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Validation of the Patient Health Questionnaire-9 (PHQ-9) in human medicine interns at a reference university in Peru during the COVID-19 pandemic

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VALIDATION OF THE PATIENT HEALTH QUESTIONNAIRE-9 (PHQ-9) IN HUMAN MEDICINE INTERNS AT AUNIVERSITY OF REFERENCE IN PERU DURING THE COVID-19 PANDEMIC

VALIDACIÓN DEL CUESTIONARIO SOBRE LA SALUD DEL PACIENTE–9 (PHQ-9) EN INTERNOS DE MEDICINA HUMANA DE UNA UNIVERSIDAD DE REFERENCIA DEL PERÚ DURANTE LA PANDEMIA COVID-19

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ABSTRACT

Introduction: Major depression currently generates a high burden of disease in the general population, which is usually higher in medical students. The Patient Health Questionnaire-9 (PHQ-9) is a widely used instrument in the general population to assess the severity of depression in primary care. **Objective:** To validate the factorial structure of the PHQ-9 questionnaire in human medicine interns at a reference university in Peru. **Methods:** An observational, cross-sectional, and instrumental design was used. We worked with a sample of 343 human medicine interns. From the responses to the questionnaire, Cronbach's alpha coefficient was calculated, as well as the factorial analysis to determine the construct validity of this instrument in the target population.**Results:** Cronbach's alpha coefficient was 88.2%, and the item/test correlation coefficients presented values higher than 0.5. A value greater than 0.05 was obtained for the chi2 goodness-of-fit test for the model, as well as results greater than 0.9 for the model's goodness-of-fit coefficients. **Conclusion:** The factorial structure of the PHQ-9 has adequate validity and reliability in the population of human medicine interns.

Keywords: Validation Study; Medicine students; Depression; Factor Analysis. (Source: MeSH NLM)

RESUMEN

Introducción: En la actualidad el trastorno de depresión mayor genera una alta carga de enfermedad en la población general, la cual suele ser mayor en estudiantes de medicina. El cuestionario de salud del paciente-9 (PHQ-9) es un instrumento ampliamente utilizado en la población general para evaluar la severidad de la depresión en atención primaria. **Objetivo:** Validar la estructura factorial del cuestionario PHQ-9 en internos de medicina humana de una universidad de referencia del Perú. **Métodos:** Se empleó un diseño observacional, transversal e instrumental. Se trabajó con una muestra de 343 internos de medicina humana. A partir de las respuestas del cuestionario se calculó el coeficiente alfa de Cronbach, así como el análisis factorial para determinar la validez de constructo del presente instrumento en la población objetivo. **Resultados:** El coeficiente alfa de Cronbach fue de 88.2%, los coeficientes de correlación ítem/test presentaron valores superiores a 0,5. Se obtuvo un valor superior a 0,05 para la prueba chi2 de bondad de ajuste para el modelo, así como resultados superiores a 0,9 para los coeficientes de bondad de ajuste del modelo. **Conclusión:** La estructura factorial del PHQ-9 posee una validez y confiabilidad adecuada en la población de internos de medicina humana.

Palabras clave: Estudio de Validación; Estudiantes de Medicina; Depresión; Análisis Factorial. (Fuente: DeCS BIREME)

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INTRODUCTION

Depressive disorders are among the most frequent mental disorders in the general population, and their impact extends to various areas such as personal, social, and occupational[1,2]. In addition, depression is among the main causes of the global disease burden, and its prevalence continues to increase[1,3]. In 2018, depression became the biggest contributor to disability worldwide, accounting for 7.5% of all years lived with disability [1]. In Peru, neuropsychiatric disorders represent the leading cause of health burden. Within them, depression generates the highest disease burden with an estimated 224,535 disability-adjusted life years, a prevalence of 6.4%, and greater affectation on women than men[4,5].

It has been reported that the prevalence of depression in certain population groups, such as medical students, can be significantly higher than in the general population [2,6] , reaching prevalences between 2.2 and 5.2 times higher than for peers from the same population and age of the general population [7]. A meta-analysis that included studies from 47 countries found a prevalence of depression of 22.7% and suicidal ideation of 11.1% in medical students, which exceed those estimated in the general population [7]. Likewise, other studies reveal that academic performance is an important factor related to depression [2,8] , where it is estimated that the relationship can be bidirectional, causing a vicious circle.

