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Psychometric Properties of the General Health Questionnaire (GHQ-28) in Ecuadorian College Students

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Abstract

Objective: To analyse the internal structure of the 28-item version of the General Health Questionnaire (GHQ-28), as well as its reliability and validity in relation to other variables in a sample of Ecuadorian university students. *Method:* Instrumental design with confirmatory factor analysis using weighted least square mean and variance adjusted (WLSMV) estimator, reliability and convergence and discrimination validity of the GHQ-28. *Sample:* 495 students (56.6% women), between 18 to 35 years old (M = 24.1 years; SD = 2.1), from three universities (59.6% public) in Ecuador. *Results:* The bifactor model of the GHQ-28 test has an adequate fit with χ^2 = 357.81; p > .05; df = 322; χ^2/df = 1.11; CFI = .991; TLI = .989; SRMR = .059; RMSEA = .015 [.000 – .023]; ω_H = .93; ECV = .90; PUC = .78. The GHQ-28 is reliable and in terms of convergent validity, it correlates significantly and negatively with mental health, assessed by MHC-SF, and it is discriminant between risk and non-risk cases. *Conclusion:* The GHQ-28 bifactor model is replicable in Ecuadorian college students.

Keywords: bifactor model, factor analysis, mental health, reliability, validation

Introduction

Health is a state of complete biological, psychological, and social well-being of individuals, and not only the absence of disease (World Health Organization [WHO], 1946). Thus, mental health is a key component for the development of well-being

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and balance in the remaining spheres (Vera-Villarroel et al., 2016; WHO, 2001). In addition, it is related to the subjective assessment of one's own state in general (introspection), coping with stress, productivity and, contribution to the community (WHO, 2014), therefore, without mental health there is no true health in general (Prince et al., 2007; Moreta-Herrera et al., 2018).

Mental health care is important for an optimal lifestyle, although it is generally underestimated (Walsh, 2011). It is also an important factor in the outcomes of educational processes (Cornaglia et al., 2015). In this respect, school populations (including university ones) are vulnerable in terms of balanced mental health. University students, although expected to be healthy, are not completely healthy (Khodarahimi & Fathi, 2016) and they are at risk for mental problems (Hope & Henderson, 2014; Saleh et al., 2017; Tran et al., 2017), performance difficulties, social adaptation challenges (Berlin et al., 2012; Lipson et al., 2015), productivity issues (Mayorga-Lascano & Moreta-Herrera, 2019) and others. Therefore, constant monitoring of these groups is important for good control and care of their health.

As in other populations, a difficulty at mental health monitoring in college students is the lack of adequate assessment tools (Prady et al., 2013; Moreta-Herrera, Perdomo-Pérez et al., 2021). Although there are self-report tests, many lose reliability and validity due to an excessive precision bias or measurements not properly calibrated and standardized. For example, some repeated problems are the absence of monitoring of the structural configuration of a measure over time and the lack of adaptation to the characteristics (culture, language, age group, others) of the population. This is the case of the Ecuadorian population, where research on mental health is scarce (Contreras et al., 2017; Moreta-Herrera, Zambrano-Estrella et al., 2021) and on assessment tools such as the General Health Questionnaire (GHQ, Goldberg, 1978) which, although widely used, does not count with extensive research on its psychometric properties both in Ecuador and in Latin American region.

The General Health Questionnaire and the Question of its Measure

The General Health Questionnaire (GHQ) is an instrument frequently used worldwide to assess the perception of health and the risk of psychopathology in primary health care (Goldberg, 1978). It has different versions (12, 17, 28, and 60 items) and translations in more than 38 languages (Sterling, 2011), Spanish included (Lobo et al., 1986). The 28-item version (GHQ-28) is the most well-known and popular version of the GHQ, which possess four factors: a) *Somatic symptoms* (items 1 to 7); b) *Anxiety/insomnia* (items 8 to 14); c) *Social dysfunction* (items 15 to 21) and d) *Severe depression* (items 22 to 28) (Goldberg & Hillier, 1979), and it is rated based on a four-option scale. The evaluation mechanism varies in terms of the identification of discomfort conditions, whether recent or chronic, according to evaluation needs.

