Factors associated with the presence of depression, anxiety, and substance use in health students from 10 Latin American countries during the COVID-19 pandemic

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ABSTRACT

Introduction. Health science students represented a particularly vulnerable group during the pandemic. Studies in various regions have found a high prevalence of psychopathology, associated with the presence of stressors such as contact with patients, isolation, and financial difficulties. **Objective.** To determine the stressors for and frequency of depression, anxiety and substance use in Latin American health science students during the COVID-19 pandemic. **Method.** A questionnaire-based, cross-sectional study was conducted to measure the presence of stressors and determine anxiety and depression symptoms through the PHQ-9 and the GAD-7 scales, and substance use in 777 students from ten countries, from June 2020 to January 2021. **Results.** The most frequent stressors were having a loved one diagnosed with COVID-19 and being diagnosed with another illness. A total of 54.1% of the sample had depression, and 46.2% had anxiety according to the rating scales cut-off points, while 24.8% reported substance use. Reading or listening to news about the pandemic was the main stressor associated with the presence of psychopathology. **Discussion and conclusion.** Latin American health science students displayed high frequencies of psychopathology associated with various stressors. It is therefore important to monitor the mental health of this population to prevent low academic performance.

Keywords: Depression, anxiety, COVID-19, pandemic, health science students.

RESUMEN

Introducción. Los estudiantes de ciencias de la salud constituyeron un grupo con especial vulnerabilidad durante la pandemia. Estudios en diferentes regiones han mostrado alta prevalencia de psicopatología, asociada con la presencia de estresores como el contacto con enfermos, el aislamiento y las dificultades económicas. **Objetivo.** Determinar los estresores y las frecuencias de depresión, ansiedad y uso de sustancias en estudiantes latinoamericanos de ciencias de la salud durante la pandemia de COVID-19. **Método.** Se realizó un estudio transversal a través de un cuestionario que incluía la presencia de estresores, la determinación de síntomas de depresión y ansiedad y depresión por medio de las escalas PHQ-9, GAD-7 y el uso de sustancias en 777 estudiantes de 10 países durante el periodo de junio 2020 a enero 2021. **Resultados.** Los estresores más frecuentes fueron el diagnóstico de COVID-19 en alguien cercano y presentar otra enfermedad. De acuerdo con los puntos de corte de las escalas, 54.1% presentaron depresión, 46.2% ansiedad y 24.8% uso de sustancias. El escuchar noticias sobre la pandemia fue el estresor más fuertemente asociado con la presencia de psicopatología. **Discusión y conclusión.** Los estudiantes de ciencias de la salud latinoamericanos presentaron frecuencias altas de psicopatología asociados con diversos estresores. Es importante hacer un seguimiento de la salud mental de esta población a fin de prevenir su disfunción académica y laboral.

Palabras clave: Depresión, ansiedad, COVID-19, pandemia, estudiantes ciencias de la salud.

INTRODUCTION

The COVID-19 outbreak was declared a pandemic on March 11, 2020. Health science students often participated in groups of professionals involved in frontline healthcare, compounding other stressors such as isolation, fear of oneself or family members becoming infected, financial difficulties and the possibility of losing the school year (Guldager et al., 2021; Shankar et al., 2022).

Various studies have documented the impact of these stressors on the mental health of students from different majors. In the case of medical students, they include a meta-analysis examining the results of forty-one studies in different countries, showing a cumulative prevalence of depression and anxiety of 37.9% and 33.7% respectively, with variations by country (Jia et al., 2022). In Peru, a cross-sectional study was conducted of 248 students to determine the frequency of depression and anxiety and their associated factors through the Depression Anxiety Stress Scale-21 (DASS-21). The results showed that 24.3% and 28.5% of those surveyed presented depression and anxiety respectively. These students mentioned chronic illness, having been infected with COVID-19, and having a family member with the disease as the main factors associated with the presence of these psychopathologies (Sandoval et al., 2021). In Argentina, DASS-21 was administered to 263 students, finding depression and anxiety symptoms in 72% and 59.7% of the sample respectively (Agranatti et al., 2021). In Colombia, 295 students were evaluated with the Zung depression scale, yielding a prevalence of 53.2% (Guavita & Sanabria, 2006). In Mexico, the Goldberg General Health Questionnaire (GHQ-28) was used to evaluate 177 students, finding that 35.8% presented anxious and 8% depressive symptoms (Ruvalcaba et al., 2021).