The different scales designed to assess depression include those conducted by doctors and those self-reported. Among these, the Patient Health Questionnaire-nine (PHQ-9) stands out, an instrument consisting of nine items designed to assess and monitor the severity of depression, self-administered in primary care and other settings[9] . The items included a focus on the diagnostic criteria of the Diagnostic and Statistical Manual of Mental Disorders in its fourth edition (DSM-IV), although in its latest version (DSM-5), the depressive disorders working group considered including the PHQ-nine as a measure of severity for the diagnosis of major depression[9] . Although the PHQ-9 is based on the information reported by the subject, the tool has shown good sensitivity and specificity in various studies, taking a score of ten as a cut-off point when compared with the diagnosis made by the patient-trained professionals using reference methods [2,10,11].

These characteristics make the PHQ-nine a very useful instrument in medical education scenarios since it is quick to apply and provides good reliability results. In support of this last point, a recent study on medical students from Peru, in a pre-pandemic context, reported adequate internal consistency (Cronbach's alpha = 0.903) and adequate psychometric properties to be applied to medical students [12]. However, to date, there are no national validation studies of this scale in medical interns in the context of the COVID-19 pandemic. Therefore, this study aims to validate the factorial structure of the PHQ-nine questionnaire in human medicine interns at a reference university in Peru in the context of the COVID-19 pandemic.

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METHODS

Study design and area

An observational, descriptive, cross-sectional, instrumental-type study was conducted at a private university in the city of Lima, Peru[13] .

Population and sample

The population consisted of 343 students from the Universidad Privada San Juan Bautista attending a medical internship during the year 2021. As selection criteria, students who had completed the questionnaire and duly signed the informed consent were included students who are doing some university exchange rotation and who have withdrawn from the academic semester.

343 medical interns were included in the study, taking into consideration the optimal sample size to perform a factorial analysis, which is recommended to be greater than 200[14] ; a simple random sampling was carried out, without replacement, using the epidemiological package of free access Epidat version 4.2.

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Variables and instruments

The Patient Health Questionnaire (PHQ-9) scale consists of 9 items according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) criteria, which are directly related to depressive symptoms in the last two weeks before self-assessment. Each item is scored on a Likert scale ranging from zero to three for nine and almost every day, respectively. According to the score obtained (zero to 27 points), five degrees of severity of the depressive disorder are reflected. These grades are none (zero to 4), mild (five to 9), moderate (ten to 14), moderately severe (15-19), and severe (20-27)[26,27].

Procedures

A virtual questionnaire was used through the Google Forms application, self-administered by the study subject, through the WhatsApp social network. The data collected were transferred to the statistical package SPSS version 26, where the statistical tests were performed.

Statistical analysis

The mean and standard deviation of the quantitative variables and the relative and absolute frequency of the qualitative variables of the target population were reported. Univariate descriptive statistics for each item, mean and standard deviation, as well as the item-test correlation, were evaluated, taking a Rho coefficient ≥ 0.3 as an acceptable value.

Cronbach's Alpha coefficient was used as an estimator of internal consistency to determine the reliability of the model.

To validate the hypothesized one-dimensional model, a confirmatory factor analysis was used, determining the goodness of fit by reporting the P-value of the chi-square statistical test of goodness of fit, with values greater than 0.05 indicating a good fit of the model, the ratio of the chi square statistic and its degrees of freedom (CMIN/DF) with values < three indicating an acceptable fit and < five a reasonable fit, as well as the Goodness of Fit Indices (GFI), Tucker Lewis (TLI) and comparative fit (CFI) where values > 0.9 indicate a good fit of the model; the mean square error of approximation (RMSEA) was calculated considering values less than 0.01, 0.05 and 0.08 as excellent, good and mediocre fit respectively, their respective confidence intervals at 90% and P-value, where the latter, by providing a p-value >0.05, represents a good fit to the model [15,16]; the square root of the squared mean of the standardized residual (SRMR) values between 0.00 and 0.08 are taken as acceptable ranges. [17]. Finally, structural equation modeling was performed to represent the one-dimensional construct of the scale.

