument must be appropriate for the characteristics of the target population must be considered, to prevent biases and unsupported interpretations in the interpretation of results, particularly in the area of health, given the profile of the future professionals evaluated and the impact of their practice on the population.

The data obtained in this research allow us to present the adapted version of the Psychological Well-being Scale as a standardized instrument for the population of Mexican medical students in public and private settings for which there is solid evidence of reliability and validity. A four-dimensional structure was obtained, which can be defined as follows:

- *Purpose in life*: characterized by planning for the future, with an impact on the establishment of personal goals, as well as actions designed to achieve it.
- *Personal rejection and self-acceptance*: comprises favorable and self-critical elements, linked to a person's way of being, flaws, character, and body image.
- *Personal control*: refers to the control of the impulses, behaviors, emotions and character of those evaluated.
- *Personal growth*: involves the development of greater competence, the search for training experiences and knowledge acquisition, the incorporation of innovation aspects, and training as a means of coping.

These dimensions are pertinent and adapted to the environment of undergraduate medicine students, enabling one to have a standardized instrument that contributes to a better assessment of Mexican medical students in regard to critical variables from their admission to their graduation. They can contribute to the development of lines of research and the psychoeducational and training context in training scenarios in both an academic and/or clinical context that will enhance the development of various lines of research.

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Conflict of interest

The authors declare that they have no conflicts of interest.

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REFERENCES

Aranguren, M., & Irrazabal, N. (2015). Estudio de las propiedades psicométricas de las escalas de bienestar psicológico de Ryff en una muestra de estudiantes argentinos. *Ciencias Psicológicas*, *9*(1), 73-83.

Bahamón, M. J., Alarcón-Vásquez, Y., Cudris Torres, L., Trejos-Herrera, A. M., & Campo Aráuz, L. (2019). Bienestar psicológico en adolescentes colombianos. *Archivos Venezolanos de Farmacología y Terapéutica*, *38*(5), 395-403.

Correa Reyes, A. S., Cuevas Martínez, M. del R., & Villaseñor Ponce, M. (2017). Bienestar psicológico, metas y rendimiento académico. *Vertientes Revista Especializada en Ciencias de la Salud*, *19*(1), 29-34.

Cuadros, J. V. (2019). Una revisión sobre el bienestar psicológico y rendimiento académico en estudiantes de pregrado. *Apuntes de Ciencia & Sociedad*, *9*(1), 1-6.

Díaz, D., Rodríguez-Carvajal, R., Blanco, A., Moreno-Jiménez, B., Gallardo, I., Valle, C., & van Dierendonck, D. (2006). Adaptación española de las escalas de bienestar psicológico de Ryff. *Psicothema*, *18*(3), 572-577. https://www.psicothema.com/pi?pii=3255

Dominguez-Lara, S., & Navarro-Loli, J. S. (2018). Revisión de metodologías empleadas en los estudios factoriales de la Escala de Bienestar Psicológico de Ryff (versión en español). *Revista Evaluar*, *18*(2), 17-30. doi: 10.35670/1667-4545.v18.n2.20800

Dominguez-Lara, S., Romo-González, T., Palmeros-Exsome, C., Barranca-Enríquez, A., del Moral-Trinidad, E., & Campos-Uscanga, Y. (2019). Análisis estructural de la Escala de Bienestar Psicológico de Ryff en universitarios mexicanos. *Liberabit*, *25*(2), 267-285. doi: 10.24265/liberabit.2019.v25n2.09

Freire, C., MarFerradás, M. del M., Núñez, J. C., & Valle, A. (2018). Estructura factorial de las Escalas de Bienestar Psicológico de Ryff en estudiantes universitarios. *European Journal of Education and Psychology*, *10*(1), 1-8. doi: 10.30552/ejep.v10i1.126

Hair, J., Anderson., R., Tatham, R., & Black, W. (2007). *Análisis multivariante*. Madrid: Pearson.

Kishida, Y., Kitamura, T., Gatayama, R., Matsuoka, T., Miura, S., & Yamabe, K. (2004). Ryff's psychological well-being inventory: factorial structure and life

history correlates among Japanese university students. *Psychological Reports*, *94*(1), 83-103. doi: 10.2466/pr0.94.1.83-103

Lindfors, P., Berntson, L., & Lundberg, U. (2006). EFactor structure of Ryff's psychological well-being scales in Swedish female and male white-collar workers. *Personality and Individual Differences*, *40*(6), 1213-1222. doi: 10.1016/j.paid.2005.10.016

Loera-Malvaez, N., Balcázar-Nava, P., Trejo-González, L., Gurrola-Peña, G. M., & Bonilla-Muñoz, M. P. (2008). Adaptación de la Escala de Bienestar Psicológico de Ryff en adolescentes preuniversitarios. *Neurología, Neurocirugía y Psiquiatría*, *41*(3-4), 90-97.

Matalinares, M. L., Díaz, G., Ornella, R., Baca, D., Uceda, J., & Yaringaño, J. (2016). Afrontamiento del estrés y bienestar psicológico en estudiantes universitarios de Lima y Huancayo. *Persona*, (19), 105-126. doi: 10.15381/rinvp.v19i2.12894

Medina, J. E. V. (2015). Bienestar psicológico en una muestra de estudiantes universitarios mexicanos. *Psicumex*, *5*(2), 4-19. doi: 10.36793/psicumex.v5i2.278

Medina-Calvillo, M. A., Gutiérrez-Hernández, C. Y., & Padrós-Blázquez, F. (2013). Propiedades psicométricas de la escala de bienestar psicológico de Ryff en población mexicana. *Revista de Educación y Desarrollo*, *27*, 25-30.

Meier, L. K., & Oros, L. B. (2019). Adaptación y análisis psicométrico de las escalas de bienestar psicológico de Ryff en adolescentes argentinos. *Psykhe (Santiago)*, *28*(1), 1-16. doi: 10.7764/psykhe.27.2.1169

Millán de Lange, A. C., García-Álvarez, D. de J., & D'Aubeterre López, M. E. (2014). Efecto de la Inteligencia Emocional y Flujo en el Trabajo Sobre Estresores y Bienestar Psicológico: Análisis de Ruta en Docentes. *Revista Colombiana de Psicología*, *23*(1), 207-228. doi: 10.15446/rcp.v23n1.37676

Moreta, R., Gabior, I., & Barrera, L. (2017). El bienestar psicológico y la satisfacción con la vida como predictores del bienestar social en una muestra de universitarios ecuatorianos. *Salud & Sociedad*, *8*(2), 172-184. doi: 10.22199/S07187475.2017.0002.00005

Pineda Roa, C. A., Castro Muñoz, J. A., & Chaparro Clavijo, R. A. (2018). Estudio psicométrico de las Escalas de Bienestar Psicológico de Ryff en adultos jóvenes colombianos. *Pensamiento Psicológico*, *16*(1), 45-55. doi: 10.11144/Javerianacali.PPSI16-1.epeb

Ryan, R. M., & Deci, E. L. (2001). On happiness and human potentials: areview of research on hedonic and eudaimonic well-being. *Annual Review of Psychology*, *52*, 141-166. doi: 10.1146/annurev.psych.52.1.141

Ryff, C. D., & Keyes, C. L. M. (1995). The structure of psychological well-being revisited. *Journal of Personality and Social Psychology*, *69*(4), 719-727. doi: 10.1037/0022-3514.69.4.719

van Dierendonck, D. (2004). The construct validity of Ryff's Scales of Psychological Well-being and its extension with spiritual well-being. *Personality and Individual Differences*, *36*(3), 629-643. doi: 10.1016/S0191-8869(03)00122-3

Vera-Villarroel, P., Urzúa, A., Silva, J. R., Pavez, P., & Celis-Atenas, K. (2013). Escala de bienestar de Ryff: análisis comparativo de los modelos teóricos en distintos grupos de edad. *Psicología: Reflexao e Crítica*, *26*(1), 106-112. doi: 10.1590/S0102-79722013000100012

Véliz-Burgos, A. (2012). Propiedades psicométricas de la escala de bienestar psicológico y su estructura factorial en universitarios chilenos. *Psicoperspectivas*, *11*(2), 143-163.

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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 escaza 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 evalúo 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 ≥ 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* ≥ 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-l-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*[a]
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)	
Subscales of burnout syndrome				
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.
[a] 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

	Subscales of burnout syndrome					
	Emotional exhaustion		*Depersonalization*		*Diminished academic efficacy*	
Academic training	*OR*[a] *(95% CI)*	*p-value*	*OR*[a] *(95% CI)*	*p-value*	*OR*[a] *(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.
[a] 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.

	School year				
	1-2 school years		3-4 school years		
Academic training	*OR[a] (95% CI)*	*p-value*	*OR[a] (95% CI)*	*p-value*	*p-interaction*
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.
[a] 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; Kaggwa 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 & Buboltz, 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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REFERENCES

Altman, D. G., & Matthews, J. N. (1996). Statistics notes. Interaction 1: Heterogeneity of effects. *BMJ (Clinical Research)*, *313*(7055), 486. doi: 10.1136/bmj.313.7055.486

Bakhamis, L., Paul, D. P. I., Smith, H., & Coustasse, A. (2019). Still an Epidemic: The Burnout Syndrome in Hospital Registered Nurses. *The Health Care Manager*, *38*(1), 3-10. doi: 10.1097/HCM.0000000000000243

Banda Guzmán, J., Robles Francia, V. H., & Lussier, R. (2021). Validación del Maslach Burnout Inventory en estudiantes universitarios de El Bajío mexicano. *RIDE Revista Iberoamericana para la Investigación y el Desarrollo Educativo*, *12*(23). doi: 10.23913/ride.v12i23.1092

Chen, C., & Meier, S. T. (2021). Burnout and depression in nurses: A systematic review and meta-analysis. *International Journal of Nursing Studies*, *124*, 104099. doi: 10.1016/j.ijnurstu.2021.104099

CONEVAL. (2021). Pobreza en México. *Resultados de pobreza en México 2020 a nivel nacional y por entidades federativas*. Consejo Nacional de Evaluación de La Política de Desarrollo Social. Retrieved from https://www.coneval.org.mx/Medicion/Paginas/PobrezaInicio.aspx

Demerouti, E., Bakker, A. B., Nachreiner, F., & Schaufeli, W. B. (2001). The job demands-resources model of burnout. *Journal of Applied Psychology*, *86*(3), 499-512. doi: 10.1037/0021-9010.86.3.499

Fares, J., Al Tabosh, H., Saadeddin, Z., El Mouhayyar, C., & Aridi, H. (2016). Stress, Burnout and Coping Strategies in Preclinical Medical Students. *North American Journal of Medical Sciences*, *8*(2), 75-81. doi: 10.4103/1947-2714.177299

Ferri, P., Guerra, E., Marcheselli, L., Cunico, L., & Di Lorenzo, R. (2015). Empathy and burnout: An analytic cross-sectional study among nurses and nursing students. *Acta Bio-Medica: Atenei Parmensis*, *86*(Suppl 2), 104-115.

García, G. M. (2002). Burnout y Engagement en un colectivo preprofesional: Estudiantes universitarios. *Boletín de Psicología*, *4*(74), 79-102.

Greenland, S. (1989). Modeling and variable selection in epidemiologic analysis. American Journal of Public Health, 79(3), 340-349. doi: 10.2105/ajph.79.3.340

Guzmán, M. O., Parrello, S., & Romero, C. P. (2020). Burnout académico en una muestra de estudiantes universitarios mexicanos. *Enseñanza e Investigación en Psicología*, *2*(1), 37-27.

Hernández-Martínez, F. J., Marques Rodrigues, A., Jiménez-Díaz, J. F., & Rodríguez-de-Vera, B. del C. (2016). El síndrome de burnout y la salud mental de los estudiantes de grado en enfermería. *Revista Portuguesa de Enfermagem de Saúde Mental*, (spe3), 79-84. doi: 10.19131/rpesm.0122

Hwang, E., & Kim, J. (2022). Factors affecting academic burnout of nursing students according to clinical practice experience. *BMC Medical Education*, *22*(1), 346. doi: 10.1186/s12909-022-03422-7

Jun, J., Ojemeni, M. M., Kalamani, R., Tong, J., & Crecelius, M. L. (2021). Relationship between nurse burnout, patient and organizational outcomes: Systematic review. *International Journal of Nursing Studies*, *119*, 103933. doi: 10.1016/j.ijnurstu.2021.103933

Kaggwa, M. M., Kajjimu, J., Sserunkuma, J., Najjuka, S. M., Atim, L. M., Olum, R., … Bongomin, F. (2021). Prevalence of burnout among university students in low- and middle-income countries: A systematic review and meta-analysis. *PloS One*, *16*(8), e0256402. doi: 10.1371/journal.pone.0256402

Kelsey, E. A., West, C. P., Cipriano, P. F., Peterson, C., Satele, D., Shanafelt, T., & Dyrbye, L. N. (2021). Original Research: Suicidal Ideation and Attitudes Toward Help Seeking in U.S. Nurses Relative to the General Working Population. *American Journal of Nursing*, *121*(11), 24-36. doi: 10.1097/01.NAJ.0000798056.73563.fa

Ledezma, J. C. R., Guzmán, A. C., Hernández, C. A. C., Fuentes, A. P. T., Sanjuan, A. M., Gardeazábal, A. S. M., & Vázquez, J. R. (2017). El síndrome de Burnout como factor influyente en el rendimiento académico del estudiante universitario. *Educación y Salud Boletín Científico Instituto de Ciencias de la Salud Universidad Autónoma del Estado de Hidalgo*, *5*(10). doi: 10.29057/icsa.v5i10.2542

Leiter, M., & Schaufeli, W. (1996). Consistency of the burnout construct across occupations. *Anxiety, Stress & Coping: An International Journal*, *9*(3), 229-243. doi: 10.1080/10615809608249404

Lin, F., & Yang, K. (2021). *The External and Internal Factors of Academic Burnout - December 24*. Proceedings of the 2021 4th International Conference on Humanities Education and Social Sciences (ICHESS 2021). Series: Advances in Social Science, Education and Humanities Research, 615, 1815-1821. Atlantis Press. doi: 10.2991/assehr.k.211220.307

March-Amengual, J.-M., Cambra Badii, I., Casas-Baroy, J.-C., Altarriba, C., Comella Company, A., Pujol-Farriols, R., … Comella Cayuela, A. (2022). Psychological

Distress, Burnout, and Academic Performance in First Year College Students. *International Journal of Environmental Research and Public Health*, *19*(6), 3356. doi: 10.3390/ijerph19063356

Maslach, C., Leiter, M. P., & Schaufeli, W. (2009). *Measuring Burnout*. In The Oxford Handbook of Organizational Well Being (pp.86-108). doi: 10.1093/oxfordhb/9780199211913.003.0005

Maslach, C., Schaufeli, W. B., & Leiter, M. P. (2001). Job Burnout. *Annual Review of Psychology*, *52*(1), 397-422. doi: 10.1146/annurev.psych.52.1.397

McCarthy, M. E., Pretty, G. M., & Catano, V. (1990). Psychological sense of community and student burnout. *Journal of College Student Development*, *31*(3), 211-216.

