Check for updates

Worry effect for COVID-19 transmission over depression, anxiety, and satisfaction with studies in Peruvian university students

Oscar Mamani-Benito[1]*, Renzo Felipe Carranza Esteban[2], Ronald Castillo-Blanco[3], Susana K. Lingán-Huamán[2], Norma del Carmen Gálvez-Díaz[4], Salomón Huancahuire-Vega[5] and Ibraín Enrique Corrales-Reyes[6]

[1]Escuela Profesional de Psicología, Universidad Peruana Unión, Juliaca, Peru, [2]Grupo de Investigación Avances en Investigación Psicológica, Facultad de Ciencias de la Salud, Universidad San Ignacio de Loyola, Lima, Peru, [3]Facultad de Ciencias de la Salud, Carrera de Psicología, Universidad Científica del Sur, Lima, Peru, [4]Escuela de Posgrado, Universidad Cesar Vallejo, Chiclayo, Peru, [5]Grupo de Investigación P53, Facultad de Ciencias de la Salud, Escuela de Medicina Humana, Universidad Peruana Unión, Lima, Peru, [6]Departamento de Cirugía Maxilofacial, Hospital General Provincial "Carlos Manuel Céspedes", Granma, Cuba

Introduction: Concern about contracting COVID-19 has had repercussions on university students. The aim of this study was to determine its effect on depression, anxiety, and satisfaction with studies.

Methods: Using an explanatory cross-sectional design, 1,260 medical, nursing, and dentistry students from both public and private universities in Peru participated in this study. They were assessed using a scale for concern about contracting COVID-19, the *Patient Health Questionnaire-2*, the *Generalized Anxiety Disorder-2* (GAD-2), and a brief scale for satisfaction with their studies.

Results: After analyzing the data using structural equation modeling, it was found that the explanatory model had an adequate fit. It showed that concern about COVID-19 had a direct and significant effect on anxiety ($\beta = 0.46$, $p < 0.001$) and depression ($\beta = 0.38$, $p < 0.001$). However, the same effect was not evident on satisfaction with studies ($\beta = -0.06$, $p = 0.068$).

Discussion: The uncertainty about contracting COVID-19 triggered symptoms of anxiety and depression among Peruvian university students. Still, it did not affect the satisfaction students felt when their academic expectations were met.

KEYWORDS

COVID-19, anxiety, depression, mental health, patient health questionnaire, students

1. Introduction

The COVID-19 pandemic has had significant mental health impacts on the university population, primarily due to the uncertainty of contracting the SARS-CoV-2 virus or one of its variants (Liu et al., 2020; Mamani-Benito et al., 2022; Whitney et al., 2022). A review of the scientific literature reveals that during the health crisis, there was a surge in symptoms related to depression, anxiety, and stress among young university students (De Oliveira et al., 2020; Rizun and Strzelecki, 2020; Son et al., 2020; Wang et al., 2020). Some researchers believe that these symptoms may have

arisen from abrupt changes in traditional education, such as the sudden shift to online learning, the lack of virtual academic platforms, connectivity issues, and the inaccessibility of specialized laboratories (Carranza et al., 2022a,b,c,d). Moreover, the concern about contracting COVID-19, which brought about fear and uncertainty, cannot be overlooked. Many students lived with direct family members, some of whom had risk and vulnerability factors.

Specifically, the concern about COVID-19 contagion is defined as an emotional state encompassing fear, unease, and distress in the face of unknown and adverse events (Carranza-Esteban et al., 2020). This concern became a focal point for health researchers, leading to the design and adaptation of various tools to reliably measure its presence. These scales were suitable for the general population (Ruiz et al., 2020), university students (Huarcaya-Victoria et al., 2021), healthcare professionals (Carranza-Esteban et al., 2020), and even accounted for new virus variants (Carranza et al., 2022a,b,c,d). Studies using these scales reported high levels of concern among at-risk populations such as healthcare workers, teachers, and active working adults (Carranza-Esteban et al., 2020; Carranza et al., 2021a,b, 2022a,b,c,d). Additionally, explanatory and predictive models were tested, revealing a direct effect on variables like psychological distress in health professionals (Carranza et al., 2021a,b) and depression in nurses (Carranza et al., 2022a,b,c,d).