Ethical aspects

This article was approved by the Faculty of Medicine of the Universidad Privada San Juan Bautista and the ethics committee of the same faculty. Likewise, to comply with the statutes given in the Declaration of Helsinki, the absolute anonymity of each of the subjects who participated in the study was respected.

RESULTS

The item/test correlation coefficients presented optimal values greater than 0.5 for each of the nine items, the lowest coefficient being item number eight with 0.537 and item number seven the highest with 0.707 (Table 1).

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Table 1. Correlación ítem/test.

Ítems	Correlation item / test
Ítem 1	0.592
Ítem 2	0.625
Ítem 3	0.612
Ítem 4	0.671
Ítem 5	0.654
Ítem 6	0.662
Ítem 7	0.707
Ítem 8	0.537
Ítem 9	0.633

The confirmatory factor analysis was used to determine the goodness of fit of the unidimensional model in which the chi2 goodness of fit test presented a p-value greater than 0.05 and the Chi2/gl coefficient presented a value less than five. In turn, the values for the coefficients of the goodness of fit (GFI), Tuker Lewis (TLI), and comparative fit (CFI) gave results greater than 0.9. The RMSEA showed an optimal fit for the model, presenting values lower than 0.05 and a P-value > 0.05. Likewise, the SRMR gave a value of 0.042. The results of these statistical tests are summarized in Table 2, presenting the goodness-of-fit coefficients of the two-dimensional model. In addition, one-dimensional structural modeling of the PHQ-9 scale was carried out, including each of the items and the dimension evaluated. (Figure 1)

Table 2. Pruebas y coeficientes de bondad de ajustes el modelo unidimensional de la escala PHQ-9.

Pruebas de Ajuste	Modelo Unidimensional	Modelo bidimensional
P-valor Chi2	<0,001	<0,001
Ratio Chi2 / gl	3,10	3,78
RMSEA (IC-90%)	0,078 (0,060 – 0,098)	0,09 (0,069 – 0,113)
SRMR	0,042	0,045
GFI	0,948	0,947
TLI	0,939	0,921
CFI	0,954	0,947
AIC	6289,617	6361,104

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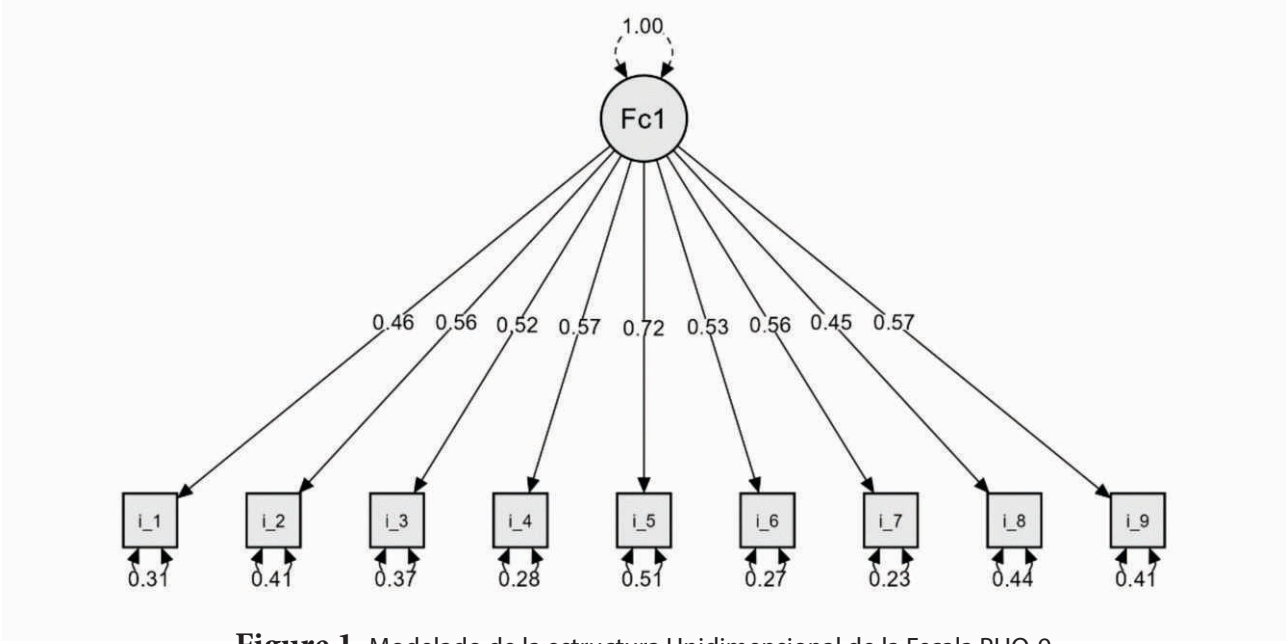

Figure 1. Modelado de la estructura Unidimensional de la Escala PHQ-9.