Reports on the mental health of students from other majors include one conducted on nursing students in Colombia, which found depression and anxiety rates of 27% and 20% (Herrera, 2021) and another conducted on dentistry students in Cuba, which showed depression and anxiety rates of 74.16% and 63.22% respectively (Corrales-Reyes et al., 2022). Although these studies were conducted on populations of educational centers or specific localities, were based on self-administered instruments, and conducted at different times during the pandemic, they all showed a high prevalence of depression and anxiety symptoms.

In parallel, substance use increased during the pandemic. In Brazil, a cross-sectional study was conducted on 1,050 dentistry students. The results showed that 18.7% reported consuming alcohol during the pandemic and having increased their frequency of consumption over pre-pandemic levels (Fernandez et al., 2021). In Mexico, a study conducted on frontline healthcare workers providing care for infected patients (such as general practitioners, specialists, undergraduate students, psychologists, nurses, social workers and paramedics) found that 20.7% reported an increase in alcohol consumption and 3.6% in the use of other substances (Bryant-Genevier et al., 2021).

Given the dearth of studies conducted on health science students in Latin America, a region significantly impacted by the pandemic (International Monetary Fund, 2022; COVID-19 Mental Disorders Collaborators, 2021), this study aims to a) determine the frequency of depression and anxiety symptoms and substance use in health sciences students, b) evaluate whether there were differences in these symptoms according to the major studied and c) examine their correlation with the presence and intensity of stressors during the COVID-19 pandemic.

METHOD

Design of the study

A cross-sectional study was conducted to obtain information on anxiety and depression symptoms and substance use through a self-administered questionnaire that included stressors, the PHQ-9 and GAD-7 scales and a question on substance use.

Participants

A total of 777 students participated in the study, most of whom were from Mexico (63.4%), Colombia (28.2%) and Argentina (5.1%), and the remainder from Bolivia, Chile, Ecuador, El Salvador, Honduras, Peru, and the Dominican Republic. They were majoring in medicine, dentistry, psychology, nutrition, biomedical engineering, clinical laboratory science, hospital support, nursing, and physiotherapy. The survey was sent in the form of a digital poster with an electronic address and QR code so that it could be scanned and sent via WhatsApp and email to key people for the students such as teachers and health professionals so that they could share the survey. Participants were asked to forward the survey to family and friends, using the snowball method (Dudovskiy, 2022).

Measurements

The information was collected from June 2020 to January 2021. The data was collected through Google Forms, a survey management software included in the Docs Editors suite provided by Google (Google, 2021), which was used to design the questionnaire described below:

a. *Demographic data*: includes sex, major and country.
b. *Stressors*: assessed using a set of questions developed by researchers, such as being diagnosed

with COVID-19 or another illness, having a loved one diagnosed with COVID-19, and receiving treatment from a mental health professional. In addition, Likert-type questions were used to evaluate stress related to COVID-19 news, having a loved one diagnosed with COVID-19, isolation, losing touch with colleagues, the possibility of becoming sick, school problems, or financial impact. Response options were "not at all," "mild," "moderate," and "a lot" and coded with values from 0 to 3.

c. *Anxiety Symptoms*: evaluated using the General Anxiety Disorder 7-Item (GAD-7), a valid, effective screening tool for detecting generalized anxiety disorder and evaluating its severity. Developed and validated by Spitzer et al. (2006). A cut-off point of 10 was used to diagnose generalized anxiety disorder with a sensitivity of 89% and a specificity of 82%. This scale was validated in Spanish with a sample of adults in Spain (García-Campayo et al., 2010).

d. *Depression Symptoms*: evaluated using the depression subscale of the 9-item Patient Health Questionnaire (PHQ-9) developed by Spitzer et al. (1999) to assess the frequency of each symptom of major depressive disorder defined by the DSM. A cut-off point of 11 was used for suspected depression, with a sensitivity of 80% and 90% and a specificity of 92% and 86% in adults (Gilbody et al., 2007) and pediatric populations respectively (Allgaier et al., 2012). The Spanish version of the scale was validated with Latina women residing in the United States (Merz et al., 2011) and pediatric populations in Chile (Borghero et al., 2018).

e. *Substance use*: evaluated using the question "Did you smoke, drink or use any drugs to feel calmer?" with Yes/No response options.