Merritt, D. L., & Buboltz, W. (2015). Academic Success in College: Socioeconomic Status and Parental Influence as Predictors of Outcome. *Open Journal of Social Sciences*, *3*(5), 127-135. doi: 10.4236/jss.2015.35018

Muñoz, A., Rosas-Hernández, L., Salas, J., Hernández-Villavicencio, A., Maxo, E., & Ochoa-López, A. (2022). Síndrome de burnout en estudiantes de enfermería de la escuela de ciencias de la salud: Modalidad en línea. *Ciencia Latina Revista Científica Multidisciplinar*, *6*(1), 4577-4601. doi: 10.37811/cl_rcm.v6i2.1775

Njim, T., Mbanga, C., Mouemba, D., Makebe, H., Toukam, L., Kika, B., & Mulango, I. (2018). Determinants of burnout syndrome among nursing students in Cameroon: Cross-sectional study. *BMC Research Notes*, *11*(1), 450. doi: 10.1186/s13104-018-3567-3

Padilla, S. G. M., Chávez, A. M. C., Hernández, M. R. H., & Monterrubio, A. J. Á. (2022). Síndrome de Burnout en estudiantes de enfermería de nivel superior. *Enfoques*, *4*(1), 299-311.

Pamungkas, H. P., & Nurlaili, E. I. (2021). *Academic Burnout Among University Students During COVID-19 Outbreak. 1163-1169 - December 24*. Atlantis Press. doi: 10.2991/assehr.k.211223.204

Pereira, C. de A., Miranda, L. C. dos S., & Passos, J. P. (2010). O estresse e seus fatores determinantes na concepção dos graduados de enfermagem. *Revista Mineira de Enfermagem*, *14*(2), 204-209.

Pérez Contreras, R. M., Barquero González, A., Pascual Orts, L. M., & González Sanz, J. D. (2021). Perceived stress factors among newcomers to the nursing career. *Enfermería: Cuidados Humanizados*, *10*(1), 60-74. doi: 10.22235/ech.v10i1.2300

Quina Galdino, M. J., Brando Matos de Almeida, L. P., Ferreira Rigonatti da Silva, L., Cremer, E., Rolim Scholze, A., Trevisan Martins, J., & Fernandez Lourenço Haddad, M. do C. (2020). Burnout among nursing students: A mixed method study. *Investigación y Educación en Enfermería*, *38*(1). doi: 10.17533/udea.iee.v38n1e07

Reith, T. P. (2018). Burnout in United States Healthcare Professionals: A Narrative Review. *Cureus*, *10*(12), e3681. doi: 10.7759/cureus.3681

Reyes, N. B., & Blanco, N. R. (2016). Prevalencia del Síndrome de Burnout académico en el estudiantado de Enfermería de la Universidad de Costa Rica. *Enfermería Actual de Costa Rica*, (31), 16-35.

Rodríguez-Villalobos, J. M., Benavides, E. V., Ornelas, M., & Jurado, P. J. (2019). El Burnout Académico Percibido en Universitarios; Comparaciones por Género. *Formación Universitaria*, *12*(5), 23-30. doi: 10.4067/S0718-50062019000500023

Rosales-Ricardo, Y., Rizzo-Chunga, F., Mocha-Bonilla, J., & Ferreira, J. P. (2021). Prevalence of burnout syndrome in university students: A systematic review. *Salud Mental*, *44*(2), 91-102. doi: 10.17711/sm.0185-3325.2021.013

Rudman, A., & Gustavsson, J. P. (2012). Burnout during nursing education predicts lower occupational preparedness and future clinical performance: A longitudinal study. *International Journal of Nursing Studies*, *49*(8), 988-1001. doi: 10.1016/j.ijnurstu.2012.03.010

Santes, M. del C., Meléndez, S., Martínez, N., Ramos, I., Preciado, M. de L., & Pando, M. (2009). La salud mental y predisposición a síndrome de burnout en estudiantes de enfermería. *Revista Chilena de Salud Pública*, *13*(1). Retrieved from https://revistasaludpublica.uchile.cl/index.php/RCSP/article/view/656

Schaufeli, W. B., Martínez, I., Marqués-Pinto, A., Salanova, M., & Bakker, A. (2002). Burnout and Engagement in University Students: A cross-national study. *Journal of Cross-Cultural Psychology*, *33*(5), 464-481. doi: 10.1177/0022022102033005003

Silva, V., Chiquito, N. C., Andrade, R. A. P. O., Brito, M. F. P., & Camelo, S. H. H. (2011). Fatores de estresse no último ano do curso de graduação em enfermagem: Percepção dos estudantes. *Revista Enfermagem UERJ*, *19*(1), 121-126.

Tomaschewski-Barlem, J. G., Lunardi, V. L., Lunardi, G. L., Barlem, E. L. D., Silveira, R. S. da, & Vidal, D. A. S. (2014). Síndrome de Burnout entre estudiantes de pregrado en enfermería de una universidad pública. *Revista Latino-Americana de Enfermagem*, *22*(6), 934-941.

United Nations Development Programme. (2020). *Human Development Insights*. Retrieved from Human Development Reports website: https://hdr.undp.org/data-center/country-insights - July 4, 2022.

Vasconcelos, E. M. de, Trindade, C. O., Barbosa, L. R., & Martino, M. M. F. de. (2020). Predictive factors of burnout syndrome in nursing students at a public university. *Revista Da Escola de Enfermagem Da USP*, *54*, e03564 doi: 10.1590/S1980-220X2018044003564

Velasco-Rodríguez, V., Córdova-Estrada, S., & Suárez-Alemán, G. (2013). Síndrome de desgaste estudiantil (Burnout) y su asociación con ansiedad y depresión en alumnos de una Escuela de Enfermería. *Revista Iberoamericana para la Investigación y el Desarrollo Educativo*, (10). Retrieved from https://1-11.ride.org.mx/index.php/RIDESECUNDARIO/article/view/180

Wei, H., Dorn, A., Hutto, H., Webb Corbett, R., Haberstroh, A., & Larson, K. (2021). Impacts of Nursing Student Burnout on Psychological Well-Being and Academic Achievement. *Journal of Nursing Education*, *60*(7), 369-376. doi: 10.3928/01484834-20210616-02

Wing, T., Pey, Y. C., Subramaniam, V., Raof, N. A. A., Ting, O. W., & Ahmad, M. H. H. (2018). Prevalence of Burnout in Medical and Non-medical Undergraduate Malaysian Students in Various International Universities—A Cross-Sectional Study. *Journal of Advances in Medicine and Medical Research*, *25*(11), 1-13. doi: 10.9734/JAMMR/2018/40212

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Mental illness attitudes in medical education: Assessing the stigma in medical students

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ABSTRACT

Introduction. Factors affecting the quality of physician care include a shortage of trained staff, stigma, and discrimination. **Objective.** The objective was to compare the intensity of stigmatization before and after a Psychiatry course, as measured by the scale of clinicians' attitudes towards mental illness, a version for medical students (MICA-2) designed to identify stigmatic attitudes towards mental disorders. **Method.** The fifth-year Medicine students enrolled in the Psychiatry course answered anonymously using the MICA-2 test at the start and the end of their course. Additionally, we asked the students to answer a question about their interest in learning more about mental illness. **Results.** Three hundred and thirty students were invited; 300 agreed to participate in the first application of the scales, and 291 in the follow-up. The average age was 22 ± 2 years, with a range of 20-30 years, and there was a similar gender distribution in both applications. In the initial application, the average score of the MICA-2 was 41.34 (SD = 7.86, 95% CI = [40.43, 42.25]). The follow-up application's mean was 37.10 (SD = 8.15, 95% CI = [36.30, 38.15]). Also, there was a decrease in interest in learning more about mental illness. **Discussion and conclusion.** A reduction in the average scores of the MICA-2 was observed after a Psychiatry course, suggesting that attitudes toward mental disorders improved. A Psychiatry clerkship with close supervision modified the attitudes of medical students toward mental disorders. However, it did not increase their interest in learning more about mental illness.

Keywords: Stigma, mental illness, medical students, Psychiatry.

RESUMEN

Introducción. Los factores que afectan la calidad de la atención médica incluyen: la escasez de personal capacitado, el estigma y la discriminación. **Objetivo.** El objetivo fue comparar la intensidad de la estigmatización antes y después del curso de Psiquiatría, se utilizó la escala de las actitudes de los clínicos hacia la enfermedad mental, versión para estudiantes médicos (MICA-2), diseñada para identificar actitudes estigmatizantes hacia los trastornos mentales. **Método.** Los estudiantes médicos de quinto año que tomaban el curso de Psiquiatría respondieron de forma anónima la escala MICA-2 al inicio y al final del curso. Además, se les preguntó sobre su interés en aprender más sobre los trastornos mentales. **Resultados.** Se invitaron a 330 estudiantes; 300 aceptaron participar en la primera aplicación de las escalas y 291 en el seguimiento. La edad promedio fue de 22 ± 2 años, con un rango de 20-30 años; con una distribución de género similar en ambas aplicaciones. En la aplicación inicial, la puntuación media del MICA-2 fue de 41.34 (DE = 7.86, IC 95% = [40.43, 42.25]). En la de seguimiento, la media fue de 37.10 (DE = 8.15, IC 95% = [36.30, 38.15]). El interés en aprender más sobre los trastornos mentales disminuyó. **Discusión y conclusión.** Observamos una reducción en los puntajes promedio después de tomar el curso de Psiquiatría, lo que sugiere que las actitudes hacia los trastornos mentales mejoraron. Un curso de Psiquiatría con mayor disposición y supervisión estrecha modificó las actitudes hacia los trastornos mentales de los estudiantes médicos, pero su interés en aprender más sobre los trastornos mentales disminuyó.

Palabras clave: Estigma, trastornos mentales, estudiantes de Medicina, Psiquiatría.

INTRODUCTION

The term stigma refers to a sign, mark, or signal that usually has negative connotations and could cause discrimination (Corrigan, Rüsch, & Scior, 2018; Rüsch & Kösters, 2021; Seeman, Tang, Brown, & Ing, 2016; Thornicroft et al., 2016; Wang, Link, Corrigan, Davidson, & Flanagan, 2018). Stigma in mental illness can be defined as a negative attitude caused by the manifestation of a mental disorder or the mention of some psychiatric treatment in a person's life (Sartorius et al., 2010).

The stigmatization of mental illness affects the relationship with other people and the self-concept of the person who suffers it (Lasalvia et al., 2021; Sartorius et al., 2010; Thornicroft et al., 2016). Such a situation would also affect the quality of care received by those with mental health diagnoses when they develop a non-psychiatric medical condition and are cared for by other specialists (Corrigan et al., 2018; Sartorius et al., 2010; Thornicroft et al., 2016), which results in a deterioration in their quality of life (Sartorius et al., 2010; Wang et al., 2018). Possible causes of persistance of stigma to persist include lack of information and lack of contact or relationship with a person with a mental disorder (Korszun, Dinos, Ahmed, & Bhui, 2012; Pandian et al., 2020; Simon & Verdoux, 2018).

It is worrying that negative and stigmatizing beliefs towards people with a mental disorder affect the general population (WHO, 2018; Lasalvia et al., 2021; Roberts & Bandstra, 2012; Seeman et al., 2016), yet the fact that these ideas extend to doctors-in-training is even more alarming. Medical students may have similar or even more negative attitudes and beliefs (Kassam, Papish, Modgill, & Patten, 2012); cultural stigmatization should not permeate or amplify in medical school (Adams, Lee, Pritchard, & White, 2010).

Stigmatization can be directed towards oneself or someone else (Eksteen, Becker, & Lippi, 2017), and would affect how students learn to provide care since they could prejudge those who seek medical attention (Roberts & Bandstra, 2012). As an additional result, patients could fell unheard and thus avoid speaking about their symptoms and health problems, further affecting the medical care they receive (Leung, Awani, Chima, & Udo, 2015; Rüsch & Kösters, 2021).

The people in charge of education play a fundamental role in facilitating and supervising direct contact with patients, promoting coexistence, participating in their treatment, and fostering comprehensive learning (Kerebih, Salelew, & Hailesilassie, 2019; Lyons & Janca, 2015). Various guidelines have been established to achieve objectives within the medical student's training (Sartorius et al., 2010).

An effective educational plan that favors contact with patients with mental disorders at different stages of the course of their illness could reduce stigma and continue to sensitize clinicians on the subject during other stages of their training (Eksteen et al., 2017; Oliveira et al., 2020). In addition, it could be extended to the rest of the medical specialties (Eksteen et al., 2017). Unfortunately, although there are studies carried out in the Mexican population that describe the attitudes towards mental illness in the general population (IESM-OMS, 2011), we did not find studies that describe the opinions of medical students in Mexico. The objective of our study was to measure and compare medical students' attitudes toward mental illness at the beginning and the end of their Psychiatry course.

METHOD

Study design

This investigation was observational, cross-sectional, descriptive, and open.

Subjects

The participants were students in their fifth year of Medicine of the same university who took the Psychiatry subject; their participation was anonymous and voluntary, and they were told that they could end their participation at any time if they wanted to.

Place

The authors invited the students to answer the MICA-2 scale in their classroom during their Psychiatry course's first and last classes.

Course characteristics

The Psychiatry course has 20 weeks and is developed over five months. The academic program is designed so that students attend theoretical and practical classes. The massive theoretical classes (300 or more students) have a frequency of one to two weekly sessions of 1-hour duration, and expository-type strategies are implemented. The practical part of the course includes case review workshops in small groups (30 students) once a week. The objective is to practice a theoretical and practical discussion of cases through live or video-recorded interviews with patients who present psychiatric pathology. In addition, students perform two shifts per semester in the emergency services and the hospitalization area of the hospital's Psychiatry department attached to the Faculty of Medicine.

Measurements

The instrument used was the Scale of Clinicians' Attitudes towards mental illness, version for medical students (MICA-2;

Kassam et al., 2012). It is self-applicable and consists of 16 items, with responses on a 6-point scale; possible scores range from 16 to 96, and higher means more negative and stigmatizing attitudes. Moreover, it has good internal reliability in the original study, with a Cronbach's alpha of .79.

Procedure

The students were asked to voluntarily participate; to avoid possible biases, their participation was anonymous. Sociodemographic information was collected, and the MICA-2 scale was applied initially and once again after the students finished their course, which lasted for five months.

Additionally, we asked the students to answer a question that explored their interest in learning more about mental illness. The question was exploratory, with answers on a Likert-type scale, with the following options: "agree," "moderately agree," "neutral," "moderately disagree," and "disagree."

Statistical analysis

We compared baseline measurements of demographic and clinimetric variables between groups to control for possible biases. For the difference concerning the change between the final and baseline score on the MICA-2 scale, the t-test was used for paired data, given the equality of variances of the sampling distributions.

Furthermore, Pearson's chi2 tests were performed for categorical variables such as gender, origin, occupation, academic condition, and residence condition in an exploratory and secondary way. All information was analyzed with the statistical software JMP 13.

Ethical considerations

The Institutional Ethics Committee reviewed and approved the study (PS15-001). There was no potential harm to participants, and the anonymity of participants was guaranteed.

RESULTS

Three hundred thirty students were invited to participate in the research, of which 300 participated in the initial application and 291 in the follow-up, with a participation rate of 97%. There was a similar gender distribution in both applications: in the initial one, 152 (51%) were men, and 148 (49%) were women; in the follow-up, 146 (50%) were men, and 144 (50%) were women. One student did not answer the section corresponding to gender. The mean age was 22 ± 2 years, within a 20-30-years range (Table 1).

Most of the participants reported to be full-time students, and most were born in the city where the medical school is located; almost a third of them were from other cities. In addition, most of the students lived with their families of origin.