Despite the wealth of studies on COVID-19 related concerns, there remains a research gap concerning its repercussions on the mental health of university students (Huarcaya-Victoria et al., 2021). Given this, the researchers of this study found it crucial to analyze the effect of this concern on depression—an affective disorder characterized by sadness, frustration, and mood changes (Arrieta et al., 2014)—and anxiety, an emotional response manifested by discomfort and unease in stressful situations (Revuelta et al., 2010). Both of these disorders are among the most prevalent psychological issues experienced by the general population due to pandemic-related social measures and restrictions (Ran et al., 2020; Salari et al., 2020; Van et al., 2020). Furthermore, the researchers also considered satisfaction with studies, defined as the enjoyment of student experiences (Merino et al., 2017). This satisfaction was negatively affected by the challenges introduced by virtual education during the COVID-19 pandemic (Yekefallah et al., 2021).

Given the limited information on explanatory models that shed light on the effects of COVID-19 concerns on academic and mental health variables amidst a global health emergency, the researchers, based on evidence showing functional relationships between concern about COVID-19 contagion, depression, anxiety, and satisfaction with studies (Bai et al., 2021; Ventura-León et al., 2022; Carranza et al., 2022a,b,c,d), deemed it necessary to test an explanatory model among university students in Peru. At one point, Peru was identified as the epicenter of infections and deaths across all of Latin America and the world (BBC News Mundo, 2020), creating alarm and uncertainty (Comercio, 2020) due to its fragile health system, the delayed arrival of SARS-CoV-2 vaccines, and issues related to the reopening of educational institutions (Maguiña Vargas, 2020; Gestión, 2021; Mejia et al., 2021).

1.1. Hypotheses

Based on what was previously analyzed, the following hypotheses are proposed (Figure 1):

FIGURE 1
Hypothesized model.
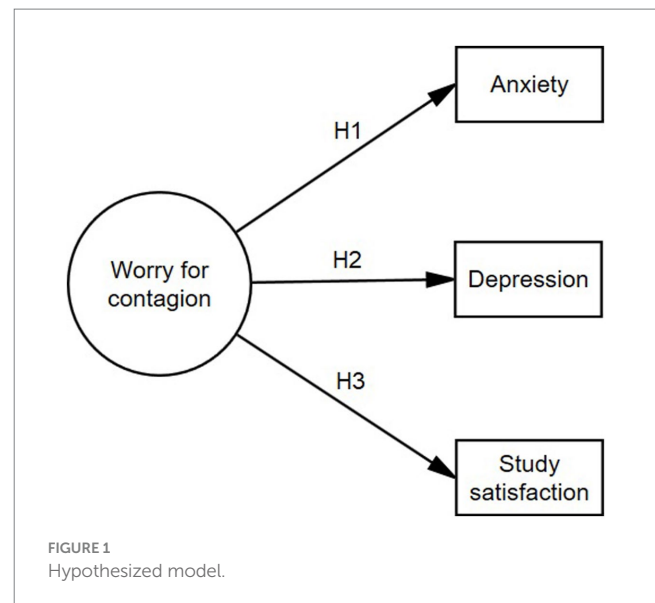
- H1: There is a direct and significant effect of the concern about transmission of COVID-19 upon anxiety.
- H2: There is a direct and significant effect of the concern about transmission of COVID-19 upon depression.
- H3: There is a direct and significant effect of the concern about transmission of COVID-19 upon satisfaction with studies.

1.2. Objective

Due to the aforementioned points, the objective of this research is to determine the effect of the concern about transmission of COVID-19 upon anxiety, depression, and satisfaction with studies in Peruvian university students.