Although studies that analyse the structure of four factors of the GHQ-28 stand out, most of them only use exploratory factor analysis (EFA) (Galindo et al., 2017; Lobo et al., 1986; Vallejo et al., 2014). Even when this technique is acceptable for a test validation process, according to Classical Test Theory (CTT), it is not enough (Batista-Fogueta et al., 2004) since it does not provide enough evidence to validate the construct. Therefore, confirmatory factor analysis (CFA) through structural equations model (SEM), is required to obtain more precise data of the factorial validity of a test (Ferrando & Anguiano-Carrasco, 2010).

CFA as a technique in the analysis of GHQ-28 is unusual and rarely used in recent scientific literature. Certain studies stand out, and most of them confirm the four-dimensional model in clinical samples such as in Spain (Pérez et al., 2010), South Africa (de Kock et al., 2014), Iran (Ghanbarnejad et al., 2013) and in a general Norwegian sample without an adequate adjustment (Hjelle et al., 2019). There is also a study on a 17 items version (items 5, 6, 7, 8, 9, 14, 20, 21, 22, 27, 28 eliminated) carried out in a multi-ethnic population residing in England (British, Pakistani, Urdu, others) with indicators of good fit (Prady et al., 2013). However, studies within college samples are difficult to find, and in the case of Latin America and Ecuador, they are non-existent, despite the widespread use of the GHQ-28 for empirical research (Garrido & Delgado, 2017; Zapata & Giraldo, 2012).

To date, current reports do not provide enough evidence about the adequacy of the factor structure of the GHQ-28 using SEM. It is also uncertain whether or not the four-dimensional configuration for this test is ideal. Likewise, former studies are limited in terms of specifying procedures regarding preliminary criteria such as multivariate normality, the configuration of the scale of measurement of the items and, the estimators for CFA, elements that are usually part of the current scientific debate around instrumental validation (Li, 2016). Although it is usual to obtain a global score through the sum of all the items, current psychometric evidence does not support the existence of a latent general factor that groups all the items of the GHQ-28, and this could generate problems in the interpretive capacity of the measure. It should be considered that the specific factors evaluate different psychological symptoms (somatization, anxiety-insomnia, social dysfunction, and depression), so it is necessary to analyse whether the GHQ-28 has a bifactorial structure behind it (Chen et al., 2006; Holzinger, 1937). That is, to check the existence of a general factor (GF) that accounts for the similarity between the factors of the scale; and on the other hand, of multiple specific factors (SF) that explain their particular influence over the general factor (Chen et al., 2013). A bifactor solution of GHQ-28, which has not previously been explored in the scientific literature, could enhance the versatility of the test for both research and diagnosis.

Regarding the exploration of other psychometric properties of the GHQ-28, unlike factorial validity, there is solid evidence about the reliability of the instrument in different samples around the world and within college students (de Kock et al., 2014; Galindo et al., 2017; Ghanbarnejad et al., 2013; Hjelle, Bragstad, Zucknick et

al., 2019; Lobo et al., 1986; Pérez et al., 2010; Vallejo et al., 2014). However, as proposed by Batista-Fogueta et al. (2004), reliability is a property that must be explored after verifying factorial validity; in consequence, many of these studies could be discarded. Within convergence validity, the GHQ-28 positively converges with tests that assess the perception of health such as the SF-36 in low and moderate ranges (Failde et al., 2000) and also with assessment tools of anxiety and depression (Chen et al., 2010).

The presence of gaps in empirical and methodological studies regarding the performance of the GHQ-28 is evident. Instrumental exploration of the GHQ-28 requires more validation methods (especially CFA through SEM) since previous methods applied in the scientific literature are not enough to confirm the adequate adjustment of the four dimensions model or even of new configurations in Latin American and Ecuadorian university populations. Therefore, research about the psychometric properties of this assessment tool will contribute to enhancing the knowledge around the validity of the GSQ-28, especially around the invariability of the proposed model when confronted with cultural and linguistic particularities of assessed populations, giving greater confidence to the test for future evaluations and diagnoses.