In the initial application, the MICA-2 average score was 41.34 (SD = 7.86, 95% CI = [40.43, 42.25]), with a maximum score of 66 and a minimum of 21. In the follow-up application, the mean was 37.10 (SD = 8.15, 95% CI = [36.30, 38.15]), with a maximum of 62 and a minimum of 19. We found a reduction in the mean scores between the initial and final application. In general, the stigmatic attitudes decreased (Figure 1). We found that this decrease was unaffected by gender, age, and the other demographic variables.

Table 1
Sociodemographic data description

	Base application (n = 300)	*Follow-up application (n = 291)*	*P*
Age	Mean 22.25 ± .138	Mean 22.3 ± .140	.696
Gender	F = 152 (51%) M = 148 (49%)	F = 144 (49%) M = 146 (50%) NS = 1	.078
Work status	Yes = 41 (14%) No = 259 (86%)	Yes = 39 (13%) No = 252 (87%)	.936
Place of birth	L = 205 (68%) O = 95 (32%)	L = 198 (71%) O = 93 (29%)	.64
Living with	NF = 227 (75.6%) F = 29 (9.6%) A = 21 (7%) OF = 19 (6.3%) S = 3 (1%) NS = 1 (.3%)	NF = 219 (75.2%) F = 29 (10%) A = 20 (6.9%) OF = 19 (6.5%) S = 3 (1%) NS = 1 (.3%)	.98

Notes: F = Female; M = Masculine; L = Born in the same state as the campus; O = Born in another state; NS = Not specified; NF = Nuclear family; F = Friends; A = Alone; OF = Own family; S = Shared.

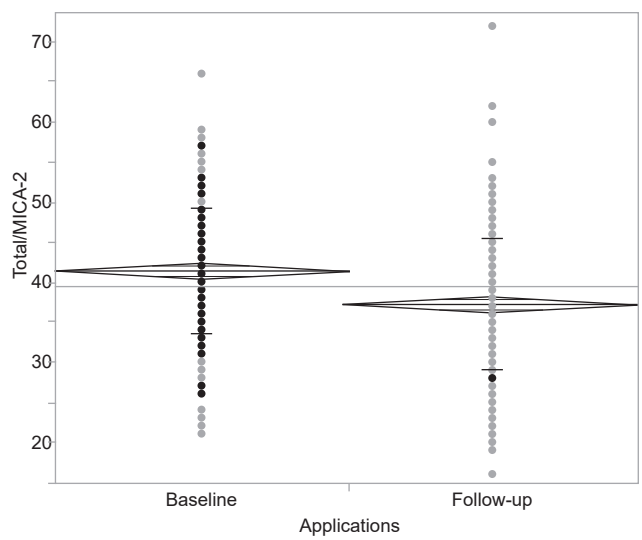

Figure 1. Univariant analysis of MICA-2 totals by applications.

Notes: Baseline application = 41.34 (SD = 7.86, 95% CI = [40.43, 42.25]); follow-up application = 37.10 (SD = 8.15, 95% CI = [36.30, 38.15]).

After finishing the course, the difference between the baseline and final applications mean scores was -4.11 (p = ≤ .0001). In our subjects, the MICA-2 scale had a Cronbach's alpha coefficient of 69 (rounded), which is considered acceptable and similar to the previously reported (Kassam et al., 2012).

The response of the question on the interest in learning more about mental illness was as follows: 270 students (89.99%) mentioned agreeing or moderately agreeing with that statement, and 28 (9.33%) answered having a neutral position. It is important to note that only two students (.66%) mentioned that they moderately disagreed and that none of them said they disagreed.

However, on the follow-up application, there was a decrease in the number of students who agreed (252 students, 86.59%). There was an increase in the neutral responses (32 students, 10.99%) and students' responses disagreeing or moderately disagreeing (6 students, 2.05%; Table 2).

Table 2
Description of the response percentage to the interest in learning more about mental illness

	Baseline application (n = 300)	*Follow-up application (n = 291)*
Agree	205 (68.33%)	179 (61.51%)
Moderately agree	65 (21.66%)	73 (25.08%)
Neutral	28 (9.33%)	32 (10.99%)
Moderately in disagreement	2 (.66%)	2 (.68%)
Disagree	0 (0%)	4 (1.37%)
Not specified	0 (0%)	1 (.34%)

Note: The percentages are according to the population during the baseline (n = 300) and follow-up application (n = 291).

DISCUSSION AND CONCLUSION

The results obtained on the MICA-2 scale are encouraging; compared with other published studies, a positive influence of academic courses on stigma in mental health was observed. The mean score at the baseline application was 41.25, (95% CI 40.43, 42.25), while at the end it became 37.10 (95% CI 36.30, 38.15). with non-overlapping confidence intervals, indicating that the stigma towards mental illness decreased after completing an academic period of 20 weeks. The academic course should be long enough to implement interventions and measure responses (Borg, Testa, Sammut, & Cassar, 2020; Hankir, Fletcher-Rogers, Ogunmuyiwa, Carrick, & Zaman, 2020) , even though some studies have reported changes after a 15-day rotation (Desai et al., 2019).

Additionally, when comparing these scores with those obtained in other studies, it seems that there is a lower presence of stigmatizing attitudes in our population. For example, in a study with students from central and eastern Europe, the authors obtained means of 38.1, 40.2, and 43.1 (Janoušková et al., 2021); conversely, in a study with a French population, the means obtained were 41.4 and 43.5 (Simon & Verdoux, 2018). The decrease in the follow-up scores can be considered an indicator of the decrease in the students stigmatizing ideas. These results are consistent with the literature (Babicki, Małecka, Kowalski, Bogudzińska, & Piotrowski, 2021; Desai et al., 2019; Masedo et al., 2021). Similarly, Simon and Verdoux (2018) report significant changes after an educational program with Psychiatry and Neurology students. Thus, it seems that stigmatizing attitudes can be reduced by an educational program, having a more marked positive impact when it is concomitant with supervised clinical practice (Simon & Verdoux, 2018) and proper guidance during their clerkships (Petkari, Masedo Gutiérrez, Xavier, & Moreno Küstner, 2018; Potts et al., 2022).

Among the various interventions to prevent stigma (Corrigan et al., 2018; Pandian et al., 2020; Rüsch & Kösters, 2021), direct contact with people with mental illness appears to be more effective than education with video exposure (Gervás et al., 2022) and group discussion (Pandian et al., 2020), which have shown high efficacy (Heim et al., 2019; Rezvanifar, Shariat, Shalbafan, Salehian, & Rasoulian, 2022). Our results suggest that it may be necessary to enrich educational interventions with more significant interaction with patients (Lien et al., 2021; Sandhu, Arora, Brasch, & Streiner, 2019), considering that the most appropriate strategies allow such coexistence in an educational context that prioritizes the clarification of beliefs and the detection of preconceived stigmatizing attitudes (Balon et al., 2017; Heim et al., 2019).

It has been suggested that to consider that interventions to prevent stigma are a success, they should be continuously evaluated for the persistence of the knowledge acquired (Pandian et al., 2020) with the use of more sophisticated instruments and even more intense interventions (Sandhu et al., 2019; Waqas et al., 2020). Interestingly, the proportion of reported interest in learning more about mental illness decreased. It is baffling that some students even disagreed with learning more; this could imply that other seminar or academic staff variables needed to be considered, such as satisfaction with the learned content or their interest in learning more about other medical specialties (Meng, Huang, Wang, Wang, & Wang, 2022). We could even hypothesize that the students who are not interested in specializing in Psychiatry may not wish to continue learning more about the subject (Meng et al., 2022; Potts et al., 2022).

Thus, it is possible to implement a simple intervention to improve the quality of the educational experience by bringing students closer to psychiatric clinical practice with more meaningful guidance and accompaniment from the professionals working in the institution. Also, collabora-

tion with different disciplines with intervention design and application is of utmost importance, such as psychology, sociology, social work, etcetera. The most successful intervention should result from interdisciplinary work (Babicki et al., 2021; Corrigan et al., 2018; Potts et al., 2022).

Limitations

Among the limitations of this study, some are that it was developed in only one generation of students after one seminar and only in one medical school (Gervás et al., 2022; Lien et al., 2021; Waqas et al., 2020). Furthermore, no questions were asked about the students' previous exposure to people with any disease or their representation by the media. It has been reported that having previous experience with medical or mental illnesses and how the media portrays psychiatrists could influence the choice of specialty (Babicki et al., 2021; Meng et al., 2022; Potts et al., 2022; Rezvanifar et al., 2022).

Although it had an internal consistency of .6859, and we used the recommended Spanish-translated version of the scale, it has not been validated yet in the Mexican population.

Other factors that were not included in the present study and that would be worth reviewing in subsequent studies are the history of contact with patients with psychiatric illnesses, having a relative who receives mental health care. Also, factors more closely related to the educational process include the teacher's role, group size, program content, type of material reviewed, and teaching strategies.

It is possible to modify medical students' attitudes towards mental disorders after taking a Psychiatry course if the people in charge of their learning show disposition and closer supervision during the clinical rotations.

However, there was a decrease in the response percentage of the interest to learn more about mental illness, suggesting that more variables were not considered.

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Conflict of interest

The authors declare they have no conflicts of interest.

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REFERENCES

Adams, E., Lee, A., Pritchard, C., & White, R. (2010). What Stops Us from Healing the Healers: A Survey of Help-Seeking Behaviour, Stigmatisation and Depression within the Medical Profession. *International Journal of Social Psychiatry*, *56*(4), 359-370. doi: 10.1177/0020764008099123

Babicki, M., Małecka, M., Kowalski, K., Bogudzińska, B., & Piotrowski, P. (2021). Stigma Levels Toward Psychiatric Patients Among Medical Students—A Worldwide Online Survey Across 65 Countries. *Frontiers in Psychiatry*, *12*, 798909. doi: 10.3389/fpsyt.2021.798909

Balon, R., Morreale, M. K., Guerrero, A., Beresin, E. V., Brenner, A., Coverdale, J. H., … Roberts, L. W. (2017). Impact of Educational Experience on Attitudes Toward Mental Illness and Career Choice. *Academic Psychiatry*, *41*(3), 309-311. doi: 10.1007/S40596-017-0686-4

Borg, N., Testa, L., Sammut, F., & Cassar, D. (2020). Attitudes of Medical Students in Malta Toward Psychiatry and Mental Illness. *Academic Psychiatry*, *44*(6), 709-713. doi: 10.1007/s40596-020-01304-y

Corrigan, P., Rüsch, N., & Scior, K. (2018) Adapting Disclosure Programs to Reduce the Stigma of Mental Illness. *Psychiatric Services*, *69*(7), 826-828. doi: 10.1176/appi.ps.201700478

Desai, R., Panchal, B., Vala, A., Ratnani, I. J., Vadher, S., & Khania, P. (2019). Impact of Clinical Posting in Psychiatry on the Attitudes towards Psychiatry and Mental Illness in Undergraduate Medical Students. *General Psychiatry*, *32*(3), e100072. doi: 10.1136/gpsych-2019-100072

Eksteen, H. C., Becker, P. J., & Lippi, G. (2017). Stigmatization towards the Mentally Ill: Perceptions of Psychiatrists, Pre-Clinical and Post-Clinical Rotation Medical Students. *International Journal of Social Psychiatry*, *63*(8), 782-791. doi: 10.1177/0020764017735865

Gervás, R., García-Ullán, L., Amor, V., Bullon, A., Vicente, P., & Roncero, C. (2022). Effectiveness and Types of Interventions to Reduce Mental Illness-Related Stigma among Medical university students: A literature review (1997-2020). *Actas Españolas de Psiquiatría*, *50*(2), 106-113.

Hankir, A., Fletcher-Rogers, J., Ogunmuyiwa, J., Carrick, F. R., & Zaman, R. (2020). Reducing mental health stigma in medical students and doctors towards their peers with mental health difficulties: a protocol. *Psychiatria Danubina*, *32*(Suppl 1), 130-134.

Heim, E., Henderson, C., Kohrt, B. A., Koschorke, M., Milenova, M., & Thornicroft, G. (2019). Reducing Mental Health-Related Stigma among Medical and Nursing Students in Low- and Middle-Income Countries: ASystematic Review. *Epidemiology and Psychiatric Sciences*. *29*, e28. doi: 10.1017/S2045796019000167

IESM-OMS. (2011). *Informe Sobre el Sistema de Salud Mental en México*. Organización Mundial de la Salud.

Janoušková, M., Formánek, T., Bražinová, A., Mílek, P., Alexová, A., Winkler, P., & Bankovská L. (2021). Attitudes towards People with Mental Illness and Low Interest in Psychiatry among Medical Students in Central and Eastern Europe. *Psychiatric Quarterly*, *92*(1), 407-418. doi: 10.1007/s11126-020-09817-3

Kassam, A., Papish, A., Modgill, G., & Patten, S. (2012). The Development and Psychometric Properties of a New Scale to Measure Mental Illness Related Stigma by Health Care Providers: The Opening Minds Scale for Health Care Providers (OMS-HC). *BMC Psychiatry*, *12*(1), 62. doi: 10.1186/1471-244X-12-62

Kerebih, H., Salelew, E., & Hailesilassie, H. (2019). Factors Associated with Medical Students' Choice of Psychiatry as Future Specialty: A Cross-Sectional Study. *Advances in Medical Education and Practice*, *10*, 751-758. doi: 10.2147/AMEP.S210286

Korszun, A., Dinos, S., Ahmed, K., & Bhui, K. (2012). Medical Student Attitudes About Mental Illness: Does Medical-School Education Reduce Stigma?. *Academic Psychiatry*, *36*(3), 197-204. doi: 10.1176/appi.ap.10110159

Lasalvia, A., Bonetto, Ch., Miglietta, E., Giacco, D., Nicaise, P., Lorant, V., … Priebe, S. (2021). Comparing Discrimination among People with Schizophrenia, Affective and Anxiety Disorders. A Multilevel Study in Five European Countries. *Journal of Affective Disorders*, *279*, 191-202. doi: 10.1016/J.JAD.2020.10.002

Leung, K., Awani, T., Chima, C., & Udo, I. (2015). What Can Qualitative Studies Reveal About Recruitment into Psychiatry?. *Academic Psychiatry*, *39*(3), 286-292. doi: 10.1007/s40596-015-0290-4

Lien, Y.-Y., Lin, H.-S., Lien, Y.-J., Tsai, C.-H., Wu, T.-T., Li, H., & Tu, Y.-K. (2021). Challenging Mental Illness Stigma in Healthcare Professionals and Students: A Systematic Review and Network Meta-Analysis. *Psychology & Health*, *36*(6), 669-684. doi: 10.1080/08870446.2020.1828413

Lyons, Z., & Janca, A. (2015). Impact of a Psychiatry Clerkship on Stigma, Attitudes towards Psychiatry, and Psychiatry as a Career Choice. *BMC Medical Education*, *15*, 34. doi: 10.1186/s12909-015-0307-4

Masedo, A, Grandón, P., Saldivia, S., Vielma-Aguilera, A., Castro-Alzate, E. S., Bustos, C., … Moreno-Küstner, B. (2021). A multicentric study on stigma towards people with mental illness in health sciences students. *BMC Medical Education*, *21*(1), 324. doi: 10.1186/s12909-021-02695-8

Meng, N., Huang, X., Wang, J., Wang, M., & Wang, Y. (2022). The Factors and Outcomes of Stigma toward Mental Disorders among Medical and Nursing Students: A Cross-Sectional Study. *BMC Psychiatry*, *22*(1), 357. doi: 10.1186/s12888-022-03996-y