Table 1
Sample characteristics

	Frequency	
Characteristic	*n*	*%*
Female	169	(78.2%)
Average age	21.38	(1.71)
Diagnosed with COVID-19	33	(4.2%)
Loved one diagnosed with COVID-19	336	(43.2%)
Suffered another illness	271	(34.9%)
Received mental health treatment	238	(30.6%)
PHQ > 11	421	(54.1%)
GAD > 10	359	(46.2%)
Used substances to feel calmer	193	(24.8%)

Statistical analysis

Statistical analyses were performed using SPSS (version 21). Descriptive statistics were used, with differences being determined by major and the presence of psychopathology using chi-square and Student's t tests. A multiple linear regression analysis was used to determine the variables associated with an increase in the number of comorbidities, considering subjects who had a PQH-9 score > 11 as cases of probable depression, those with a GAD-7 score > 10 as cases of probable anxiety, and those who answered the respective question affirmatively as substance use cases. A value of $p < .05$ was considered statistically significant.

Ethical considerations

The study was approved by the Ethics Committee of the Dr. Juan N. Navarro Children's Psychiatric Hospital, with registration no. II3/02/0420 on June 3, 2020.

RESULTS

A total of 4.2% of the participants reported having been diagnosed with COVID-19, 43.2% reported that a loved one had been diagnosed with it, 34.9% presented with another illness apart from COVID-19 and 30.6% had been treated by a psychologist or psychiatrist in the past six months. Participants reported increased stress due to having a loved one with COVID-19, not seeing their friends, and financial problems in the family. The evaluation of psychopathology found that 421 subjects (54.1%) obtained a PHQ score ≥ 11, suggesting moderate to severe depression; 359 (46.2%) obtained a GAD score ≥ 10, suggesting generalized anxiety, while 193 subjects (24.8%) reported using substances to feel calmer. Table 1 shows the sample characteristics and the frequency of the stressors examined.

The frequency of symptoms in students in the different majors is shown in figure 1; no significant differences were found.

Correlation of symptoms with the presence and intensity of stressors

Participants who obtained scores on the scales above their cut-off point and reported using substances to feel calmer reported having been treated by a mental health professional more frequently, as well as having experienced more stress (Table 2).

A total of 94 subjects (12.1%) presented with depression, anxiety, and substance use. An examination of the stressors that were significantly greater in these subjects found that the degree of stress due to pandemic news was the most powerful predictor of the number of disorders (Table 3).
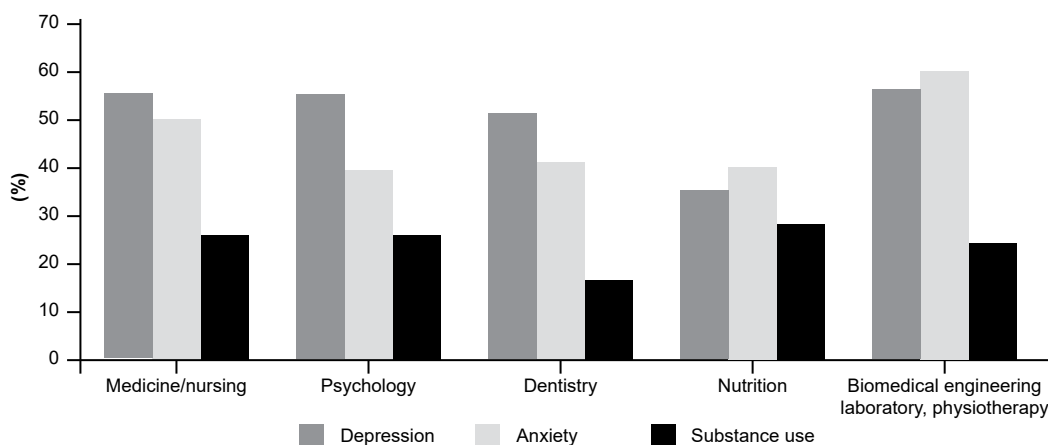
Figure 1. Distribution of symptoms of depression, anxiety and substance use in students in different majors.