Objectives and Hypotheses

The objectives of the study are a) to confirm the best model fit (four factors and bifactor) of the GHQ in its 17 and 28 items versions, in a sample of Ecuadorian college students. As H1, it is estimated that the bifactor model with 28 items has an adequate fit; b) to identify the reliability of the GHQ. As H2, reliability is considered to be acceptable and greater than .80; c) to ratify convergence validity of the GHQ-28 by means of the MHC-SF test. As H3 it is assumed that the test has moderate convergence validity ($r > .60$).

Methodology

Participants

The sample corresponded to 495 students; 56.6% are women, between 18 and 35 years, with a mean age of $M = 24.1$ ($SD = 2.1$); 90.1% define themselves as mestizos (Aboriginal descendants with Europeans or Asians), while 9.9% are indigenous and Afro-Ecuadorian. Regarding place of residence, 85.9% come from urban sectors and 14.1% from rural areas; and 19% of the participants present a socio-economic risk due to difficulties in their families. Students are currently attending 13 different undergraduate careers at three universities (59.6% public) of Tungurahua and Cotopaxi in Ecuador; 12.3% present academic risk due to low performance, while 13.5% pay their studies through financial aids and scholarships.

Selection of the participants was carried throughout a non-probability convenience sampling with the following inclusion criteria: a) Students above legal age; b) Legally registered and with regular attendance; c) Voluntary participation; d) Proper physical and mental state to carry out the evaluation and e) Written and signed consent to participate in the study.

Instruments

28-item *General Health Questionnaire* (GHQ-28, Goldberg, 1978) in its Spanish version by Lobo et al. (1986). This instrument assesses the general perception of health, based upon 28 items on a four-option scale. The responses are analysed based on four subscales: a) Somatization, b) Anxiety-insomnia, c) Social difficulties and d) Depression. There are several methods to score the GHQ-28, one of these is the binary method, which assigns 0 points for the answer options "*Not at all*" and "*No more than usual*"; and one point for the answer options "*Rather more than usual*" and "*Much more than usual*". Using this method, a total score greater than 4 indicates the presence of a psychiatric case. In the current scientific literature, reliability of Cronbach´s $\alpha = .94$ (Vergara-Moragues & González-Saiz, 2020) and $\alpha = .95$ (Gibbons et al., 2004) has been reported.

Mental Health Continuum-Short Form (MHC-SF, Keyes, 2005) in its Spanish version of Echeverría et al. (2017). Designed to assess the positive perception of mental health in a 14 items questionnaire completed on a five-options Likert scale, where 1 is *never* and 5 is *always*. The MHC-SF has three subscales that assess emotional, psychological and social well-being. It is a scale of regular use in academic research, with several translations and adaptations in different countries and languages such as Polish, Arabic, Armenian, Russian, Flemish, French, Portuguese, Bulgarian and others (Karaś et al., 2014; Żemojtel-Piotrowska et al., 2018) with an adequate fit of a three dimensions model. Recently there is an adaptation to the Ecuadorian population, with an adequate adjustment and reliability of McDonald's $\omega = .93$ equivalent to high (Contreras et al., 2017). Since it measures the perception of mental health, it will be used to analyse convergence validity in this study.

Procedure

After the authorization of the educational centres, voluntary participation of the students was requested to be part of the project. First, interested students received information about the objectives, the form of participation, and the treatment that will be given to the information provided by them and then they signed the respective letters of consent in order to participate in the study. Participants completed the questions of each test in their classrooms under the supervision of the research project staff. Once the evaluation was completed, data were refined and only those evaluations with complete information were considered. It should be noted that this

report is part of the research project called: *"The current state of mental health of college students in Cotopaxi and Tungurahua"* which was reviewed and approved by the Psychology faculty of the Pontificia Universidad Católica del Ecuador Sede Ambato and it followed the guidelines suggested by the Helsinki convention on ethical care for research.

Data Analysis

This study applied an instrumental design (Ato et al., 2013) to confirm the adjustment of the bifactor structure of the GHQ-28 (Goldberg, 1978) in a sample of Ecuadorian college students, as well as its reliability and convergence and discriminant validity.