Oliveira, A. M., Machado, D., Fonseca, J. B., Palha, F., Moreira, P. S., Sousa, N., … Morgado, P. (2020). Stigmatizing Attitudes Toward Patients with Psychiatric Disorders Among Medical Students and Professionals. *Frontiers in Psychiatry*, *11*, 326. doi: 10.3389/fpsyt.2020.00326

Pandian, H., Mohamedali, Z., Chapman, G. E., Vinchenzo, P., Ahmed, S., Mulliez, Z., … Tracy, D. K. (2020). Psych Socs: Student-Led Psychiatry Societies, an Untapped Resource for Recruitment and Reducing Stigma. *BJPsych Bulletin*, *44*(3), 91-95. doi: 10.1192/bjb.2019.88

Petkari, E., Masedo Gutiérrez, A. I., Xavier, M., & Moreno Küstner, B. (2018). The Influence of Clerkship on Students' Stigma towards Mental Illness: A Meta-Analysis. *Medical Education*, *52*(7), 694-704. doi: 10.1111/medu.13548

Potts, L. C., Bakolis, I., Deb, T., Lempp, H., Vince, T., Benbow, Y., … The Indigo Read Study Group. (2022). Anti-Stigma Training and Positive Changes in Mental Illness Stigma Outcomes in Medical Students in Ten Countries: A Mediation Analysis on Pathways via Empathy Development and Anxiety Reduction. *Social Psychiatry and Psychiatric Epidemiology*, *57*(9), 1861-1873. doi: 10.1007/s00127-022-02284-0

Rezvanifar, F., Shariat, S. V., Shalbafan, M., Salehian, R., & Rasoulian, M. (2022). Developing an Educational Package to Improve Attitude of Medical Students Toward People With Mental Illness: A Delphi Expert Panel, Based on a Scoping Review. *Frontiers in Psychiatry*, *13*, 860117. doi: 10.3389/fpsyt.2022.860117

Roberts, L. W., & Bandstra, B. S. (2012). Addressing Stigma to Strengthen Psychiatric Education. *Academic Psychiatry*, *36*(5), 347-350. doi: 10.1176/appi.ap.12060118

Rüsch, N., & Kösters, M. (2021). Honest, Open, Proud to Support Disclosure Decisions and to Decrease Stigma's Impact among People with Mental Illness: Conceptual Review and Meta-Analysis of Program Efficacy. *Social Psychiatry and Psychiatric Epidemiology*, *56*, 1513-1526. doi: 10.1007/s00127-021-02076-y

Sandhu, H. S., Arora, A., Brasch, J., & Streiner, D. L. (2019). Mental Health Stigma: Explicit and Implicit Attitudes of Canadian Undergraduate Students, Medical School Students, and Psychiatrists. *Canadian Journal of Psychiatry*, *64*(3), 209-217. doi: 10.1177/0706743718792193

Sartorius, N., Gaebel, W., Cleveland, H. R., Stuart, H., Akiyama, T., Arboleda-Flórez, J., … Tasman, A. (2010). WPA Guidance on How to Combat Stigmatization of Psychiatry and Psychiatrists. World Psychiatry. *World Psychiatric*, *9*(3), 131-144. doi: 10.1002/j.2051-5545.2010.tb00296.x

Seeman, N., Tang, S., Brown, A. D., & Ing., A. (2016). World Survey of Mental Illness Stigma. *Journal of Affective Disorders*, *190*, 115-121. doi: 10.1016/j.jad.2015.10.011

Simon, N., & Verdoux, H. (2018). Impact of Education Program and Clinical Posting in Psychiatry on Medical Students' Stigmatizing Attitudes towards Psychiatry and Psychiatric Disorders. *Encephale*, *44*(4), 329-336. doi: 10.1016/j.encep.2017.05.003

Thornicroft, G., Mehta, N., Clement, S., Evans-Lacko, S., Doherty, M., Rose, D., ... Henderson C. (2016). Evidence for Effective Interventions to Reduce Mental-Health-Related Stigma and Discrimination. *The Lancet*, *387*(10023), 1123-1132. doi: 10.1016/S0140-6736(15)00298-6

Wang, K., Link, B. G., Corrigan, P. W., Davidson, L., & Flanagan, E. (2018). Perceived Provider Stigma as a Predictor of Mental Health Service Users' Internalized Stigma and Disempowerment. *Psychiatry Research*, *259*, 526-531. doi: 10.1016/j.psychres.2017.11.036

Waqas, A., Malik, S., Fida, A., Abbas, N., Mian, N., Miryala, S., … Naveed, S. (2020). Interventions to Reduce Stigma Related to Mental Illnesses in Educational Institutes: A Systematic Review. *Psychiatric Quarterly*, *91*(3), 887-903. doi: 10.1007/s11126-020-09751-4

World Health Organization [WHO]. (2018). *Mental Health Atlas 2017*. WHO: Geneva. Retrieved from https://apps.who.int/iris/handle/10665/272735

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Resilience, adverse childhood experiences, and mental health in Health Science students during the COVID-19 pandemic

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ABSTRACT

Introduction. A steady rise in mental problems has been observed in the university population, particularly in the area of health, related to the COVID-19 pandemic. Protective factors such as resilience and risk factors such as adverse events in childhood have been associated with mental health outcomes. **Objective.** Describe psychiatric symptoms and their association with adverse childhood experiences and resilience in first-semester students in the three undergraduate programs of the Faculty of Health Sciences of the University of Caldas, Colombia in 2020. **Method.** Descriptive, cross-sectional, correlational study, using a virtual survey including the SRQ (*Self Reporting Questionnaire*), Wagnild and Young's Resilience Scale and questions on adverse childhood experiences. **Results.** A total of 108 students with a mean age of 19.6 years participated in the study. Affective symptoms were found in 6.4% of subjects. The most frequent level of resilience was medium, while the most commonly reported adverse event was child abuse. An association was found between being exposed to adverse childhood experiences and the presence of symptoms that compromise mental health and alter one of the domains of resilience. A link was also found between the presence of these symptoms and the alteration of domains of resilience. **Discussion and conclusion.** It was possible to identify a risk of mental health disorders in students, and to establish an association between adverse events in childhood and resilience.

Keywords: Mental health, students, adverse childhood experiences, resilience psychological, COVID-19.

RESUMEN

Introducción. Se ha descrito un aumento progresivo de problemas mentales en la población universitaria, especialmente en el área de la salud, relacionado con la pandemia por COVID-19. Factores protectores como la resiliencia y factores de riesgo como eventos adversos en la infancia, se han relacionado con desenlaces en la salud mental. **Objetivo.** Describir síntomas psiquiátricos y su asociación con eventos adversos en la infancia y resiliencia, en estudiantes de primer semestre de los tres programas de pregrado de la Facultad de Ciencias para la Salud de la Universidad de Caldas, Colombia en 2020. **Método.** Estudio descriptivo, transversal, correlacional, mediante una encuesta virtual incluyendo el SRQ (*Self Reporting Questionnaire*), escala de resiliencia de Wagnild y Young y preguntas relacionadas con eventos adversos en la infancia. **Resultados.** Participaron 108 estudiantes con edad media de 19.6 años. Hubo presencia de síntomas afectivos en 6.4%. El nivel de resiliencia más frecuentemente encontrado fue "medio" y el evento adverso en la infancia más comúnmente reportado fue el maltrato. Se demostró asociación entre haber estado expuesto a eventos adversos en la infancia tanto con presencia de síntomas que comprometen la salud mental como con afectación de uno de los dominios de resiliencia. Asimismo, hubo asociación entre presencia de dichos síntomas con afectación de los dominios de la resiliencia. **Discusión y conclusión.** Se pudo identificar riesgo de alteraciones de la salud mental en los estudiantes, resaltando la asociación con eventos adversos en la infancia y la resiliencia.

Palabras clave: Salud mental, estudiantes, experiencias adversas de la infancia, resiliencia psicológica, COVID-19.

INTRODUCTION

Up to 30% of young adults have reported a diagnosable mental illness, with 9% of these cases being considered severe (MacPhee et al., 2021). This rate increases in college students, among which there is a reported prevalence of 15% (Eisenberg, Hunt, & Speer, 2013), especially in those with personal, familial, and social stressors (Gong, 2020), and freshmen (Antúnez & Vinet, 2013). It has been observed that one in three students report mental health problems after being admitted to university (Bruffaerts et al., 2018). These alterations affect academic performance and contribute to university dropout (Lipson, Abelson, Ceglarek, Phillips, & Eisenberg, 2019).

Health-related university studies have a greater impact on mental health, as they are linked to a heavier academic load, exposure to stressors, relationships with peers frequently associated with competition, an imbalance between academic and personal life, academic problems, and proximity to suffering and death (Kunzler et al., 2020). Significant indicators of exhaustion, stress, and depression have been found in students in the area of health (Hill, Goicochea, & Merlo., 2018; Pacheco et al., 2017), which also have an impact on university dropout rates (Vega, 2021). This is not only evident among university students, since studies of health workers have reported a risk of developing depression and anxiety of 23.1% and 15.2%, respectively, following the onset of the pandemic (Mascayano et al., 2022).

The coronavirus pandemic brought many abrupt changes, such as the initial lockdown, the closure of educational establishments, working and learning from home, which decreased contact with colleagues and peers, loneliness, family conflicts, and proximity to the disease (Secord & McGrath, 2021). This impacted the lives of everyone, contributing to the already low probability of timely attention and exacerbating pre-existing disorders (Gunnell et al., 2020). According to UNICEF data from 2021, higher levels of anxiety and depression were reported in adolescents and young adults following the onset of the pandemic, coupled with decreased motivation and optimism about the future (UNICEF, 2021).

In the context of university students, there is also evidence of higher levels of depression, anxiety, stress, and changes in quality of life due to having to cope with this new reality (Husky, Kovess-Masfety, & Swendsen, 2020; Kaparounaki et al., 2020; Odriozola-González, Planchuelo-Gómez, Irurtia, & de Luis-García, 2020). In regard to mental health, there are both risk factors, such as adverse events in childhood (Vega-Arce & Nuñez-Ulloa, 2017) and substance use, and protective factors, such as support networks and healthy environments (Patel et al., 2018).

Resilience, understood as a personality trait that mitigates the negative effect of stress and encourages adaptation (Crombie, López, Mesa, & Samper, 2015), is the ability to prevail, grow, be strong, and even succeed despite adversity (Nunja Arroyo, 2016). Studies conducted on university students show acceptable levels of resilience, finding high and medium levels in students in the area of health (Flores, Estévez, & Machado, 2018; Villalba & Martínez, 2019), in addition to emphasizing it as a strong protective factor for mental health (Lavoie, Pereira, & Talwar, 2016), specifically in the university environment (Caldera Montes, Aceves Lupercio, & Reynoso González, 2016; Perales et al., 2019; Villalobos-Otayza, Vela-Alfaro, Wiegering-Gianoli, & Robles-Alfaro, 2019).

Within the framework of the COVID-19 pandemic, resilience has been shown to play a protective role with regard to mental health disorders (PeConga et al., 2020; Yildirim & Solmaz, 2022). Regarding its levels, studies have shown that they can remain stable (Castagnola Sánchez, Cotrina-Aliaga, & Aguinaga-Villegas, 2021), increase (Hernández-Ballester, Ferrer-Pérez, Montagud-Romero, & Blanco-Gandía, 2023), or be affected by alterations related to COVID-19 (Delgado, 2020; Killgore, Taylor, Cloonan, & Dailey, 2020).

Given the high impact of mental health alterations and their significant prevalence in university students, universities are an ideal setting for the early detection of potential alterations, as well as risk and protection factors (Lipson et al., 2019). Although several research projects have identified the link between adverse events and resilience and the mental health of university students, very few studies have explored this association within a socio-health crisis or individual responses to the transition to university life (Padrão et al., 2021). Having a baseline of risk factors, protective factors, and mental health factors and the association between these factors in university health science students will also make it possible to determine other mediating variables, particularly those linked to the university setting (Restrepo, Sánchez, & Castañeda, 2020). The aim of this study is to describe psychiatric symptoms and their association with adverse events in childhood and resilience in first-year students in the three undergraduate programs of the Health Sciences Faculty of the University of Caldas, Colombia in 2021.

METHOD

Design of the study

This is a descriptive, correlational, cross-sectional study comprising students enrolled in the nursing, physical education, recreation and sports and medicine programs of the Faculty of Health Sciences of the University of Caldas in the city of Manizales, Colombia.

Table 1.
Sample calculation by proportional allocation to calculate frequencies

Group	*Ni*	*Pi*	*Qi*	*PiQi*	*NiPiQi*	*Wi*	*ni*	*ni_approx*
PE 5º	55	.5	.5	.25	13.75	.2594	35.4	35
PE 10º	32	.5	.5	.25	8	.1509	20.6	21
Nsg. 5º	32	.5	.5	.25	8	.1509	20.6	21
Nsg. 10º	28	.5	.5	.25	7	.1321	18.0	18
M 5º	24	.5	.5	.25	6	.1132	15.5	16
M 10º	41	.5	.5	.25	10.25	.1934	26.4	26
Total	212				53	1.0000	136.6	137

Notes: PE: Degree in Physical Education; Nsg.: Nursing; M: Medicine; 5º: fifth semester; 10º: tenth semester.

Subjects/sample description

Students in the undergraduate programs of the Faculty of Health Sciences of the University of Caldas in the first semester of 2021. Maximum variance was used (expected prevalence of 50%) for the estimate, given that the results of previous studies indicate a prevalence of 47% to 56% for mental health problems (Gómez-Restrepo, 2016) as shown in Table 1.

As a result of a decision by the researchers, a selection probability equal to 1.0 was assigned to all students enrolled in the first semester of 2021 in the three programs with a view to this group becoming a cohort for subsequent studies. A total of one hundred and ninety students in the first semester of 2021 were included, in keeping with historical data. The sample size calculated for the study comprised sixty people in each bachelor's degree program (physical education, recreation and sports, nursing, and medicine), making a total of 180.

Measurements and procedure

A virtual self-completion survey was administered through the institutional mail of each student once authorization had been obtained through the informed consent form included. Three instruments were used to measure the variables of interest.

The Self-Reporting Questionnaire (SRQ) designed by the World Health Organization (Beusenberg, Orley, & World Health Organization, 1994) and used by the National Mental Health Survey of Colombia (Gómez-Restrepo, 2016) was administered to detect affective symptoms. It consists of two parts, the first comprising twenty questions related to symptoms of depression, anxiety or both, with subjects testing positive with a score equal to or greater than eleven points. The second part consists of five questions for the detection of symptoms related to psychosis and seizures. In this part, each question scores as individual risk. In validation studies in Latin America, including Colombia, a sensitivity of 62.9% to 90% and a specificity of 44% to 95.2% were determined, together with an internal consistency of .81 (Cronbach's alpha; Beusenberg et al., 1994).

For resilience, Wagnild and Young's Scale was used, comprising twenty-five items scored on a seven-level Likert-type scale, in which one means disagreement, and seven total agreement. The scale has five components: self-confidence, equanimity, perseverance, personal satisfaction, and feeling happy alone, the minimum score being twenty-five and the maximum 175 (Wagnild & Young, 1993). In adaptations for adolescent populations, the instrument has shown a reliability level of .90 and adequate levels of adjustment (Bravo-Andrade et al., 2019). In the Colombian university population, the instrument was adapted with a reliability of .846 (Oviedo-Feria, 2017), which was used in the present study because it showed adequate psychometric properties in a population similar to the one studied.