Table 2
Frequency and degree of stress in subjects with and without symptoms or substance use

Stressor	GAD-7 > 10	PHQ > 11	Using substances to feel calmer
Diagnosed with COVID-19	3.9% *vs.* 4.5%	3.3% *vs.* 5.3%	3.6% *vs.* 4.5%
	$x^2 = .19$, df = 1	$x^2 = 1.91$, df = 1	$x^2 = .24$, df = 1
Loved one diagnosed with COVID-19	47.9% *vs.* 39.2%	45.6% *vs.* 40.4%	51.8% *vs.* 40.4%
	$x^2 = 5.92$, df = 1*	$x^2 = 2.09$, df = 1	$x^2 = 7.68\%$, df = 1**
Suffered from another illness	39.8% *vs.* 30.6%	38.7% *vs.* 30.3%	40.9% *vs.* 32.9%
	$x^2 = 7.21\%$, df = 1**	$x^2 = 5.96$, df = 1*	$x^2 = 4.14$, df = 1*
Received mental health treatment	37.9% *vs.* 24.4%	37.3% *vs.* 22.8%	41.5% *vs.* 27.1%
	$x^2 = 16.51$, df = 1	$x^2 = 19.19$, df = 1	$x^2 = 14.14$, df = 1
Stress about news	2.25 (.72) *vs.* 1.62 (.74)	2.13 (.72) *vs.* 1.66 (.80)	2.07 (.77) *vs.* 1.86 (.80)
	$t = 12$, df = 761***	$t = 8.57$, df = 775***	$t = 3.18$, df = 339***
Stress about loved one diagnosed with COVID-19	3.25 (1.09) *vs.* 3.12 (1.31)	3.26 (1.12) *vs.* 3.08 (1.12)	3.20 (1.16) *vs.* 3.18 (1.23)
	$t = 1.52$, df = 775	$t = 2.05$, df = 775*	$t = .20$, df = 345
Stress about staying at home	2.38 (.78) *vs.* 1.75 (.91)	2.28 (.84) *vs.* 1.76 (.91)	2.20 (.88) *vs.* 1.99 (.91)
	$t = 10.37$, df = 775***	$t = 8.32$, df = 731***	$t = 2.88$, df = 336**
Stress about no longer seeing their friends	2.42 (.82) *vs.* 2.01 (.95)	2.38 (.82) *vs.* 1.99 (.98)	2.40 (.84) *vs.* 2.14 (.93)
	$t = 6.29$, df = 775***	$t = 5.91$, df = 775***	$t = 3.45$, df = 775***
Stress about the possibility of getting sick	2.09 (93) *vs.* 1.53 (.93)	1.96 (.94) *vs.* 1.60 (.97)	1.83 (.99) *vs.* 1.78 (.96)
	$t = 8.3$, df = 756***	$t = 5.24$, df = 775***	$t = .60$, df = 319
Stress about the possibility of losing the school year	2.25 (1) *vs.* 1.78 (1)	2.22 (.98) *vs.* 1.73 (1.09)	2.20 (99) *vs.* 1.93 (1.08)
	$t = 6.38$, df = 775***	$t = 6.6$, df = 775***	$t = 3.01$, df = 775***
Stress about financial problems	2.48 (.79) *vs.* 1.96 (.96)	2.40 (.83) *vs.* 1.96 (.97)	2.34 (.93) *vs.* 2.15 (.92)
	$t = 8.1$, df = 775***	$t = 6.71$, df = 775***	$t = 2.41$, df = 324**

*$p < .05$, **$p < .01$, ***$p < .001$
The degree of perceived stress was evaluated from 0 = Not at all to 3 = Very much.

DISCUSSION AND CONCLUSION

The present study includes reports from students in nine majors in ten countries. To our knowledge, this is the first study to include such a broad range of majors within the area of health sciences in Latin American countries, since others focused on samples of medical, dentistry, and nursing students. The results show that depression and anxiety, assessed using self-administered scales, were found in half the participants, and the use of substances to feel calmer

Table 3
Variables associated with the highest degree of comorbidity

Variable	B coefficient	Standardized B coefficient	95% CI	p
Stress about news	.302	.233	.214 - .389	< .001
Stress about staying at home	.215	.189	.139 - .291	< .001
Stress about financial problems	.177	.159	.103 - .252	< .001
Received mental health treatment	.341	.152	.201 - .480	< .001
Stress about the possibility of losing the school year	.09	.093	.025 - .155	< .01

Model: R^2 = .255 sum of squares 211.8, df = 5; F = 52.78, *p* < .001.

in almost a quarter. Participants reported being affected by various stressors.