Statistical treatment of data is divided into three blocks. The first block corresponds to a preliminary analysis of the items, including mean (*M*), standard deviation (*SD*), skewness (*g*1), and kurtosis (*g*2). In addition, univariate normality assumption is verified when the values of *g*1 and *g*2 are within the parameter ± 2 (Field, 2009). Also, multivariate normality was checked, which is fulfilled when values of skewness and kurtosis are not statistically significant ($p > .05$) in the Mardia test (1970).

The second block comprises the CFA of the GHQ-28 to know the fit presented by the four-dimensional and 28-item model. WLSMV estimator is used through a matrix of polychoric correlations. This is the most suitable method for categorical variables without multivariate normality (Li, 2016). In CFA, absolute fit indices are analysed such as the Chi-Squared (χ^2), normed Chi-Squared (χ^2/df) and the Standardized Mean Square Residual (SRMR); also, relative fit indices such as the Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI); finally, non-centrality based index such as the Mean Square Error of Approximation (RMSEA). A factor model is considered to have an adequate fit when the χ^2 is not significant ($p > .05$), the χ^2/ df is less than 4, SRMR and RMSEA are less than .08 and CFI and TLI are higher than .90 (Byrne, 2008; Brown, 2015; Jonason et al., 2020; Yang-Wallentin et al., 2010). Factor loadings (λ) of the model with the best fit were also analysed to verify that the saturation of the items in each factor contributes significantly to the analysed model and that its explained variance is more consolidated. Saturations equal to or greater than .5 are considered adequate (Dominguez-Lara, 2018).

In addition, the presence of high intercorrelations between factors and good fit indices, suggests that the relationship in the dimensions can be explained by the presence of a general factor (GF), which explains a greater variance of the items with respect to specific factors (SF) (Dominguez-Lara & Rodriguez, 2017), therefore, the existence of a GF can be hypothesized. In order to analyse this, specific indices such as the Omega hierarchical for the general factor (ω_H) and the specific factors (ω_{Hs}), Explained Common Variance (ECV), and the Percent of Uncontaminated Correlations (PUC) are used. It is accepted that a bifactor model presents a good fit

when ω_H is > .70; ECV > .60 and PUC > .70 (Reise et al., 2013; Rodriguez et al., 2016; Smits et al., 2015).

After that, reliability was analysed through the Omega coefficient (ω, McDonald, 1999; Ventura-León & Caycho-Rodríguez, 2017), with a 95% confidence interval (95% CI, Padilla & Divers, 2013). On the other hand, convergence validity was analysed using the MHC-SF, to identify the approximation that the GHQ has with the construct "general health" through the Pearson coefficient (*r*); and discriminant validity comparing participants identified as part of a "risk group" by means of the MHC-SF versus patients identified as being in the "non-risk group", using the Student's *t*-test for independent samples.

Statistical treatment of the results was carried out using the R software in its version 4.0 (R Core Team, 2019) with the MNV, Lavaan, and MBESS packages; and the IndicesBifactor.xls module for the bifactor fit indices (Dominguez-Lara & Rodriguez, 2017).

Results

Preliminary Analysis

Table 1 shows the results of the means obtained in each of the 28 items. It is also evident that the mean scores are homogeneous between items and that it fluctuates between *M* = 0.13 for items 22, 23, 24, 25, and 26; and *M* = 0.30 for items 2 and 3.

On the other hand, it can be seen that items 12, 15, 17, 19, 20, 21, 22, 23, 24, 25, 26, 27, and 28 exceed the critical number of ± 2 in the values of g_1 or g_2, this suggests that there is no univariate normality among scores. Regarding multivariate normality between the items, Mardia tests for skewness and kurtosis report significance ($p < .05$), therefore this assumption is not fulfilled.

Table 1

Preliminary Analysis of the GHQ-28 Items

Items	*M*	*SD*	g_1	g_2
Item 01	0.24	0.43	1.23	-0.48
Item 02	0.30	0.46	0.86	-1.27
Item 03	0.30	0.46	0.88	-1.23
Item 04	0.24	0.43	1.21	-0.55
Item 05	0.25	0.43	1.14	-0.70
Item 06	0.27	0.45	1.02	-0.96
Item 07	0.26	0.44	1.12	-0.75
Item 08	0.23	0.42	1.29	-0.35
Item 09	0.23	0.42	1.26	-0.42