Four questions were included: "Were you a victim of any type of sexual abuse in your childhood?" "Were you a victim of abuse in childhood?" "Did your parents divorce or did one of them die or abandon your home during your childhood?" "Were you a victim of violence in the community or social context during your childhood?" with response options "Yes," "No," and "Do not remember" to identify adverse events in childhood.

Statistical analysis

Categorical variables are described using frequency distribution tables. The associations between the risk found through the SRQ and having been exposed to an adverse event in childhood, the risk found through the SRQ and alteration of the domains of resilience and having been exposed to an adverse event in childhood and alteration of the domains of resilience was determined through Spearman's correlation coefficient. SPSS version 26.0 software was used.

Ethical considerations

This study meets the standards for research in human beings as provided for in resolution No. 008430,1993 of the Min-

Table 2
Distribution by gender and university degree of subjects

	Women		*Men*	
Variable	*Number*	*%*	*Number*	*%*
Nursing students	28	77.8	8	22.2
Undergraduate physical education, recreation, and sports students	7	16.7	35	83.3
Medical students	14	46.7	16	53.3

istry of Health and in the Declaration of Helsinki 2000. It is a minimal risk investigation. This project was approved by the Maternal and Child Department and the medical ethics committee of the Faculty of Health Sciences of the University of Caldas, through act CB022 2020.

The necessary measures were taken at all times to respect the privacy of the subjects by encoding the information when it was systematized. Each of the subjects was offered clear, accurate information on the purpose and objective of the study and the meaning of their participation, which was corroborated by signing an informed consent form. Subjects were informed that the information collected in this research project would be confidential. The published results would preserve their accuracy, and reference global rather than individual data.

Whenever a risky alteration was detected, a care route was activated by contacting the university health services and the health services of each person. In addition, a meeting was held with at-risk people to provide them with psychoeducation and show them health care routes. This was done while respecting the privacy and confidentiality of each person in individual spaces. At the same time, identification data were stored in a database to which only the principal clinical investigators had access and was revealed when the health routes were mentioned, with the authorization of each student.

Table 3
Number and percentage of positive responses to each SRQ question

Symptoms	*Answered "Yes"*	*%*
1. Do you have frequent headaches?	29	26.8
2. Do you have a poor appetite?	16	14.8
3. Do you sleep badly?	27	25
4. Do you get scared easily?	31	28.7
5. Do you suffer from hand tremors?	12	11.1
6. Do you feel nervous, tense or bored?	45	41.6
7. Do you suffer from poor digestion?	19	17.5
8. Do you find it hard to think straight?	30	27.7
9. Do you feel sad?	18	16.6
10. Do you cry often?	15	13.8
11. Do you have difficulty enjoying your daily activities?	14	12.9
12. Do you have difficulty making decisions?	35	32.4
13. Do you have difficulty doing your job? (Do you suffer as a result of your job?)	12	11.1
14. Are you unable to play a useful role in your life?	11	10.1
15. Have you lost interest in things?	30	27.7
16. Do you feel that you are a useless person?	16	14.8
17. Have you thought of ending your life?	13	12
18. Do you feel tired all the time?	20	18.5
19. Do you have unpleasant sensations in your stomach?	13	12
20. Do you get scared easily?	29	26.8
21. Do you feel someone has tried to hurt you in any way?	40	37
22. Are you a much more important person than many people think?	65	60.1
23. Have you noticed interference or something strange in your thinking?	14	12.9
24. Do you hear voices and not know where they're coming from or that other people can't hear?	3	2.7
25. Have you had convulsions, seizures or fallen to the ground with movements of your arms and legs, tongue biting or loss of consciousness?	4	3.7

Table 4
Association between the risk found through the SRQ and having been exposed to an adverse event in childhood

	SRQ Risk questions 1-20	*SRQ21*	*SRQ22*	*SRQ23*	*SRQ24*	*SRQ25*
Sexual abuse	-.037	-.130	-.094	-.065	-.029	-.033
Abuse	-.092	.139	.065	-.061	-.035	.223""
Problems with parents	.111	.003	.086	.101	-.048	-.055
Violence	.013	-.019	.197*	-.094	-.041	-.048

* $p < .05$. Spearman's correlation.

Table 5
Association between the risk found in SRQ and effects on the domains of resilience

	SRQ Risk questions 1-20	*SRQ21*	*SRQ22*	*SRQ23*	*SRQ24*	*SRQ25*
Personal satisfaction	- .382**	-.010	.009	-.153	-.124	.066
Equanimity	- .324**	-.132	-.021	-.279**	-.132	.022
Feeling happy alone	- .248**	.110	-.161	-.127	.050	.094
Self confidence	- .472**	.004	-.079	-.242*	-.019	.033
Perseverance	- .365**	.058	-.047	-.185	-.047	.036

* $p < .05$. ** $p < .01$. Spearman's correlation.

RESULTS

Of the 180 students enrolled in the first semester of the programs included, 108 agreed to participate. The mean age was 19.6 years. Table 2 contains the distribution by gender and university degree program of the subjects.

After the administration of the SRQ (Table 3), it was found that seven students (6.4%) had eleven or more positive responses. Four of them were enrolled in the nursing (57.1%), two in the physical education, recreation, and sports (28.5%), and one in the medical degree program (14.2%). The most frequent symptom was "feeling nervous, tense or bored" with 47.2% of the students reporting the presence of at least four symptoms that suggested depression or anxiety and 12% answering "yes" to the question "Have you ever thought of ending your life? In the second part of the instrument, it was found that 75% of students had given at least one positive response.

Wagnild and Young's scale was used to measure resilience, finding that the minimum score was seventy-two, corresponding to a nursing student and that the maximum was 172 for a medical student, the average being 142.1. To determine the levels of resilience, the percentiles of the data were taken as follows: low scores were less than 125 (*p* 25), medium scores were between 125 and 156 (*p* 25-75), and high scores were greater than 156 (*p* 75). Students in this study were mostly observed to be in the medium level (52.7%), followed by the low level (25%), and lastly the high level (22.2%).

The most commonly reported adverse event in childhood was "abuse" (42.5%), particularly in students with a degree in physical education, recreation, and sports, followed by "parents who divorced, or one of them died or left home" (7.4%), and "violence in the community or social context" (4.6%). The least frequently reported adverse event was "sexual abuse" (1.8%).

In addition, a statistically significant association was found between having been exposed to adverse events in childhood and having answered "yes" to two questions in the SRQ, which were "Have you had seizures, attacks or fallen to the ground with movements of your arms and legs, tongue biting or loss of consciousness? ($p = .020$) and "Are you a much more important person than many people think?" ($p = .041$), as shown in Table 4.

A statistically significant association was also found between the presence of symptoms that compromise mental health and affect all domains of resilience, as can be seen in Table 5.

Likewise, Table 6 shows the statistically significant association found between having been exposed to sexual abuse in childhood and effects on the "feeling happy alone" domain of resilience ($p = .006$). No significant association

Table 6
Associations between having been exposed to an adverse event in childhood and effects on the domains of resilience

	Sexual abuse	*Abuse*	*Problems with parents*	*Violence*
Personal satisfaction	-.054	-.102	-.075	-.168
Equanimity	-.090	-.103	.036	-.070
Feeling happy alone	-.262**	-.020	.010	-.135
Self-confidence	-.062	-.093	-.058	-.075
Perseverance	-.158	-.077	-.044	-.113

* $p < .05$. * $p < .01$. Spearman's correlation.

was found between having been exposed to other adverse events and effects on the domains of resilience.

DISCUSSION AND CONCLUSION

There is a high prevalence of mental health disorders among university students (Pacheco et al., 2017), which has been compounded by the advent of the COVID-19 pandemic, particularly in workers and students in the area of health (Vélez-Botero et al., 2023) and in low- and middle-income countries, exacerbating existing inequities (Arora et al., 2022; Kola et al., 2021). In the present study, psychiatric symptoms and their association with childhood adverse events and resilience in health sciences students were described, which points to the need to address these issues.

When people are exposed to adverse situations that demand a response from the individual, a series of strategies are set in motion to deal with them. This underlines the fact that both adverse events in childhood and resilience influence this response. The association between adverse events in childhood, resilience, and mental health has been demonstrated in previous studies, such as the meta-analysis by Yule, Houston, and Grych (2019), which notes that while exposure to adverse experiences can increase the risk of psychopathology, there are also protective factors such as family, school, and peer support that promote resilience and adaptive behaviors. The relationship between these three factors has been observed even if there are existing mental pathologies (Liu et al., 2020).

Compared with those enrolled in other degree programs, health sciences students are at a higher risk of mental problems or disorders and experience a greater impact on resilience associated with stressful events (Leitón Espinoza et al., 2022). Apart from factors related to their development, this is associated with having a heavy academic load, long hours of study and a large volume of information, as well as exposure to stress, a competitive relationship with peers, fear of failure, finding a balance between study and leisure, alterations of family and couple relationships, fear of the future, financial problems, living apart from their families, and physical exhaustion (Kunzler et al., 2020).

In regard to the risk of presenting an anxiety disorder or depression or both, the present study found that 6.4% of students tested positive for these in the instrument used (SRQ), which was lower than the rate observed in the 2015 National Mental Health Survey (ENSM) conducted in Colombia (11.2% for adolescents and 9.6% for young adults) (Gómez-Restrepo, 2016). The same instrument was used in a meta-analysis by Pacheco et al. (2017) that included medical students, in which 31.5% of subjects tested positive. In the study by Gomes, Pereira Junior, Cardoso, and Silva (2020), 39.9% of respondents tested positive with this instrument. It should be noted that subjects included students drawn from various degree programs and enrolled in different semesters. However, specifically in nursing and medicine, 43.8% and 27.3% respectively were classified as having a possible risk of presenting mental health disorders.

After the administration of the SRQ, it was found that the most frequently reported symptoms resembled those found in the ENSM for similar age groups. In the present study, "feeling nervous, tense or bored" was the main symptom in the first part and "being a much more important person than many people think" the main one in the second. It is worth noting that 12% (compared to 6.2% and 6.8% reported in the ENSM) answered "yes" to the question "Have you ever thought of ending your life?" In addition, without regarding them as having tested positive for anxiety or depression, with the aforementioned cut-off point, 47.2% of the students reported the presence of four or more symptoms in the first part of the instrument, which was similar to the results of the ENSM (50.5% and 53.1%; Gómez-Restrepo, 2016), which points to symptoms that require identification and monitoring in university students.

The present study revealed exposure to adverse events in childhood in university students, as described in the study by Karatekin (2018), who noted that 30% of university students reported exposure to two adverse experiences in childhood while an additional 22% had been exposed to at least one. At the same time, other studies also report events related to problems with parents according to Cheng, Zhao, Wang, and Sun (2020) or sexual abuse, as noted by Soldatou, Pantzios, Panagiotou, Panagiotopoulos, Nicoletos, and Michala (2021).

The negative impact of adverse events in childhood on mental health has been demonstrated in previous studies (Gardner, Thomas, & Erskine., 2019; Piñeros-Ortiz et al., 2021; Pirdehghan, Vakili, Rajabzadeh, Puyandehpour, & Aghakoochak, 2016; Sánchez Acosta et al., 2019). This was also observed in the results of the present study, since a statistically significant association was found between having been exposed to abuse or violence in childhood and answering "yes" to questions identified in the SRQ on individual risk, namely "Have you had convulsions or seizures or fallen to the ground with movements of your arms and legs and tongue biting or lost consciousness?" (p = .020) and "Are you a much more important person than many people think?" However, it is worth noting that there was no association with all the individual risk questions, or with risk in the first twenty questions of the SRQ, which supports the view that not everyone exposed to adverse events will necessarily experience alterations to their mental health, since protective factors such as social support and resilience play a key role (Su, D'Arcy, & Meng, 2020).

This association may be linked to the lockdown dynamics of the pandemic, in which students may have lived in adverse family environments (Valdivieso, Burbano, & Burbano, 2020). It is also typical of problems experienced

by university students due to the pandemic, particularly those involving social isolation, financial problems, access to technologies, fear of infection, and socialization with peers (United Nations Educational, Scientific and Cultural Organization, 2020).

Regarding the effect of these adverse factors in childhood on resilience, in the present study, a statistically significant association was found between having been exposed to sexual abuse in childhood and having one of the domains of resilience compromised, namely "feeling happy alone". However, no significant association was demonstrated between having been exposed to the other adverse events and effects on other domains of resilience. This has been described in previous studies such as the one by Lavoie et al. (2016), which states that protective factors can contribute to a positive environment for emotional growth and progress, even though people have had to experience previous situations of stress or adversity. Likewise, studies such as those by Henao Rojas, Ponce García, Zuluaga Gil, Posada Gómez, and Zapata Zabala (2020) observe that resilience levels can be maintained despite the stress experienced.

After the administration of Wagnild and Young's Resilience Scale, the present study found an average of 142.1, which is similar to that of other publications using the same instrument, albeit with different age ranges and including other university degrees programs, not only those in the area of health. Similar results were reported by Rodríguez (2021), where the average was 138.7, and Caldera-Montes et al. (2016) in Mexico, where the average was 144.6. A Portuguese study reported a mean of 129.4, which is lower than the results found in the aforementioned studies (Gonçalves & Camarneiro, 2018).

This is how both high (Ordoñez Morales, 2020) and medium (Mejía, 2018) levels of resilience have been reported in university students despite adversity such as the pandemic. During this time, they continued to be reported as moderate (Medina, Lujano, Aza, & Sucari, 2020), and constituted an effective tool for continuing to cope with difficulties and mitigating the possible negative impacts on mental health.

As for the association with mental health problems, as previously described in reviews, subjects with low resilience are more likely to develop mental health problems (Gower et al., 2020; Villalobos-Otayza et al., 2019; Perales et al., 2019). The present study found a statistically significant association between having experienced some form of risk identified in either of the two blocks of the SRQ (questions one to twenty and twenty-one to twenty-five) and effects on the domains of resilience.

Apart from this review undertaken by Cochrane (Kunzler et al., 2020), other studies also indicate that these factors may impact the strengthening of resilience and post-traumatic growth (Chi et al., 2020; Hernández-Ballester et al., 2023) in students in the area of health. These factors could be explored in longitudinal studies once the health emergency has ended.

Limitations of the present study include the impossibility of undertaking a longitudinal analysis, which could indicate how the factors determined in the study influence the recovery processes after a traumatic event, and identify other sociodemographic factors in the response to socio-health crises. One of the strengths of the study is that it pinpoints aspects of future health professionals within the framework of a global emergency that could be considered in possible interventions in university life, such as adverse childhood events, resilience factors and mental health in general.

The COVID-19 pandemic has had a major impact on mental health, increasing the effects associated with the latter, which is why it is essential to promote mental health, particularly in future health workers, including all areas of performance and levels of complexity, since they are regarded as being extremely vulnerable to the effects of this situation. Lastly, the data obtained in the present study are considered valuable, since it is essential to promote protective factors such as resilience, and provide timely care for the possible consequences of adverse events in childhood in young university students that could interact with specific factors of the educational environment and this stage of life during their time at university.

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Conflict of interest

The authors declare that they have no conflicts of interest.