2. Materials and methods

2.1. Design and participants

An explanatory cross-sectional design was employed (Ato et al., 2013) since the aim was to elucidate the relationship among a set of variables and how they might influence one another. The study involved 1,260 Peruvian university students who were selected non-probabilistically through snowball sampling. Inclusion criteria were having completed the entire questionnaire and providing informed consent. Conversely, exclusion criteria were set for those who did not answer all the questions, even if they had given informed consent. Lastly, to estimate the sample size, the G*Power program (Faul et al., 2009) was utilized. With an effect size considered small ($f2 = 0.15$), $\alpha = 0.05$, and power = 0.95, it was determined that 74 participants were sufficient to detect effects. However, the actual sample collected significantly exceeded this number (see Figure 2).
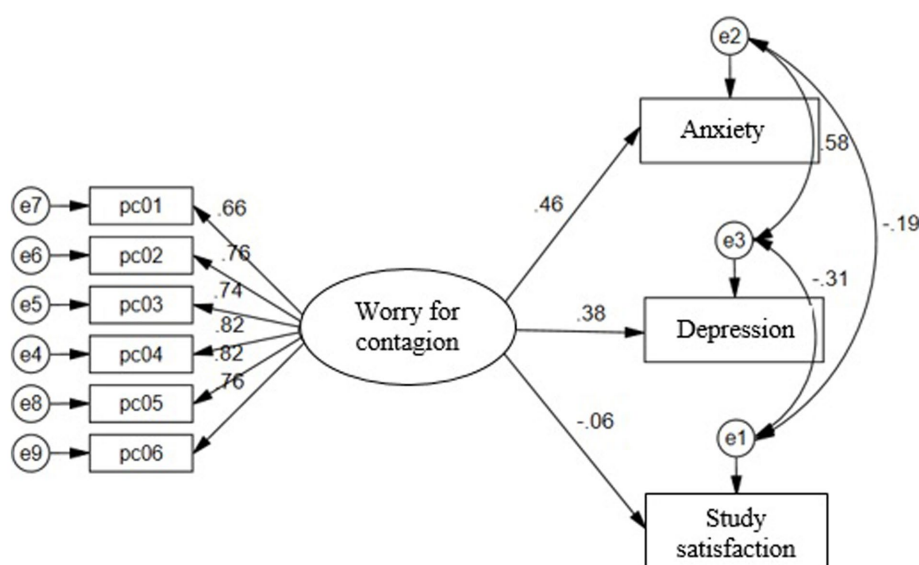
FIGURE 2
Explanatory model. Concern about transmission (V1), Anxiety (V2), Depression (V3), and Study satisfaction (V4).

2.2. Instruments

The Scale of Worry for transmission of COVID-19 (EPPC-Cov19) (Carranza-Esteban et al., 2020) instrument evaluates the feelings of fear, restlessness, anguish, and immobility as a response to negative and unknown events. It is composed of eight items with five answer options (1 = nothing, 2 = a little, 3 = regular, 4 = too much, 5 = a lot). The internal consistency shown by the EPPC-Cov19 in this study was good ($\alpha = 0.89$ [95% CI, 0.87–0.90]).

Depressive symptoms were evaluated using the Patient Health Questionnaire-2 (PHQ-2) (Kroenke et al., 2003). This instrument has two items that explore emotional and cognitive aspects linked to depression (discouragement, hopelessness, and disinterest in things). The scale format is ordinal with four response options ranging from 0 (nothing) to 3 (almost every day).

For the evaluation of anxiety symptoms, the version of the Generalized Anxiety Disorder-2 scale (GAD-2) adapted to Peruvian Spanish was used (Kroenke et al., 2007). It is a universally valid scale to assess the severity of depressive disorders in clinical practice in the previous two weeks. The GAD-2 consists of two items that evaluate behaviors related to emotional and cognitive expressions of generalized anxiety (feeling nervous and worried). Items are scaled in Likert format, with four answer options, from 0 (nothing) to 3 (almost every day).

The Brief Study Satisfaction Scale (EBSE) (Merino et al., 2017) was used, which analyzes the student's satisfaction with their way of studying and academic performance. The EBSE presents three items with Likert response alternatives from 1 to 5 (Strongly disagree, somewhat disagree, neither agree nor disagree, somewhat agree, and strongly agree).

2.3. Procedure, data collection, and analysis

Due to the pandemic by COVID-19, an online questionnaire was designed through Google Forms. The first section presented the informed consent and the purpose of the investigation, and it was specified that participation was voluntary, anonymous, and that the data were for investigative purposes only. Participants were invited via Facebook, Telegram, and WhatsApp and informed consent was requested before starting to answer the form.

The study model was analyzed using modeling structural equations with the maximum likelihood with robust standard errors (MLR), which is an estimator indicated for numerical variables and for being strong to inferential normal deviations (Muthén and Muthén, 2017). The evaluation of the adjustment was made with the comparative fix index (CFI), the root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). The values of CFI > 0.90 (Bentler, 1990), RMSEA <0.080, and SRMR <0.080 were used (Browne and Cudeck, 1992). The data analysis was performed with the software "R" version 4.0.5 and the "lavaan" library version 0.6–9 was used (Rosseel, 2012).

2.4. Ethical aspects

Participants were given information about the study. All information was handled anonymously. The ethics committee of the César Vallejo University in Peru approved the development of the research (N° 017-2022-CEIM-EPG/UCV).