Items	*M*	*SD*	g_1	g_2
Item 10	0.27	0.45	1.01	-0.98
Item 11	0.25	0.43	1.14	-0.70
Item 12	0.20	0.40	1.54	0.36
Item 13	0.26	0.44	1.11	-0.78
Item 14	0.21	0.40	1.46	0.13
Item 15	0.20	0.40	1.52	0.31
Item 16	0.21	0.41	1.41	0.00
Item 17	0.18	0.39	1.64	0.68
Item 18	0.20	0.40	1.50	0.26
Item 19	0.19	0.39	1.60	0.57
Item 20	0.18	0.39	1.64	0.68
Item 21	0.18	0.39	1.65	0.74
Item 22	0.13	0.34	2.19	2.81
Item 23	0.13	0.33	2.27	3.17
Item 24	0.13	0.33	2.27	3.17
Item 25	0.13	0.34	2.22	2.92
Item 26	0.13	0.33	2.24	3.05
Item 27	0.14	0.34	2.14	2.58
Item 28	0.17	0.38	1.75	1.05
		Mardia	57009.9^{***}	469.6^{***}

Note. M – Arithmetic mean; *SD* – Standard Deviation; *g*1 – Skewness; *g*2 – Kurtosis. $^{***}p < .001$.

Confirmatory Factor Analysis

Table 2 shows the results of the CFA of GHQ-28. Here four models were tested. The first corresponds to the model of four correlated factors of 28 items (Goldberg, 1978), the second model corresponds to the short version of 17 items (GHQ-17, Prady et al., 2013). High intercorrelations between factors in models 1 and 2 allow us to hypothesize the presence of a general factor (GF) that would better explain the behaviour of the items, so a third and fourth model of the two previous versions were tested as bifactor models: with a GF and four SF.

Within the analysis of the models, it is observed that the models with correlated factors with 17 and 28 items, as well as the bifactor model of 28 items present good fit indicators, except for χ^2, which presented significance in models 1 and 2. However, a better fit can be found in the 28-item bifactor model. Absolute Fit Indices (χ^2, χ^2/df, and SRMR), Relative Fit Indices (CFI and TLI) and non-centrality-based index (RMSEA) of this model are within adequate parameters suggesting that this model is suitable for Ecuadorian college students.

Table 2

Confirmatory Factor Analysis of GHQ-28

Models	χ^2	*df*	χ^2/df	CFI	TLI	SRMR	RMSEA
28 items – 4 factors	694.95***	344	2.02	.910	.900	.041	.045 [.041 - .050]
17 items – 4 factors	261.99***	113	2.31	.940	.920	.034	.052 [.044 - .060]
28 items – Bifactor	357.81	322	1.11	.991	.989	.059	.015 [.000 - .023]
17 items – Bifactor	90.99	102	0.90	1.00	1.01	.048	.000 [.000 - .017]

Note. χ^2 – Chi square; *df* – degrees of freedom; χ^2/df – normed Chi square; CFI – Comparative Adjustment Index; TLI – Tucker-Lewis Index; SRMR – Standardized Mean Square Residue; RMSEA – Mean Square Error of Approximation. $^{***}p < .001$.