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REFERENCES

Antúnez, Z., & Vinet, E. V. (2013). Problemas de salud mental en estudiantes de una universidad regional chilena. *Revista Médica de Chile*, *141*(2), 209-216. doi: 10.4067/S0034-98872013000200010

Arora, T., Grey, I., Östlundh, L., Lam, K., Omar, O. M., & Arnone, D. (2022). The prevalence of psychological consequences of COVID-19: A systematic review and meta-analysis of observational studies. *Journal of Health Psychology*, *27*(4), 805-824. doi: 10.1177/1359105320966639

Beusenberg, M., Orley, J. H., & World Health Organization. Division of Mental Health. (1994). *A User's guide to the self reporting questionnaire* (SRQ / compiled by M. Beusenberg and J. Orley. World Health Organization. Retrieved from https://apps.who.int/iris/handle/10665/61113

Bravo-Andrade, H. R., González-Betanzos, F., Ruvalcaba-Romero, N. A., López-Peñaloza, J., & Orozco-Solís, M. G. (2019). Psychometric properties of the Resilience questionnaire for children and adolescents in Mexican Students from high school. *Acta Colombiana de Psicología*, *22*(2), 292-305. doi: 10.14718/ACP.2019.22.2.14

Bruffaerts, R., Mortier, P., Kiekens, G., Auerbach, R. P., Cuijpers, P., Demyttenaere, K., … Kessler, R. C. (2018). Mental health problems in college freshmen: Prevalence and academic functioning. *Journal of Affective Disorders*, *225*, 97-103. doi: 10.1016/j.jad.2017.07.044

Caldera Montes, J., Aceves Lupercio, B. I., & Reynoso González, Ó. U. (2016). Resiliencia en estudiantes universitarios. Un estudio comparado entre carreras. *Psicogente*, *19*(36), 227-239. doi: 10.17081/psico.19.36.1294

Castagnola Sánchez, C. G., Cotrina-Aliaga, J. C., & Aguinaga-Villegas, D. (2021). La resiliencia como factor fundamental en tiempos de Covid-19. *Propósitos y Representaciones*, *9*(1), e1044. doi: 10.20511/pyr2021.v9n1.1044

Cheng, J., Zhao, Y. Y., Wang, J., & Sun, Y. H. (2020). Academic burnout and depression of Chinese medical students in the pre-clinical years: the buffering hypothesis of resilience and social support. *Psychology, Health & Medicine*, *25*(9), 1094-1105. doi: 10.1080/13548506.2019.1709651

Chi, X., Becker, B., Yu, Q., Willeit, P., Jiao, C., Huang, L., … Solmi, M. (2020). Prevalence and Psychosocial Correlates of Mental Health Outcomes Among Chinese College Students During the Coronavirus Disease (COVID-19) Pandemic. *Frontiers in Psychiatry*, *11*. doi: 10.3389/fpsyt.2020.00803

Crombie, P., Lopez, M., Mesa, M., & Samper, L. (2015). *Adaptación de la Escala de Resiliencia de Wagnild y Young*. Bogotá: Universidad de los Andes – Psicometría. Retrieved from https://issuu.com/samperlina/docs/adaptaci__n_de_la_escala_de_resilie

Delgado, M. (2020). *Resiliencia en jóvenes españoles ante la cuarentena por la COVID-19*. Trabajo de Fin de Grado de Psicología, Facultad de Psicología y Logopedia – Universidad de la Laguna. Retrieved from https://riull.ull.es/xmlui/bitstream/handle/915/21314/Resiliencia%20en%20jovenes%20espanoles%20ante%20la%20cuarentena%20por%20la%20COVID-19.pdf?sequence=1.

Eisenberg, D., Hunt, J., & Speer, N. (2013). Mental health in American colleges and universities: Variation across student subgroups and across campuses. *The Journal of Nervous and Mental Disease*, *201*(1), 60-67. doi: 10.1097/NMD.0b013e31827ab077

Flores, J., Estévez, R., & Machado, B. (2018). *Nivel de resiliencia de estudiantes universitarios de nuevo ingreso a la carrera de enfermería* (3-7). XVI Coloquio Panamericano de Investigación en Enfermería, Palacio de Convenciones, Habana.

Gardner, M. J., Thomas, H. J., & Erskine, H. E. (2019). The association between five forms of child maltreatment and depressive and anxiety disorders: A systematic review and meta-analysis. *Child Abuse & Neglect*, *96*, 104082. doi: 10.1016/j.chiabu.2019.104082

Gomes, C. F. M., Pereira Junior, R. J., Cardoso, J. V., & Silva, D. A. (2020). Common mental disorders in university students: epidemiological approach about vulnerabilities. SMAD, *Revista Eletrônica Saúde Mental Álcool e Drogas*, *16*(1),1-8. doi: 10.11606/issn.1806-6976.smad.2020.157317

Gómez-Restrepo, C. (2016). La Encuesta Nacional de Salud Mental–ENSM 2015 [National Mental Health Survey- NMHST 2015]. *Revista Colombiana de Psiquiatría*, *45*(Suppl 1), 1. doi: 10.1016/j.rcp.2016.09.006

Gong, K. (2020). Extensible Strategies and Their Performance for Mental Health Education in Colleges. *International Journal of Emerging Technologies in Learning (iJET)*, *15*(09), 205-218. doi: 10.3991/ijet.v15i09.14037

Gonçalves, A. M. P. M. P. C., & Camarneiro, A. P. (2018). Validação da Resilience Scale de Wagnild e Young em contexto de acolhimento residencial de adolescentes. *Revista de Enfermagem Referência*, *IV*(17), 107-117. Retrieved from https://www.redalyc.org/articulo.oa?id=388256983015

Gower, T., Rancher, C., Campbell, J., Mahoney, A., Jackson, M., McDonald, R., & Jouriles, E. N. (2020). Caregiver and divine support: Associations with resilience among adolescents following disclosure of sexual abuse. *Child Abuse & Neglect*, *109*, 104681. doi: 10.1016/j.chiabu.2020.104681

Gunnell, D., Appleby, L., Arensman, E., Hawton, K., John, A., Kapur, N., … COVID-19 Suicide Prevention Research Collaboration. (2020). Suicide risk and prevention during the COVID-19 pandemic. *The Lancet. Psychiatry*, *7*(6), 468-471. doi: 10.1016/S2215-0366(20)30171-1

Henao Rojas, Y. E., Ponce García, J. A., Zuluaga Gil, I., Posada Gómez, S., & Zapata Zabala, M. E. (2020). Traumatic experiences and resilience in population exposed to violence. *Revista de Investigación e Innovación en Ciencias de la Salud*, *2*(1), 28-40. doi: 10.46634/riics.42

Hernández-Ballester, C., Ferrer-Pérez, C., Montagud-Romero, S., & Blanco-Gandía, M. C. (2023). Estrés en tiempos de confinamiento: estrategias de afrontamiento y crecimiento postraumático en población universitaria. *Revista de Psicología y Educación*, *18*(1), 1-10. doi: 10.23923/rpye2023.01.229

Hill, M. R., Goicochea, S., & Merlo, L. J. (2018). In their own words: stressors facing medical students in the millennial generation. *Medical Education Online*, *23*(1), 1530558. doi: 10.1080/10872981.2018.1530558

Husky, M. M., Kovess-Masfety, V., & Swendsen, J. D. (2020). Stress and anxiety among university students in France during Covid-19 mandatory confinement. *Comprehensive Psychiatry*, *102*, 152191. doi: 10.1016/j.comppsych.2020.152191

Kaparounaki, C. K., Patsali, M. E., Mousa, D. V., Papadopoulou, E., Papadopoulou, K., & Fountoulakis, K. N. (2020). University students' mental health amidst the COVID-19 quarantine in Greece. *Psychiatry Research*, *290*, 113111. doi: 10.1016/j.psychres.2020.113111

Karatekin, C. (2018). Adverse Childhood Experiences (ACEs), Stress and Mental Health in College Students. *Stress and Health*, *34*(1), 36-45. doi: 10.1002/smi.2761

Killgore, W., Taylor, E. C., Cloonan, S. A., & Dailey, N. S. (2020). Psychological resilience during the COVID-19 lockdown. *Psychiatry Research*, *291*, 113216. doi: 10.1016/j.psychres.2020.113216

Kola, L., Kohrt, B. A., Hanlon, C., Naslund, J. A., Sikander, S., Balaji, M., … Patel, V. (2021). COVID-19 mental health impact and responses in low-income and middle-income countries: reimagining global mental health. *The Lancet, Psychiatry*, *8*(6), 535-550. doi: 10.1016/S2215-0366(21)00025-0

Kunzler, A. M., Helmreich, I., Chmitorz, A., König, J., Binder, H., Wessa, M., & Lieb, K. (2020). Psychological interventions to foster resilience in healthcare professionals. *Cochrane Database of Systematic Reviews*, *7*(7), CD012527. doi: 10.1002/14651858.CD012527.pub2

Lavoie, J., Pereira, L. C., & Talwar, V. (2016). Children's Physical Resilience Outcomes: Meta-Analysis of Vulnerability and Protective Factors. *Journal of Pediatric Nursing*, *31*(6), 701-711. doi: 10.1016/j.pedn.2016.07.011

Leitón Espinoza, Z., Cáceda Ñazco, G. S., Pérez-Valdez, C. L., Gómez-Luján, M. del P., González y González, V.F., & Villanueva-Benites, M. E. (2022). Calidad de vida del estudiante universitario antes y durante la pandemia de Covid-19. *Salud Uninorte*, *38*(3), 675-692. doi: 10.14482/sun.38.3.614.59

Lipson, S. K., Abelson, S., Ceglarek, P., Phillips, M., & Eisenberg, D. (2019). *Investing in student mental health: Opportunities & benefits for college leadership*. Washington, DC: American Council on Education.

Liu, M., Mejia-Lancheros, C., Lachaud, J., Nisenbaum, R., Stergiopoulos, V., & Hwang, S. W. (2020). Resilience and Adverse Childhood Experiences: Associations with Poor Mental Health Among Homeless Adults. *American Journal of Preventive Medicine*, *58*(6), 807-816. doi: 10.1016/j.amepre.2019.12.017

MacPhee, J., Modi, K., Gorman, S., Roy, N., Riba, E., Cusumano, D., … Doraiswamy, P. M. (2021). *A Comprehensive Approach to Mental Health Promotion and Suicide Prevention for Colleges and Universities*. Washington, DC: National Academy of Medicine. NAM Perspectives. doi: 10.31478/202106b

Mascayano, F., van der Ven, E., Moro, M. F., Schilling, S., Alarcón, S., Al Barathie, J., … HEROES group (2022). The impact of the COVID-19 pandemic on the mental health of healthcare workers: study protocol for the COVID-19 HEalth caRe wOrkErS (HEROES) study. *Social Psychiatry and Psychiatric Epidemiology*, *57*(3), 633-645. doi: 10.1007/s00127-021-02211-9

Medina, G., Lujano, Y., Aza, P., & Sucari, W. (2020). Resiliencia y engagement en estudiantes universitarios durante el contexto del COVID 19. *Revista Innova Educación*, *2*(4), 658-667. doi: 10.35622/j.rie.2020.04.010

Mejía, J. (2018). *Resiliencia en los estudiantes del quinto ciclo de enfermería y psicología de la Universidad Autónoma de Ica*. Perú. Retrieved from https://alicia.concytec.gob.pe/vufind/Record/AUIC_458da647a34151b0c01c8ca5832e6dab/Details

Nunja Arroyo, M. S. (2016). *Propiedades psicométricas de la escala de resiliencia en estudiantes de institutos técnicos superiores de la ciudad de Trujillo* [Tesis para obtener el título profesional de Licenciada en Psicología]. Trujillo – Perú: Facultad de humanidades, Universidad César Vallejo.

Odriozola-González, P., Planchuelo-Gómez, Á., Irurtia, M. J., & de Luis-García, R. (2020). Psychological effects of the COVID-19 outbreak and lockdown among students and workers of a Spanish university. *Psychiatry Research*, *290*, 113108. doi: 10.1016/j.psychres.2020.113108

Ordoñez Morales, D. (2020). *Resiliencia y compromiso académico en estudiantes de una universidad de Quevedo* [Tesis para obtener el grado académico de Maestra

en Docencia Universitaria]. Piura, Perú: Universidad César Vallejo. Retrieved from https://repositorio.ucv.edu.pe/handle/20.500.12692/47952?show=full

Organización de las Naciones Unidas para la Educación, la Ciencia y la Cultura [UNESCO]. (2020). *Education: From disruption to recovery, Covid-19*. UNESCO.

Oviedo-Feria, G. (2017). *Adaptación y validación psicométrica de la escala de resiliencia (RE) de Wagnild y Young a estudiantes entre 18 a 25 años de edad, en la ciudad de Sincelejo – Sucre*. [Tesis de psicología]. Corporación Universitaria del Caribe - CECAR.

Pacheco, J. P., Giacomin, H. T., Tam, W. W., Ribeiro, T. B., Arab, C., Bezerra, I. M., & Pinasco, G. C. (2017). Mental health problems among medical students in Brazil: a systematic review and meta-analysis. *Revista Brasileira de Psiquiatria*, *39*(4), 369-378. doi: 10.1590/1516-4446-2017-2223

Padrão, M. R. A. D. V., Tomasini, A. J., Romero, M. L. A. D. M., Silva, D., Cavaca, A. G., & Köptcke, L. S. (2021). Peer education: youth protagonism in a preventive approach to alcohol and other drugs. *Ciência & Saúde Coletiva*, *26*(7), 2759-2768. doi: 10.1590/1413-81232021267.07322021

Patel, V., Saxena, S., Lund, C., Thornicroft, G., Baingana, F., Bolton, P., … UnÜtzer, J. (2018). The Lancet Commission on global mental health and sustainable development. *Lancet*, *392*(10157), 1553-1598. doi: 10.1016/S0140-6736(18)31612-X

PeConga, E. K., Gauthier, G. M., Holloway, A., Walker, R., Rosencrans, P. L., Zoellner, L. A., & Bedard-Gilligan, M. (2020). Resilience is spreading: Mental health within the COVID-19 pandemic. *Psychological Trauma: Theory, Research, Practice, and Policy*, *12*(S1), S47-S48. doi: 10.1037/tra0000874

Perales, A., Izaguirre, M., Sánchez, E., Barahona, L., Martina, M., Amemiya, I., … Padilla, A. (2019). Salud mental en estudiantes de pregrado de la Facultad de Medicina de la Universidad Nacional Mayor de San Marcos. *Anales de la Facultad de Medicina*, *80*(4), 443-450. doi: 10.15381/anales.v80i4.17142

Piñeros-Ortiz, S., Moreno-Chaparro, J., Garzón-Orjuela, N., Urrego-Mendoza, Z., Samacá-Samacá, D., & Eslava-Schmalbach, J. (2021). Consecuencias de los conflictos armados en la salud mental de niños y adolescentes: revisión de revisiones de la literatura. *Biomédica*, *41*(3), 424-448. doi: 10.7705/biomedica.5447

Pirdehghan, A., Vakili, M., Rajabzadeh, Y., Puyandehpour, M., & Aghakoochak, A. (2016). Child Abuse and Mental Disorders in Iranian Adolescents. *Iranian Journal of Pediatrics*, *26*(2), e3839. doi: 10.5812/ijp.3839

Restrepo, J. E., Sánchez, O. A., & Castañeda, T. (2020). Estrés académico en estudiantes universitarios. *Psicoespacios*, *14*(24), 17-37. doi: 10.25057/21452776.1331

Rodríguez, A. (2021). *Propiedades psicométricas del test conociendo mis emociones en niños de 8 a 12 años de la Ciudad de Piura* [Tesis para optar por el título de profesional de Licenciado en Psicología]. Facultad de Medicina Humana, Universidad Privada Antenor Orrego. Retrieved from https://repositorio.upao.edu.pe/bitstream/20.500.12759/9175/1/REP_JENNY.TERRONES_TIRSA.RODRIGUEZ_PROPIEDADES.PSICOMETRICAS.pdf