3. Results

Initially, as part of the validity analysis, the internal structure of the "concern about contagion" scale was examined. The unidimensional structural model displayed a good fit, with $\chi^2(8) = 43.7$, $p < 0.001$, CFI = 0.997, RMSEA = 0.060, SRMR = 0.017. This fit was achieved after allowing for the covariance of the errors between items two and three. This procedure was performed on the aforementioned scale as it had the required number of items for the confirmatory factor analysis. For the other scales, including the one

on concern about contagion, a respective content validity analysis was conducted.

A total of 1,260 students participated in the study, with an average age of 21.90 years, of which 63.57% were women, 54.60% were studying medicine, and 68.01% were in private universities (Table 1). Based on these data, it can be assumed that the women were more interested in participating in this study. The fact that most of them studied a career directly linked to the prevention and cure of diseases demonstrates the interest of the subject for the effective practice of health sciences, a motivation observed in students who have recently entered university.

The scores of the variables of the study were scaled to values between 0 and 30 to facilitate their visualization with the consideration that this procedure does not affect the values of correlations between the variables. Table 2 shows the descriptive results such as asymmetry (A) and the correlation results between 0.05 and 0.65 in absolute value for the study variables. The coefficients of internal consistency alpha were also observed, which were found between the values of 0.77 and 0.89. Based on these results, it is assumed that there were significant correlations between the variables under study, as well as the presence of adequate indicators to test the hypotheses through the application of structural equation modeling.

The proposed model showed an adequate fit, $\chi^2(24) = 114.7$, $p < 0.001$, CFI = 0.975, RMSEA = 0.055, SRMR = 0.024. H1 and H2 were confirmed on the positive worry effect for transmission on anxiety, $\beta = 0.46$, $p < 0.001$, and depression, $\beta = 0.38$, $p < 0.001$, respectively. H3, on the negative association of infection concern with study satisfaction, was not confirmed, $\beta = -0.06$, $p = 0.068$. These results are shown in Figure 2 and corroborate most of the hypotheses put forward by the researchers.

TABLE 1 Socio-educational characteristics of students.

Variables	n	%
Sex		
Female	801	63.57
Male	459	36.43
Age (years)		
Measure of central tendency and standard deviation	21.90	5.30
Career		
Medicine	688	54.60
Nursing	386	30.63
Odontology	186	14.76
Academic year		
First	368	29.20
Second	209	16.59
Third	189	15.00
Fourth	160	12.70
Fifth	173	13.73
Sixth	77	6.11
Seventh	84	6.67
University		
Private	857	68.01
Public	403	31.98

4. Discussion

The COVID 19 pandemic is an unprecedented disruptive event and its impact on people's daily lives is of great interest to academics, researchers, politicians, and health managers. Thus, an aspect of particular interest is to know how this health emergency has impacted the mental health and academic aspects of university students, who are particularly vulnerable because of the great social demands they must meet and because they are in a transition to adulthood.

The results show a direct impact of concern about COVID-19 contagion on anxiety and depression. As the level of concern about contagion increases, there is a higher likelihood of presenting symptoms related to anxiety and depression. While concern about contracting COVID-19 might be seen as a natural reaction, certain factors during the pandemic could have amplified this concern, leading to maladaptive behaviors. These behaviors significantly disrupted individuals' daily activities, resulting in anxiety and depression symptoms. In fact, various studies confirm that anxiety and depression were the most prevalent psychopathologies during the pandemic, both in the general population (Ran et al., 2020; Salari et al., 2020; Van et al., 2020) and among university students (De Oliveira et al., 2020; Son et al., 2020; Wang et al., 2020). An intriguing observation is that the concern about COVID-19 contagion had a stronger effect on anxiety compared with its influence on depression. This is understandable when considering that concern often centers on potentially threatening situations that might occur in the future. Nonetheless, these findings are in line with prior studies that detected high levels of concern in various emotional disorders, especially anxiety and depression (Ehring and Watkins, 2008). Thus, the results of this study can be explained by the notion that worry, combined with rumination and catastrophizing, are maladaptive strategies that can lead to increased anxiety and depression (McEvoy et al., 2013), substantially affecting mental health.