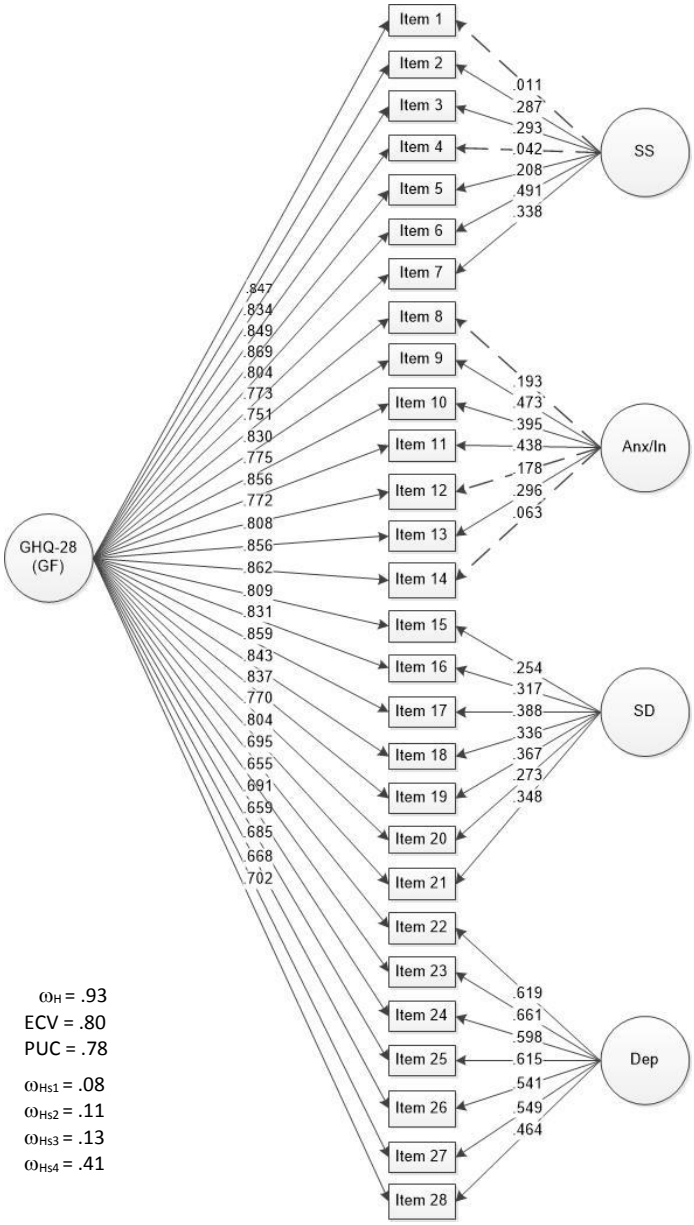
In addition, Figure 1 shows factor loadings (λ) of the items of both the GF that groups all the items, and the SF. In this regard, the GF presents better saturation of the items, which fluctuate between $\lambda_4 = .869$ and $\lambda_{23} = .655$, and being above .50, this allows a better explanation of the variance, thus contributing significantly to the model unlike the saturations of the SF. Likewise, in the specific fit indices for bifactor models, the values of ω_H, EVC and PUC are within the expected parameters, so a GF would better explain the general health model with 28 items.

Reliability and Convergence Validity

Given that the configuration of a general factor and four specifics factors that explain the items of the GHQ-28 is evident, its integral reliability is analyzed, which is equivalent to very high and therefore adequate for Ecuadorian college students. Convergence validity is also verified, as observed in Table 3, through the MSC-SF test. GF of the GHQ-28 and the four SF converge significantly ($p < .05$) in a moderate and negative way with a similar test when measuring the construct "mental health". It is estimated that the GHQ-28 is a useful instrument for this population.

Figure 1

GHQ-28 Bifactor Model with One General Factor and Four Factors



Note. The circles show the latent variables, while the rectangles show the observable variables along with the saturations. SS – Somatic symptoms; Anx/In – Anxiety and Insomnia; SD – Social Dysfunction; Dep – Depression; ωH – Hierarchical Omega; ECV – Explained Common Variance; PUC – Percentage of uncontaminated correlations; ωHs – Hierarchical Specific Omega.

Table 3

Analysis of Validity of Convergence and Reliability of the GHQ-28

Variables	Som	A-I	SD	Dep	GHQ-28
Emotional Well-being	-.64**	-.67**	-.53**	-50**	-.64**
Social Welfare	-.62**	-.64**	-.49**	-.45**	-.61**
Psychological Well-being	-.64**	-.68**	-.49**	-.48**	-.63**
Keyes Well-being Scale	-.67**	-.70**	-.53**	-.50**	-.66**
Reliability (ω; IC [95%])	.949 [.939-.959]	.957 [.948-.966]	.962 [.952-.971]	.963 [.952-.975]	.981 [.978-.984]

Note. ω – McDonald coefficient; CI – Confidence Intervals; Som – Somatization; A-I – Anxiety/ insomnia; SD – Social disfuntion; Dep – Depressión; GHQ-28 – General Health Questionnarie-28. $^{**}p < .01$.