Frequency of stressors

Regarding the stressors reported during the pandemic, it was found that health science students are exposed to some situations they share with the rest of the population and others specific to their profession. Previous studies have highlighted having a loved one who is sick, a lack of information regarding the virus, financial difficulties, and changes in teaching methods. Those directly exposed to the virus in clinical fields reported fear and uncertainty due to the risk of becoming infected (Alkureishi et al., 2022; Frank et al., 2022; Jia et al., 2022).

Frequency of psychopathology and substance use

The frequency of probable cases of depression and anxiety (nearly half the sample) contrasts with the results of a systematic review and meta-analysis of the prevalence of anxiety in medical students during the pandemic published by Lasheras et al. (2020). This author, who reports a cumulative prevalence of 28%, mentions the methodological heterogeneity in the studies analyzed, which is a limitation.

The results of studies using the PQH and GAD scales also vary. A lower frequency was found in China (Cao et al., 2020; Liu et al., 2020); and a similar or greater frequency of depression and anxiety was found in the United States (Christophers et al., 2021; Halperin et al., 2021). It is, however, important to consider the broader timeframe and the inclusion of students from other majors in our study, which could affect the differences observed. The similarity with the Sartorao Filho et al. (2020) study could reflect the impact of the pandemic in this region, characterized by a lower availability of health professionals, which could, in turn, have required greater participation of undergraduate students in patient care.

The literature highlights the increase in prevalence of depression and anxiety during the pandemic (Duan et al., 2020; Racine et al., 2021; Ravens-Sieberer et al., 2021). Data on the mental health of university students prior to the pandemic in Latin America shows heterogeneous results. However, the present results reveal an increase in depression and anxiety over previous rates in Mexico (Granados-Cosme et al., 2020), Argentina (Czernik et al., 2006) and a multicenter study conducted on university students from twenty-one countries showing rates of 11.7% for anxiety and 4.5% for depression and substance use (Auerbach et al., 2016).

Conversely, the frequency of substance use was similar to that reported in studies evaluating the general population (Ekström et al., 2022) and health personnel in contact with infected patients (Bryant-Genevier et al., 2021). Although no significant differences were found in the frequency of depression, anxiety and substance use among students from different majors, the present results can be contrasted with those of studies and meta-analyses previously reported. For example, 40% of dentistry participants obtained GAD-7 scale scores over 10 points, higher than the figure reported in a meta-analysis showing a global prevalence of 35%. Moreover, figures were lower in studies conducted in European than Latin American countries (Lasheras et al., 2020). The present results contrast with those of the study conducted in Germany by Guse et al. (2021) comparing the frequency of stress, depression and anxiety among first-year medicine and dentistry students, showing that the latter had a higher frequency of stress, a difference they attributed to the curricula of each major.

Factors associated with the presence of psychopathology

The results showed that stressors during the pandemic were associated with one or more of the symptom groups evaluated: staying at home (Rodrigues et al., 2022) having another disease (Sandoval et al., 2021), having a loved one with COVID-19, hearing pandemic news and being treated for mental health problems, have been associated with the presence of anxiety and depression symptoms (Ma et al., 2020).

Finally, although numerous stressors related to the presence of anxiety, depression and substance use were found, the factors associated with the presence of all three could be linked to the syllabuses of the students' majors. Students in the latter half of their degree programs may have been undertaking their clinical practices, which increases their risk to that of frontline healthcare workers. On the other hand, staying at home can be associated with stress due to losing the school year or the feeling of not acquiring the required skills (Abbasi et al., 2020; Natarajan & Joseph, 2022). Lastly, pandemic news would have included medical information received first-hand and scientific articles in addition to the news the general population received, which would have increased their degree of stress.

Limitations

The present results should be examined considering the following limitations: 1) Although the questionnaire was designed for the entire Latin American region, since most of the respondents came from Mexico, the sample cannot be considered representative; 2) The cross-sectional design of the study and the use of self-administered scales; 3) Data was not gathered on other variables that could influence the degree of stress of the participants, for example if they were frontline health care workers or if they experienced symptoms of other psychopathologies; 4) No comparisons were made with students enrolled in other degree programs.

The population of health students from these Latin American countries showed high frequencies of depression, anxiety, and substance use, associated with stressors that could have increased as a result of the courses taken. Since depression and anxiety can become chronic (Conway et al. 2016; Weisberg, 2009), this study highlights the need to detect and intervene in risk factors among this population, to reduce the impact on the mental health of those who will be responsible for patient care.

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Conflict of interest

The authors declare that they have no conflicts of interest.

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