The findings of this study are consistent with previous research, particularly those conducted among frontline healthcare workers treating COVID-19 patients. In Peru, one study concluded that concern about COVID-19 contagion is a significant predictor of depression among nurses (Carranza et al., 2022a,b,c,d). Another study highlighted the profound impact of COVID-19 concern on anxiety, depression, and psychological distress among health sector workers in a Peruvian mountain region (Mamani-Benito et al., 2021). Internationally, a study in the USA demonstrated that COVID-19-related concern significantly correlated with more severe anxiety and depression symptoms among first responders (Vujanovic et al., 2021). In the general population, research from Georgia found that a heightened concern about COVID-19 was associated with elevated levels of mental disorders, including anxiety and depression (Makhashvili et al., 2020). Additionally, the findings of the present study align with research addressing the variable fear of COVID-19. For instance, a study in El Salvador reported that fear of COVID-19 moderately correlates with anxiety and slightly with depression in the adult population (Lobos-Rivera et al., 2022).

It was also found that there is no relationship between worry about infection and study satisfaction. While previous research (Gabrovec et al., 2022; Carranza et al., 2022a,b,c,d) reports that study satisfaction is related to anxiety and depression in the pandemic context, the discrepancy with these results can be explained by taking into account that the variable considered as a predictor is the worry for the transmission of COVID-19, since this variable, due to aspects linked to

TABLE 2 Descriptive statistics, internal consistency, and correlations for the study variables.

Variables	*M*	*DE*	A	α (IC 90%)	1	2	3	4
1.Worry for transmission	9.50	7.10	0.60	0.89 [0.87–0.90]	-			
2. Anxiety	10.20	8.40	0.60	0.77 [0.74–0.79]	0.43	-		
3. Depression	9.40	8.50	0.60	0.78 [0.75–0.80]	0.36	0.65	-	
4. Study satisfaction	17.60	7.90	−0.40	0.86 [0.84–0.87]	−0.05	−0.19	−0.31	-

All correlations are statistically significant ($p < 0.05$). Those correlations between study variables are highlighted.

own health, can be considered a normal and even adaptive response by an individual, as it can motivate the adoption of preventive behaviors before the disease. In this way, only when the concern about contracting COVID-19 is excessive, it can lead to harmful consequences for people's well-being and negatively affect their performance in different contexts, such as academia. Therefore, it is suggested that, in order to deepen the approach to the relationship between worry for transmission and study satisfaction, future research should consider other moderator variables, such as anxiety and depression, which, according to the evidence found, are the primary factors affecting the mental health of students.

This research has its limitations. Firstly, data were collected using a cross-sectional design, making it impossible to establish temporal causal relationships. Since no mental health indicators prior to the outbreak of the COVID-19 pandemic were considered, it is not feasible to verify if pre-existing symptoms of anxiety and depression are predictors of concern about COVID-19 contagion. Another limitation lies in the non-probabilistic nature of participant selection, which hinders the generalization of the results to the broader Peruvian university student population. However, the large sample size of this research supports the robustness of the obtained results. Lastly, data collection relied exclusively on self-report measures, which could introduce biases in the information gathered.

In light of these limitations, future research should delve deeper into the interaction and prediction of variables related to concern about COVID-19 and mental health, employing longitudinal designs. It is also suggested that future studies adopt stratified probabilistic sampling to gather information from diverse segments of Peru's regions. Furthermore, subsequent research should incorporate multi-method techniques to measure study variables, especially those tied to mental health, which can be discerned through clinical criteria.

In conclusion, the concern over COVID-19 transmission directly impacts anxiety and depression among Peruvian students, but not their satisfaction with their studies. The implications of these findings emphasize the provision of valuable information for educational institutions to monitor their students' mental health. It is pivotal to consider measuring the concern about COVID-19 as a strategy to identify risk factors potentially leading to symptoms of depression and anxiety in students. By doing so, interventions can be initiated to mitigate and curtail the adverse effects of COVID-19 on university students' mental health.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by the ethics committee of the César Vallejo University in Peru (N° 017-2022-CEIM-EPG/UCV). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

OM-B, RCE, and IC-R conceived and designed the experiments, performed the experiments, analyzed and interpreted the data, and wrote the paper. RC-B, SL-H, NG-D, and SH-V contributed materials, analysis tools, or data, and wrote the paper. All authors contributed to the article and approved the submitted version.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

References

Arrieta, K. M., Díaz, S., and González, F. (2014). Síntomas de depresión y ansiedad en jóvenes universitarios: prevalencia y factores relacionados. *Rev Clínica Med Fam.* 7, 14–22. doi: 10.4321/s1699-695x2014000100003