Sánchez Acosta, D., Castaño Pérez, G., Sierra Hincapié, G., Moratto Vásquez, N. S., Salas Zapata, C., Buitrago Salazar, J., & Torres de Galvis, Y. (2019). Salud mental de adolescentes y jóvenes víctimas de desplazamiento forzado en Colombia. *CES Psicología*, *12*(3), 1-19. doi: 10.21615/cesp.12.3.1

Secord, E., & McGrath, E. (2021). Covid-19 in Children. *Pediatric Clinics North America*, *68*(5), 307. https://sostelemedicina.ucv.ve/covid19/manuales/COVID-19%20en%20ninos.pdf

Soldatou, A., Pantzios, S. I., Panagiotou, M. R., Panagiotopoulos, T., Nicoletos, T., & Michala, L. (2021). Child sexual abuse among medical school students: experiences and perceptions. *International Journal of Impotence Research*, *33*(3), 364-368. doi: 10.1038/s41443-020-0254-4

Su, Y., D'Arcy, C., & Meng, X. (2020). Social Support and Positive Coping Skills as Mediators Buffering the Impact of Childhood Maltreatment on Psychological Distress and Positive Mental Health in Adulthood: Analysis of a National Population-Based Sample. *American Journal of Epidemiology*, *189*(5), 394-402. doi: 10.1093/aje/kwz275

Unicef. (2021). *The impact of COVID-19 on the mental health of adolescents and youth* [En línea]. Retrieved from https://www.unicef.org/lac/en/impact-covid-19-mental-health-adolescents-and-youth (Access date 20/08/2022)

Valdivieso, M., Burbano, V., & Burbano, A. (2020). Percepción de estudiantes universitarios colombianos sobre el efecto del confinamiento por el coronavirus, y su rendimiento académico. *Revista Espacios*, *41*(42), 3. doi: 10.48082/espacios-a20v41n42p23

Vega, J. (2021). *Deserción escolar en el marco de la Pandemia del COVID-19 en Colombia* [Tesis]. Retrieved from https://repositorio.uniandes.edu.co/bitstream/handle/1992/55077/26195.pdf?sequence=1&isAllowed=y

Vega-Arce, M., & Nuñez-Ulloa, G. (2017). Experiencias Adversas en la Infancia: Revisión de su impacto en niños de 0 a 5 años. *Enfermería Universitaria*, *14*(2), 124-130. doi: 10.1016/j.reu.2017.02.004

Vélez-Botero, H., Bohórquez, J., Agudelo Hernández, F., Bautista-Bautista, N., Peñuela, A. M., & Guerrero, A. (2023). Salud mental en trabajadores de la salud en la pandemia por COVID-19 en Colombia. *Revista Colombiana de Terapia Ocupacional*, *1*. Retrieved from https://www.minsalud.gov.co/Paginas/La-salud-mental-de-los-trabajadores-de-la-salud-es-prioridad.aspx

Villalba, K., & Martínez, R. (2019). Resilience as a factor determining satisfaction with life among university students. *Revista Cubana de Educación Médica Superior*, *33*(3),1-15. Retrieved from https://pesquisa.bvsalud.org/portal/resource/pt/biblio-1089922

Villalobos-Otayza, A., Vela-Alfaro, F., Wiegering-Gianoli, D., & Robles-Alfaro, R. (2019). Level of resilience and depressive symptoms in medical interns in Peru. *Educación Médica*, *22*(1):14-19. Retrieved from https://pesquisa.bvsalud.org/portal/resource/pt/ibc-202111

Wagnild, G., & Young, H. (1993) Development and psychometric evaluation of the resilience Scale. *Journal of Nursing Measurement*, *1*(2), 165-178. Retrieved from https://pubmed.ncbi.nlm.nih.gov/7850498/

Yıldırım, M., & Solmaz, F. (2022). COVID-19 burnout, COVID-19 stress and resilience: Initial psychometric properties of COVID-19 Burnout Scale. *Death Studies*, *46*(3), 524-532. doi: 10.1080/07481187.2020.1818885

Yule, K., Houston, J., & Grych, J. (2019). Resilience in Children Exposed to Violence: A Meta-analysis of Protective Factors Across Ecological Contexts. *Clinical Child and Family Psychology Review*, *22*(3), 406-431. doi: 10.1007/s10567-019-00293-1

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La revista Salud Mental publica artículos originales sobre psiquiatría, psicología, neurociencias y disciplinas afines de acuerdo con los siguientes formatos:

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   Se escriben por invitación del Director-Editor de la revista. Deben expresar opiniones autorizadas sobre temas específicos de interés para la comunidad científica y para el área de la salud mental. Su objetivo es estimular el debate y promover nuevas líneas de investigación. *Extensión máxima: 1000 palabras*.
2. **Artículos originales (sección revisada por pares)**
   Presentan resultados de investigaciones no publicados en otras revistas. Pueden desarrollarse a partir de las siguientes metodologías:
   - **Metodología cuantitativa:** Incluye resultados primarios y secundarios de estudios transversales, ensayos clínicos, casos y controles, cohortes y estudios cuasi experimentales. *Extensión máxima: 3500 palabras*.
   - **Metodología cualitativa:** Incluye reportes de grupos focales, entrevistas a profundidad, redes semánticas y análisis de contenido. *Extensión máxima: 5000 palabras*.
3. **Originales breves (sección revisada por pares)**
   Consisten en la validación de instrumentos de medición y resultados preliminares de investigaciones originales. *Extensión máxima: 2000 palabras*.
4. **Artículos de revisión (sección revisada por pares)**
   - **Revisiones narrativas:** Comprenden revisiones narrativas basadas en la bibliografía nacional e internacional, apegadas a los estándares correspondientes. *Extensión máxima: 5000 palabras.*
   - **Revisiones sistemáticas:** Deben apegarse a las metodologías estándar (e.g. Cochrane). Preferentemente deben incluir un metaanálisis. *Extensión máxima: 4000 palabras*.

Nota: El conteo de palabras para cada una de estas secciones excluye el título, los resúmenes y las palabras clave, así como los apartados de financiamiento, conflictos de interés y agradecimientos; tampoco se consideran las palabras incluidas en tablas, figuras y referencias.

IDIOMAS

Salud Mental publica manuscritos en español e inglés. Sin embargo, debido a nuestro alcance internacional, se prefiere la publicación de artículos en inglés para beneficio de la comunidad científica internacional.

ASPECTOS ÉTICOS EN LA PUBLICACIÓN

Para Salud Mental es importante mantener un código de ética en la investigación; por ello, es primordial que todas las investigaciones con sujetos animales y/o humanos se apeguen a las normas nacionales e internacionales de la investigación básica, clínica y social. Todos los artículos de investigación clínica deberán ceñirse a las normas internacionales de la ICMJE (*http://www.icmje.org*).

DECLARACIÓN DE ENVÍO

Al someter un manuscrito, el autor afirma que:

1. El trabajo no se ha publicado previamente (excepto en forma de resumen o como parte de una ponencia o tesis de grado).
2. No está en proceso de revisión para ninguna otra publicación en cualquier otro idioma.
3. Ha sido autorizado por todos los coautores y las autoridades responsables del lugar donde se realizó.

AUTORÍA

Únicamente se deben considerar como autores a aquellos que hayan participado de forma activa en el proceso de investigación y elaboración del manuscrito. Por este motivo, Salud Mental acepta un máximo de cinco coautores (además del autor principal). En el caso de proyectos que integren múltiples grupos de investigación y requieran la incorporación de más de cinco coautores, el autor principal debe justificar la inclusión en la Carta de presentación.

ENVÍE SU MANUSCRITO

El envío de manuscritos se lleva a cabo exclusivamente a través del sitio web disponible en: *http://revistasaludmental.mx*. Para realizar este proceso, es necesario estar registrado previamente como autor en el sitio. Antes de efectuar el envío, asegúrese de dar clic en “CARGAR” cada vez que agregue un archivo. En el paso 1 se debe contestar el formato para declarar que el artículo cumple con las políticas establecidas por la revista. En el paso 2 debe adjuntarse el manuscrito en formato Word sin notas ni control de cambios; éste debe cumplir con cada uno de los puntos descritos más adelante en la sección *Guía para autores*. Los datos principales se solicitarán en el paso 3. En el paso 4 se agregarán la Carta de autorización de uso de obra y la Carta de presentación.

LINEAMIENTOS EDITORIALES

Es muy importante que los autores consideren los siguientes puntos antes de enviar sus manuscritos:

1. Los manuscritos deben redactarse de forma clara y concisa, sin errores de ortografía ni de sintaxis.
2. El texto debe estar escrito en formato Word, en fuente Times New Roman de 12 puntos, a doble espacio, con márgenes de 2.5 cm. y en tamaño carta.
3. Las páginas se numeran consecutivamente, empezando por la página del título y con el número escrito en la esquina superior derecha.
4. La primera página (donde se encuentra el título) debe contener los siguientes apartados en el orden que se menciona:

   - **Título del trabajo en español y en inglés.** El título debe ser descriptivo e indicar los resultados principales del estudio.
   - **Título corto.** Debe contener un máximo de seis palabras.
   - **Nombre completo del autor y de los coautores.** El orden en el que se proporcione esta información será el que aparecerá en su posible publicación y en las bases de datos. Los autores deberán separarse por una coma; luego, en superíndice, sin espacio intermedio, deberá colocarse un número arábigo que indique la institución de adscripción. De acuerdo con la numeración del superíndice de cada autor/coautor, se señalará la adscripción completa de la institución a la que pertenece, especificando el área en la que labora dentro de ésta.
   - **Adscripción de los autores.** Se debe indicar con números arábigos y en superíndice. Las adscripciones se colocan inmediatamente después de los nombres de los autores (no como notas en pie de página). Es necesario que la adscripción especifique: departamento, área, institución, ciudad y país de cada autor. No es necesario indicar la dirección postal. Las instituciones deben escribirse en su idioma original, sin traducción. Si los autores añaden siglas, éstas deben pertenecer al nombre oficial. No se deben escribir cargos ni grados de los autores (doctor, residente, investigador, etc.).

     Ejemplo:

     Juan José García-Urbina,[1] Héctor Valentín Esquivias Zavala[2]

     [1] Dirección de Investigaciones Epidemiológicas y Psicosociales, Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz, Ciudad de México, México.
     [2] Departamento de Publicaciones, Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz, Ciudad de México, México.

- Al final de la primera página debe colocarse el texto “Enviar correspondencia a…”, señalando al coautor corresponsal con su respectiva dirección postal completa y correo electrónico. Éste será el único autor al que Salud Mental se dirigirá durante el proceso.

  Ejemplo:

  Correspondencia:
  Juan José García-Urbina
  Dirección de Investigaciones Epidemiológicas y Psicosociales, Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz.
  Calz. México-Xochimilco 101, San Lorenzo Huipulco, Tlalpan, 14370, México, DF.
  Tel: 55 4152-3624
  E-mail: jurb@imp.edu.mx

5. La segunda página debe contener los resúmenes del trabajo presentado en inglés y español. Cada resumen debe presentarse con un máximo de 250 palabras.
   - Los resúmenes de los Artículos originales, Originales cortos y Revisiones sistemáticas deben estar conformados por: Introducción, Objetivo, Método, Resultados y Discusión y conclusión.
   - El resumen de las Revisiones narrativas debe contener las siguientes secciones: Antecedentes, Objetivo, Método (bases de datos consultadas), Resultados y Discusión y conclusión.
   - **Palabras clave.** Al final de cada resumen se incluirá un mínimo de cuatro y un máximo de seis palabras clave, separadas por comas y en minúsculas. Las palabras clave deben ser las mismas en inglés y en español. Éstas suelen emplearse para la indexación de los artículos, por lo cual tres de ellas deben encontrarse en el MeSH (Medical Subject Headings), que puede consultarse en: *http://www.nlm.nih.gov/mesh/MBrowser.html*.
6. A partir de la tercera página comienza el cuerpo del manuscrito, el cual debera conservar la misma estructura señalada en el resumen.
   - **Introducción (o Antecedentes en el caso de las Revisiones narrativas).** Aquí se mencionarán los antecedentes en los que se sostiene la investigación, de modo que el lector comprenda la problemática tratada. El último párrafo de este apartado debe incluir de forma clara los objetivos del trabajo y, si se cree necesario, las hipótesis.
   - **Método.** Debe presentarse suficientemente detallado para que el estudio pueda reproducirse. Por este motivo, es preciso que cuente con las siguientes secciones:

     • Diseño del estudio
     • Sujetos/descripción de la muestra
     • Sedes
     • Mediciones
     • Procedimientos
     • Análisis estadísticos
     • Consideraciones éticas
   - **Resultados.** Se presentarán en una secuencia lógica dentro del texto. Pueden apoyarse con tablas, gráficas y figuras.
   - **Discusión y conclusión.** En esta sección se destacarán los aspectos nuevos e importantes del estudio y las conclusiones que derivan del mismo, así como las posibles implicaciones de sus hallazgos y sus limitaciones.
7. Después del apartado de Discusión y conclusión, es preciso agregar las declaraciones de los autores en el siguiente orden:
   - **Financiamiento.** En este apartado se debe declarar si el estudio o la preparación del manuscrito recibió algún tipo de financiamiento, indicando el nombre de la entidad que proporcionó los fondos.

     Ejemplo:

     Este estudio fue financiado en parte por el CONSEJO NACIONAL DE CIENCIA Y TECNOLOGÍA. (No. XXXXXXX).

     Si no se recibió ningún apoyo financiero, los autores deben declararlo también.

     Ejemplo:

     Ninguno.
   - **Conflicto de intereses.** En esta sección, los autores deberán declarar si tienen conflictos de intereses relacionados con su actividad científica. Tener un conflicto de interés no supone necesariamente un impedimento para la publicación del manuscrito. Si no existe conflicto de interés se debe insertar la siguiente frase: “Los autores declaran no tener algún conflicto de intereses”.
   - **Agradecimientos.** Cuando se considere necesario, se mencionarán después de las declaraciones anteriores los agradecimientos a las personas, centros o entidades que hayan colaborado o apoyado en la investigación.
8. **Referencias.** Las referencias se colocan después de las declaraciones del autor (Financiamiento, Conflicto de intereses y Agradecimientos), y deben seguir exclusivamente las normas de publicación de la American Psychological Association (APA), sexta edición.
9. **Tablas y figuras.** Salud Mental establece un máximo de cinco elementos gráficos en total, excepto en el caso de las comunicaciones cortas, las cuales solamente pueden incluir dos. El estándar solicitado para la elaboración de tablas y figuras es el de la American Psychological Association (APA), sexta edición. Éstas se colocarán en el mismo documento del manuscrito después de las referencias:
   - Las tablas deben contener título y, en la parte inferior, una nota con el desglose de siglas.
   - Las figuras deben enviarse en un formato de alta resolución (mínimo 300 dpi).
   - Los títulos de las tablas y los pies de las figuras deben ser claros, breves y llevar siempre el número correspondiente que los identifique. Dentro del texto, el autor debe indicar entre paréntesis y con mayúsculas en qué parte del texto sugiere insertar los elementos gráficos.