DISCUSSION

This study sought to validate the factorial structure of the Patient Health Questionnaire-nine (PHQ-9) in human medicine interns at a reference university in Peru. The results determined a good fit for the one-dimensional model, whose coefficients of the goodness of fit as the AIC, showed a value of 6289.617. In addition to this, through Cronbach's alpha coefficient, a value of 0.882 was obtained for internal consistency, reflecting a consistent estimate. On the other hand, the GFI, TLI, and CFI obtained values of 0.948, 0.939, and 0.954, respectively. This last value indicates that the model can reproduce at least 90% of the covariance in the data. Likewise, both the RMSEA and SRMR indexes yielded values of 0.078 (<0.08) and 0.042 (0<05), indicating a good fit for the model, respectively.

The value of internal consistency obtained (Cronbach's alpha: 0.882) was analogous to a study at the Latin American level in medical students from Colombia (Cronbach's alpha: 0.830), while at the international level, a study in Korea showed an alpha Cronbach's of 0.837 [18,19]. On the other hand, in a sample of students not studying medicine in China and Korea, values of 0.854 and 0.83, respectively, were found [20,21]. Additionally, a study carried out by Arturo CM, et al [22] validating the PHQ-nine in adults from a primary care center reported a value for Cronbach's alpha of 0.80. However, a study carried out in Peru, applied to medical students, showed a higher value than the one reported (0.903) [23]. Given these data, it is important to consider that the previously mentioned studies, both nationally and internationally, did not report the value of the AIC, unlike our study (6289.617). The lower the AIC value for the instrument, it is considered the best model to choose, but a contrast with other models of one or more dimensions is required [24].

Confirmatory factor analysis determined that the factor structure and internal consistency fit the original (one-dimensional) model of the Patient Health Questionnaire-nine (PHQ-nine) in human medicine interns. These findings are similar to studies previously carried out in Asia [18,20,21], while, at the Latin American level, both Peru and Colombia validated a bifactorial model [19,23].

It is important to consider that this study adds to the few that exist at the national level on validating the construct in human medicine interns. Therefore, it is also necessary to consider that the instrument was designed for outpatients. After the above, there are some limitations.

First, only students from a single university house were included, therefore, the data cannot be completely generalized to interns from other houses of study. Second, the nature of the study, the inmates may show varying degrees of depression or other associated pathologies depending on the previous or current situation that is happening, and there may be ntervening variables not considered as the history of mental illness. Finally, there was no control group. In the future, it is recommended to carry out longitudinal icohort studies, including a multicenter sample, and carry out more validation studies due to its scarcity in this population and high prevalence[25].

CONCLUSION

This study demonstrated that the PHQ-9 questionnaire has adequate validity and reliability in the population of medical students. These findings could help screen for depression in this population and thus be able to carry out interventions early to avoid consequences that limit the performance of health personnel.

Authorship contributions: Efraín Antonio Cehua Alvarez: Conception and design of the article; Data analysis and interpretation; Writing of the article; Approval of the final version Horus Viru-Flores: Collection of results; Writing of the article; Approval of the final version Joseph Alburqueque-Melgarejo: Collection of results; Writing of the article; Approval of the final version Juan Carlos Roque-Quezada: Conception and design of the article; Data analysis and interpretation; Approval of the final version Jamee Guerra Valencia: Writing the article; Critical review of the article; Approval of the final version Geremi Alexander Gonzales Matta: Writing the article; Approval of the final version Magdiel José Manuel Gonzales Menéndez: Writing the article; Critical review of the article; Approval of the final version David Alfonso Laván Quiroz: Writing the article; Critical review of the article; Approval of the final version.

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