Ato, M., López, J. J., and Benavente, A. (2013). A classification system for research designs in psychology. *An Psicol [Internet].* 29, 1038–1059. doi: 10.6018/analesps.29.3.178511

Bai, W., Cai, H., Liu, S., Chen, X., Sha, S., Cheung, T., et al. (2021). Anxiety and depressive symptoms in college students during the late stage of the COVID-19 outbreak: a network approach. *Transl. Psychiatry* 11:638. doi: 10.1038/s41398-021-01738-4

BBC News Mundo. Cuarentena en Perú: 5 factores que explican por qué las medidas de confinamiento no impiden que sea el segundo país de América Latina con más casos

de covid-19. (2020). Available at: https://www.bbc.com/mundo/noticias-america-latina-52748764

Bentler, P. (1990). Comparative fit indices in structural models. *Psychol. Bull.* 107, 238–246. doi: 10.1037/0033-2909.107.2.238

Browne, M. W., and Cudeck, R. (1992). Alternative ways of assessing model fit. *Sociol. Methods Res.* 21, 230–258. doi: 10.1177/0049124192021002005

Carranza, R. F., Mamani-Benito, O., Caycho-Rodriguez, T., Lingán-Huamán, S. K., and Ruiz Mamani, P. G. (2022d). Psychological distress, anxiety, and academic self-efficacy as predictors of study satisfaction among Peruvian university students during the COVID-19 pandemic. *Front. Psychol.* 13:809230. doi: 10.3389/fpsyg.2022.809230

Carranza, R. F., Mamani-Benito, O. J., Quinteros-Zúñiga, D., and Farfán-Solís, R. (2021a). Preocupación por el contagio de la COVID-19 y carga laboral como predictores del malestar psicológico durante la emergencia sanitaria en personal de salud de Perú. *Rev Colomb Psiquiatr.*, 1–7. doi: 10.1016/j.rcp.2021.06.005

Carranza, R. F., Mamani, O., Turpo, J., Farfán, R., and Cutipa, N. (2021b). Preocupación por el contagio de la COVID-19 y carga de trabajo como predictores de la ansiedad en enfermeras peruanas. *Rev. Cubana Enferm.* 37:e4227, 539–552. doi: 10.14482/sun.37.3.614.5921

Carranza, R. F., Mamani-Benito, O., Quinteros-Zúñiga, D., Caycho-Rodríguez, T., and Blanco, S. D. (2022a). Preocupación por el contagio de la COVID-19, apoyo social en el trabajo y ansiedad como predictores de la depresión en enfermeras peruanas. *Salud Uninorte.* 37, 539–552. http://dx.doi.org/10.14482/sun.37.3.614.5921

Carranza, R. F., Mamani-Benito, O., Ruiz, P., and Mejia, C. (2022b). Escala de preocupación por el contagio de una variante de la COVID-19 (EPCNVCov-19). *Rev Cuba Med Mil.* 51:e02201714

Carranza, R. F., Mamani-Benito, O., Sarria-Arenaza, F., Meza-Villafranca, A., Paula Alfaro, A., and Lingan, S. K. (2022c). Translation and validation of the online homework distraction scale for Peruvian university students. *Front Educ.* 7, 1–7. doi: 10.3389/feduc.2022.793151

Carranza-Esteban, R., Mamani-Benito, O., Rodriguez-Alarcón, F., Corrales-Reyes, I., and Farfán-Solís, R. (2020). Escala de preocupación por el contagio de la COVID-19 en personal de la salud peruano. *Rev Colomb Psiquiatr.* 52, 38–44. doi: 10.1016/j.rcp.2021.03.006

Comercio, El. *Puno: fallecidos por COVID-19 superan el centenar de casos en la región región [Internet].* (2020). Available at: https://elcomercio.pe/peru/puno-fallecidos-por-covid-19-alcanza-los-100-casos-en-la-region-region-pandemia-coronavirus-covid-19-noticia/

De Oliveira, F., Abrantes, L., Martins, P., Bezerra, C., and Rolim, M. (2020). Impact of Sars-Cov-2 and its reverberation in global higher education and mental health. *Psychiatry Res.* 288:112977. doi: 10.1016/j.psychres.2020.112977