     Ejemplo:

     Se cambiaron las definiciones de algunos patrones conductuales (Tabla 3) de manera que fueran más comprensibles en el idioma español y se redefinieron las categorías que agrupan dichos patrones con base en la literatura especializada. (INSERTAR AQUÍ TABLA 3)

ARCHIVOS COMPLEMENTARIOS

Los siguientes documentos se adjuntan en el paso 4 del envío. Asegúrese de dar clic en “CARGAR” después de seleccionar cada archivo. De no hacerlo, los archivos no se adjuntarán al guardar y continuar con los demás pasos.

1. **Carta de autorización de uso de obra.** Todo artículo debe acompañarse de la Carta de autorización de uso de obra firmada por todos los autores y enviarse en formato PDF. El formato de la Carta de autorización de uso de obra está disponible en el siguiente enlace: *http://revistasaludmental.mx/Carta_autorizacion_uso_obra_final.pdf.*
2. **Carta de presentación.** El autor debe exponer las fortalezas de su aportación científica, resaltando el alcance, la originalidad y la importancia de su contribución al campo de la salud mental. En la carta se pueden sugerir tres revisores nacionales o internacionales calificados en el campo de conocimiento del manuscrito sometido, asegurándose de que éstos no tengan ningún conflicto de intereses con los resultados presentados. Ésta debe cargarse en formato PDF.
3. ***Checklist* de estándares metodológicos.** Es importante enviar el *checklist* debidamente contestado según las guías para cada tipo de estudio (veáse apartado de *CONSIDERACIONES METODOLÓGICAS*) y en formato PDF.

CONSIDERACIONES METODOLÓGICAS

Salud Mental adopta el sistema convencional de cinco por ciento como valor para la significancia estadística y no toma en cuenta las tendencias para valores mayores. Con el propósito de proporcionar mayor claridad a los lectores y revisores, es necesario que, de acuerdo con el tipo de estudio, los manuscritos se apeguen a los siguientes estándares:

- Los ensayos clínicos aleatorizados deben adecuarse a las guías CONSORT (*http://www.consort-statement.org*).
- Los estudios con diseños no experimentales, a las guías TREND (*http://www.trend-statement.org*).
- Los estudios transversales, de cohorte y de casos y controles, a la guía STROBE (*http://www.strobe-statement.org*).
- Los estudios cualitativos, a la guía COREQ (*https://academic.oup.com/intqhc/article/19/6/349/1791966/Consolidated-criteria-for-reporting-qualitative*).
- Los artículos de revisión, a las guías PRISMA (*http://www.prisma-statement.org/PRISMAStatement/PRISMAStatement.aspx*) y/o MOOSE (*http://www.ncbi.nlm.nih.gov/pubmed/10789670*).

ÉNFASIS Y PUNTUACIÓN

1. Es importante que los manuscritos eviten en general las notas a pie de página, aunque se pueden considerar si son claramente necesarias.
2. No deben utilizarse letras negritas en el texto.
3. Las cursivas deben utilizarse para:
   - Destacar palabras extranjeras.
   - Enfatizar expresiones populares.
   - Mencionar títulos de libros, documentos ya publicados y publicaciones periódicas.
4. Las cursivas pueden emplearse para:
   - Resaltar términos significativos o importantes cuando se mencionan por primera vez.
   - Destacar una palabra u oración dentro de una cita.
5. Las comillas dobles deben usarse solamente para:
   - Citar párrafos de otros autores dentro del texto.
   - Referir textualmente fragmentos del discurso de los sujetos de estudio.
6. En la medida de lo posible, se recomienda evitar el uso de cualquier otro tipo de énfasis como cursivas, negritas, subrayados o letras mayúsculas.
7. Evite el uso de paréntesis doble, es decir, un paréntesis dentro de otro. En su lugar utilice corchetes.
8. Pueden emplearse guiones largos para indicar oraciones parentéticas.
9. Deben utilizarse de forma correcta todos los signos de puntuación. Por ejemplo, si emplea signos de interrogación en un texto en español, debe colocar el de apertura y cierre correspondientes, de igual manera se debe proceder con las comillas.

FÓRMULAS MATEMÁTICAS Y ESTADÍSTICAS

Para presentar los resultados se deben considerar las siguientes indicaciones:

1. Escribir con letra las cifras de cero a nueve y con números las cifras de 10 o más.
2. Utilizar números cuando se trate de fechas, muestras, etc.
3. Incluir en los datos estadísticos los intervalos de confianza.
4. Escribir en cursivas los símbolos estadísticos (por ejemplo, *M, SD)*.
5. Expresar la probabilidad exacta con dos o tres decimales (por ejemplo, $p = .04$; $p = .002$) sin el cero adelante del punto decimal. En caso de ser menor a .001 se deberá indicar con un < .001.
6. Dejar un espacio antes y después de cada signo (a + b = c en lugar de a+b=c).
7. Emplear puntos en lugar de comas para indicar decimales.

VERIFIQUE LO SIGUIENTE ANTES DE SOMETER SU MANUSCRITO

Antes de enviar su manuscrito, cerciórese de adjuntar la documentación solicitada. Anexamos la siguiente tabla que describe el contenido y el formato en el que es necesario presentar dichos documentos.

Documento	Contenido	Formato
1. Manuscrito	1. Primera página (página de título) 2. Segunda página (resúmenes) 3. Tercera página (cuerpo del artículo) con la siguiente estructura: - Introducción/Antecedentes - Objetivo - Método - Resultados - Discusión y conclusión - Declaraciones de los autores (Financiamiento, Conflictos de intereses y Agradecimientos) - Referencias - Tablas, figuras e ilustraciones.	Word. Se adjunta en el segundo paso del envío en la página web (“CARGAR EL ENVÍO”).
2. Carta de presentación	Breve presentación de las fortalezas, originalidad y aportaciones del artículo. En este espacio se pueden sugerir tres revisores para la evaluación del manuscrito.	PDF. Se adjunta en el paso 4 del envío (“CARGAR LOS ARCHIVOS COMPLEMENTARIOS”).
3. Carta de autorización de uso de obra	Este documento debe presentarse firmado por el autor responsable (a quien se dirigirá la correspondencia); además, debe contener los nombres y correos electrónicos de todos los coautores.	PDF. El formato está disponible en: *http://revistasaludmental.mx/Carta_autorizacion_uso_obra_final.pdf.* (“CARGAR LOS ARCHIVOS COMPLEMENTARIOS”).
4. *Checklist* de estándares metodológicos	Debe estar debidamente contestada según el tipo de estudio.	PDF. Se adjunta en el paso 4 del envío (“CARGAR LOS ARCHIVOS COMPLEMENTARIOS”).

UNA VEZ ENVIADO SU MANUSCRITO

El envío y la recepción del manuscrito, así como la resolución del proceso de evaluación, podrá consultarlos en el “ÁREA PERSONAL”.

Salud Mental recibe una gran cantidad de manuscritos, cuya calidad es determinada por el Comité de Evaluación Interno (CEI), encargado de comprobar que estos trabajos cumplan con los estándares de calidad establecidos: calidad metodológica, relevancia e innovación. Además, cada manuscrito es evaluado por pares externos que, en ocasiones, son miembros del Comité Editorial de la revista o expertos en el tema de la publicación y, en los casos en los que el autor haya sugerido dictaminadores, pueden ser elegidos de entre éstos.

Las posibles calificaciones que se pueden asignar a los manuscritos evaluados son: aceptado, publicable con modificaciones, reevaluable y no publicable. En función de los procesos de la Coordinación Editorial, Salud Mental estima un período de evaluación de tres a cuatro meses para el dictamen inicial del manuscrito y de uno a dos meses para la evaluación de segundas versiones, lo cual varía según el tipo de correcciones solicitadas.

GUIDELINE FOR AUTHORS

Salud Mental publishes original articles on psychiatry, psychology, neurosciences and other related fields according to the following formats:

1. **Editorials**
   Written at the invitation of the Director-Editor of the journal. They must express authoritative opinions on specific topics of interest for the scientific community and the mental health field. They must also stimulate debate and promote new research lines. *Maximum extension: 1000 words*.
2. **Original articles (peer-reviewed section)**
   They present unpublished research results. They can be developed according to the following methodologies:
   - **Quantitative:** Comprehends primary and secondary results of transversal studies, clinical trials, cases and controls, cohorts, and quasi-experimental studies. *Maximum extension: 3500 words*.
   - **Qualitative:** They include reports of focus groups, in-depth interviews, semantic networks, and content analysis. *Maximum extension: 5000 words*.
3. **Brief original articles (peer-reviewed section)**
   They validate measuring instruments and preliminary results of original research. *Maximum extension: 2000 words*.
4. **Review articles (peer-reviewed section)**
   - **Narrative reviews.** They comprise narrative reviews based on national and international bibliography in accordance with the corresponding standards. *Maximum extension: 5000 words.*
   - **Systematic reviews.** They must adhere to standard methodologies (e.g. Cochrane), preferably, they should include a meta-analysis. *Maximum extension: 4000 words*.

- **Case reports**
  They include reports of atypical cases in clinical practice as well as the diagnosis approach and innovative procedures. *Maximum length 2000 words*.

N.B. the word count of each section does not consider title, abstracts and keywords, or sections on funding, conflict of interests and acknowledgments; neither does it consider words included in tables, figures and references.

LANGUAGES

Salud Mental publishes manuscripts in Spanish and English. However, the publication of articles in English is preferred for the benefit of the international scientific community.

ETHICAL ASPECTS IN PUBLISHING

For Salud Mental it is important to observe the ethical policies of scientific publishing, Because of this, it is essential for the editors that every research involving animal and/or human subjects adheres to national and international regulations of basic, clinical, and social research. All clinical research articles must adhere to the ICJME international regulations.

SUBMISSION DECLARATION

By submitting an manuscript, the author states that:

1. The work has not been previously published (except as a summary or as a part of a lecture or a degree thesis).
2. It is not currently under review in any other journal in any language.
3. The work has been authorized by all co-authors and responsible authorities of the place where it was carried out.

AUTHORSHIP

Only those individuals who actively participated in the process of research and drafting of the manuscript should be considered as authors. Owing to this, Salud Mental accepts five coauthors maximum (in addition to the main author). In the case of projects involving multiple research groups and requiring the inclusion of more than five coauthors, the main author must justify their inclusion in the Cover letter.

SUBMIT YOUR PUBLICATION

Manuscripts must be exclusively submitted through the website available at: *http://revistasaludmental.mx* Prior to the submission of a manuscript, the sender needs to be registered as an author. Before making a submission, make sure to click on UPLOAD every time a file is added. In step 1 you must fill the checklist to declare you fulfill the policies established by the journal. In step 2, the Microsoft Word manuscript is attached. It must not include notes or track changes and must comply with each requirement listed in Guidelines for Authors. The main data will be requested in step 3. In step 4, Copyright Assessment and Cover letter must be attached in PDF.

EDITORIAL GUIDELINES

It is of the utmost importance for authors to consider the following before sending their manuscript:

1. Manuscripts must be clear and concise, avoiding spelling, grammar, and syntax mistakes.
2. The text must be written in Microsoft Word format, Times New Roman 12, with double spacing and 2.5 centimeters margins, in letter size paper.
3. Pages must be numbered in a consecutive order, beginning by the title page, with numbers placed in the upper right corner.
4. The title page should contain the following ordered sections:
   - **Title of the study in Spanish and English.** The title must be descriptive and indicate the study's main results.
   - **Short title.** Six words at most.
   - **Full name(s) of the author and coauthors.** The order in which this information is provided will be preserved in the manuscript's possible publication and registration in databases. Authors' full names must be separated by a comma. Then, following this punctuation mark, an Arabic numeral in superscript, with no intermediate space, will indicate the affiliation institution. Following each author's superscript number, their full affiliation must be stated, specifying their particular area of work therein.
   - **Author's affiliation.** This is indicated in Arabic numerals as superscripts. Affiliations are placed immediately below authors' names, not as footnotes. It is necessary that the ascription specifies: department, area, institution, city and country for each author, without indicating a postal address. The institutions must be written in their official language. The authors' degrees or positions (PHD, doctor, resident, researcher, etc.) must not be included.

     For example:

     Juan José García-Urbina,[1] Héctor Valentín Esquivias Zavala[2]

     [1] Dirección de Investigaciones Epidemiológicas y Psicosociales, Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz, Ciudad de México, México.
     [2] Departamento de Publicaciones, Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz, Ciudad de México, México.

   - At the bottom of the first page, the legend "**Correspondence:**…" must be placed, mentioning the corresponding author and including affiliation with postal address, telephone number and email. This will be the only author addressed by Salud Mental during the entire process.

For example:

Correspondence:
Juan José García-Urbina
Dirección de Investigaciones Epidemiológicas y Psicosociales, Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz.
Calz. México-Xochimilco 101, San Lorenzo Huipulco, Tlalpan, 14370, Ciudad de México, México.
Phone: 55 4152-3624
E-mail: jurb@imp.edu.mx

5. The second page must present the abstract of the work in Spanish and English. Each abstract must be 250 words maximum.
   - The abstracts of Original articles, Brief original articles, and Systematic reviews must comprise: Introduction, Objective, Method, Results, and Discussion and conclusion.
   - In the cases of Narrative reviews, the order of the abstract must be: Background, Objective, Method (databases consulted), Results, and Discussion and conclusion.
   - **Keywords.** At the end of each abstract, four key words minimum and six maximum must be included, separated by commas and in lowercase. Keywords must be the same in Spanish and English. As these are used in the articles' indexation, at least three of them must be based on MeSH (Medical Subject Headings), consulting *http://www.nlm.nih.gov/mesh/MBrowser.html*.
6. The manuscript proper begins in page three, following this structure:
   - **Introduction (**or **Background** in the case only of Narrative reviews)**.** The research's background is disclosed here for the reader to understand the problem being dealt with. The final paragraph of this section must clearly state the objectives of the work, and if deemed necessary the hypotheses.
   - **Method.** It must be sufficiently detailed so that the study can be reproduced. It must include the following sections:
     • Design of the study
     • Subjects / description of the sample
     • Places
     • Measurements
     • Procedures
     • Statistical analysis
     • Ethical considerations
   - **Results.** They are presented following a logical sequence in the text and making use of tables, graphs, and figures.
   - **Discussion and conclusion.** This section highlights new and important aspects of the study, conclusions drawn from it, possible implications of the findings, and its limitations if any.
7. After the Discussion and conclusion, the authors' declarations are listed in the following order:
   - **Funding.** In this section, it must be declared if the study or the manuscript preparation received any funding, indicating the name of the financing entity.

     For example:

     This study was partially funded by CONSEJO NACIONAL DE CIENCIA Y TECNOLOGÍA (No. XXXXXXX).

     If no financial support was received, the authors must state it was well.

     For example:

     None.
   - **Conflict of interest.** Authors must declare here if they have any conflict of interest regarding their scientific activity. Having a conflict of interest does not necessarily pose an impediment to publish the manuscript. If there is no conflict of interest, the following must be written: "The authors declare they have no conflicts of interest."
   - **Acknowledgments.** When deemed necessary, after the declarations, acknowledgements for people, centers, or entities that collaborated or supported the research must be mentioned.
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     For example:

     The definition of some behavioral patterns was changed (Table 3) so that they were more comprehensible in Spanish and the categories that group such patterns were redefined based on specialized literature.
     (INSERT TABLE 3 HERE)

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2. Use numbers in the case of dates, samples, and so on.
3. Include confidence intervals in statistical data.
4. Write statistical symbols in italics *(M, SD)*.
5. Use the exact probability with two or three decimals (e.g., $p = .04$; $p = .002$) with no zero before the decimal point. If it is lower than 001, indicate it as < .001.
6. Leave a space before and after each sign (a + b = c, instead of a+b=c).
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