Ehring, T., and Watkins, E. R. (2008). Repetitive negative thinking as a Transdiagnostic process. *Int. J. Cogn. Ther.* 1, 192–205. doi: 10.1521/ijct.2008.1.3.192

Faul, F., Erdfelder, E., Buchner, A., and Lang, A. G. (2009). Statistical power analyses using G*power 3.1: tests for correlation and regression analyses. *Behav. Res. Methods* 41, 1149–1160. doi: 10.3758/BRM.41.4.1149

Gabrovec, B., Selak, Š., Crnkovič, N., Cesar, K., and Šorgo, A. (2022). Perceived satisfaction with online study during COVID-19 lockdown correlates positively with resilience and negatively with anxiety, depression, and stress among Slovenian postsecondary students. *Int. J. Environ. Res. Public Health* 19:7024. doi: 10.3390/ijerph19127024

Gestión, Diario. *Vacunación COVID-19: 55% de población objetivo ya tiene al menos una dosis.* (2021). Available at: https://gestion.pe/peru/vacunacion-covid-19-mas-del-55-de-la-poblacion-objetivo-ya-tiene-al-menos-una-dosis-nndc-noticia/?ref=gesr

Huarcaya-Victoria, J., Elera-Fitzcarrald, C., Crisol-Deza, D., Villanueva-Zúñiga, L., Pacherres, A., Torres, A., et al. (2021). Evidencias psicométricas de una escala de preocupación por el contagio de la COVID-19 en internos peruanos. *Rev. Cuba. Investig. Biomed.* 52:e1650, 236–244. doi: 10.1016/j.rcp.2021.06.002

Kroenke, K., Spitzer, R. L., and Williams, J. B. W. (2003). The patient health questionnaire-2: validity of a two-item depression screener. *Med. Care* 41, 1284–1292. doi: 10.1097/01.MLR.0000093487.78664.3C

Kroenke, K., Spitzer, R. L., Williams, J. B. W., Monahan, P. O., and Löwe, B. (2007). Anxiety disorders in primary care: prevalence, annals of internal medicine anxiety disorders in primary care: prevalence, impairment. *Ann. Intern. Med.* 146, 317–325. doi: 10.7326/0003-4819-146-5-200703060-00004

Liu, S., Liu, Y., and Liu, Y. (2020). Somatic symptoms and concern regarding COVID-19 among Chinese college and primary school students: a cross-sectional survey. *Psychiatry Res.* 289:113070. doi: 10.1016/j.psychres.2020.113070

Lobos-Rivera, M. E., Chacón-Andrade, E. R., Cervigni, M., Gallegos, M., Martino, P., Caycho-Rodríguez, T., et al. (2022). Psychological factors related to fear of COVID-19 in the general Salvadoran population. *Electron J Gen Med.* 19:em351. doi: 10.29333/ejgm/11550

Maguiña Vargas, C. (2020). Reflections on COVID-19 infection, Colegio Medico del Peru and the public health. *Acta Medica Peru.* 37, 8–10. doi: 10.35663/amp.2020.371.929

Makhashvili, N., Javakhishvili, J. D., Sturua, L., Pilauri, K., Fuhr, D. C., and Roberts, B. (2020). The influence of concern about COVID-19 on mental health in the republic of Georgia: a cross-sectional study. *Glob. Health* 16, 1–10. doi: 10.1186/s12992-020-00641-9

Mamani-Benito, O., Esteban, R. F. C., Ventura-León, J., Caycho-Rodríguez, T., Solís, R. F., and Shocosh, D. H. B. (2021). Effect of concern about COVID-19 on professional self-efficacy, psychological distress, anxiety, and depression in Peruvian health personnel. *Salud Ment.* 44, 215–220. doi: 10.17711/SM.0185-3325.2021.028

Mamani-Benito, O., Farfán-Solís, R., Tito-Betancur, M., Vinelli-Arzubiaga, D., Armada, J., and Mejía, C. (2022). Factores asociados a preocupación y miedo durante la COVID - 19 en practicantes preprofesionales de salud factors associated with worry and fear during COVID - 19 in preprofessional health practitioners. *Rev Cuba Med Mil.* 51:e02201707

McEvoy, P. M., Watson, H., Watkins, E. R., and Nathan, P. (2013). The relationship between worry, rumination, and comorbidity: evidence for repetitive negative thinking as a transdiagnostic construct. *J. Affect. Disord.* 151, 313–320. doi: 10.1016/j.jad.2013.06.014

Mejia, C. R., Rodriguez-alarcon, J. F., Ticona, D., Flores-lovon, K., Paredes-obando, M., Avalos-reyes, M. S., et al. (2021). Validation of a scale to measure the perception of SARS-CoV-2 vaccines acceptance: the VAC-COVID-19 scale. *Electron J Gen Med.* 18:em303. doi: 10.29333/ejgm/11012

Merino, C., Dominguez, S., and Fernández, M. (2017). Validación inicial de una escala breve de satisfacción con los estudios en estudiantes universitarios de Lima. *Educ Medica.* 18, 74–77. doi: 10.1016/j.edumed.2016.06.016

Muthén, L. K., and Muthén, B. O. (2017). *MPlus user's guide.* 8th ed. Los Angeles, CA: Muthén & Muthén.

Ran, L., Wang, W., Ai, M., Kong, Y., Chen, J., and Kuang, L. (2020). Psychological resilience, depression, anxiety, and somatization symptoms in response to COVID-19: a study of the general population in China at the peak of its epidemic. *Soc. Sci. Med.* 262:113261. doi: 10.1016/j.socscimed.2020.113261

Revuelta, E., Segura, E., and Paulino, J. (2010). Depression, anxiety and fibromyalgia. *Rev la Soc Española del Dolor.* 17, 326–332. doi: 10.1016/j.resed.2010.07.002

Rizun, M., and Strzelecki, A. (2020). Students acceptance of the COVID-19 impact on shifting higher education to distance learning in Poland. *Int. J. Environ. Res. Public Health* 17, 1–19. doi: 10.3390/ijerph17186468

Rosseel, Y. (2012). Lavaan: an R package for structural equation modeling. *J. Stat. Softw.* 48, 1–93. doi: 10.18637/jss.v048.i02

Ruiz, P. G., Morales-García, W. C., White, M., and Marquez-Ruiz, M. S. (2020). Properties of a scale of concern for COVID-19: exploratory analysis in a Peruvian sample. *Med. Clin. (Barc.)* 155, 535–537. doi: 10.1016/j.medcli.2020.06.022

Salari, N., Hosseinian-Far, A., Jalali, R., Vaisi-Raygani, A., Rasoulpoor, S., Mohammadi, M., et al. (2020). Prevalence of stress, anxiety, depression among the general population during the COVID-19 pandemic: a systematic review and meta-analysis. *Glob. Health* 16, 1–11. doi: 10.1186/s12992-020-00589-w

Son, C., Hegde, S., Smith, A., Wang, X., and Sasangohar, F. (2020). Effects of COVID-19 on college students' mental health in the United States: interview survey study. *J. Med. Internet Res.* 22:e21279. doi: 10.2196/21279

Van, P. G., Contino, C., Das, M., van Loon, P., and Bosmans, M. W. G. (2020). Anxiety and depression symptoms, and lack of emotional support among the general population before and during the COVID-19 pandemic. A prospective national study on prevalence and risk factors. *J. Affect. Disord.* 277, 540–548. doi: 10.1016/j.jad.2020.08.026

Ventura-León, J., Caycho-Rodríguez, T., Talledo-Sánchez, K., and Casiano-Valdivieso, K. (2022). Depression, COVID-19 anxiety, subjective well-being, and academic performance in university students with COVID-19-infected relatives: a network analysis. *Front. Psychol.* 13:837606. doi: 10.3389/fpsyg.2022.837606

Vujanovic, A. A., Lebeaut, A., and Leonard, S. (2021). Exploring the impact of the COVID-19 pandemic on the mental health of first responders. *Cogn. Behav. Ther.* 50, 320–335. doi: 10.1080/16506073.2021.1874506

Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C. S., et al. (2020). Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *Int. J. Environ. Res. Public Health* 17:1729. doi: 10.3390/ijerph17051729

Whitney, E., Moore, G., Petrie, T., and Slavin, L. (2022). College student-athletes' COVID-19 worry and psychological distress differed by gender, race, and exposure to COVID-19–related events. *J. Adolesc. Health* 70, 559–566. doi: 10.1016/j.jadohealth.2021.12.022

Yekefallah, L., Namdar, P., Panahi, R., and Dehghankar, L. (2021). Factors related to students' satisfaction with holding e-learning during the Covid-19 pandemic based on the dimensions of e-learning. *Heliyon.* 7:e07628. doi: 10.1016/j.heliyon.2021.e07628