Discussion

The goals of this study were to verify the internal structure of the GHQ-28, as well as the reliability and validity due to its association with other variables in a sample of Ecuadorian college students. Regarding the evidence of validity from the analysis of its internal structure, results suggest that the factorial model of four correlated dimensions of the GHQ-28 and GHQ-17 present an adequate adjustment in the sample of Ecuadorian college students based on absolute fit indices (χ^2, χ^2/df, and SRMR), relative fit indices (CFI and TLI) and non-centrality based index (RMSEA) (Byrne, 2008; Brown, 2015; Yang-Wallentin et al., 2010). Findings of this study are similar to preliminary studies carried out in Spain (Pérez et al., 2010), South Africa (de Kock et al., 2014) and Iran (Ghanbarnejad et al., 2013) for 28 items; and Prady et al. (2013) for 17 items. However, due to the high intercorrelations between factors founded, we tested an alternative model incorporating a GF that explains the 28 items together with four SF (bifactor model).

The bifactor model presents a better statistical fit than the oblique factor models of 28 and 17 items. Factor loadings (λ) of the GF are adequate and allow a consistent explained variance of the model (Dominguez-Lara, 2018). Furthermore, fit indices for the bifactor models are within the acceptance parameters (Reise et al., 2013; Rodriguez et al., 2016; Smits et al., 2015). This finding is relevant and innovative because it provides a better factor structure for the GHQ-28 with robust estimators, evidencing that the use of a single score is recommended. Therefore, these results are ground-breaking in the field of psychometric analysis of this assessment tool and will allow better normalization processes of the population through evaluation.

In the case of the reliability of the scale, results show an optimal internal consistency of the item scores in the analysed sample and are consistent with similar studies worldwide (de Kock et al., 2014; Galindo et al., 2017; Ghanbarnejad et al.,

2013; Hjelle et al., 2019; Lobo et al., 1986; Pérez et al., 2010; Vallejo et al., 2014), and since we first verified the factor structure for the test, reliability analysis turns out to be more dependable to confirm the usefulness and precision of the scale for college students (Batista-Fogueta et al., 2004).

Regarding the validity evidence due to its relationship with other variables analysed with the help of the MCH-SF test (Contreras et al., 2017; Keyes, 2005), it is estimated that the GHQ-28 converges adequately with the MCH-SF with moderate correlations. These values can be corroborated with the study by Failde et al. (2000) who analyse this property with a similar assessment tool for the perception of health and also with the findings of Chen et al. (2010) who prove it with measures of anxiety and depression.

On the implications of the founded results, two aspects are deepened. First, it can be considered one of the most complete studies that exist in terms of the psychometric exploration of the GHQ-28. In addition, it provides statistical evidence about the behaviour of the test in terms of the factor structure in Ecuadorian college students and, as mentioned before, it has been barely analysed with SEM techniques and the proper estimators for ordinal variables and in the absence of multivariate normality.

In this way, these findings help fill gaps both in instrumental and methodological scientific literature applying multivariate statistics for scale validation, as well as their different statistical estimators. It should be noted that the excessive confidence placed in the GHQ-28 by researchers, has led to a neglect of the rigorous use of psychometric validation techniques that adequately analyse the internal structure of the test. Although the use of the four-factor model with 28 and 17 items has factorial validity that supports its use, a bifactor model of the test estimates a better factorial interpretation of the measure and a greater interpretation of the behaviour of the latent measures, which allow greater operability of the measure.

The second aspect is related to the practical implications of the use of this test to assess university populations in Ecuador. This will allow greater confidence in the assessment results obtained by the test and will provide support for diagnosis, showing good evidence of validity in terms of internal structure as well as convergence with a measure of well-being.

The conclusions of the study show that the GHQ-28 has a broader structural potential than previously reported. This bifactorial structure, different from the one reported in the original model, is more versatile and comprehensive for the understanding and evaluation of the mental health construct and, along with an adequate criterion of reliability and validity, will allow further development in the investigation and diagnosis of mental health, as well as its practical utility in the population of Ecuador.

Limitations and Future Research

Like any instrumental study, this research presents some limitations that need to be considered for future studies. One of them has to do with the type of sample analysed that was exclusively Ecuadorian college students, therefore, to expand the universality of the measure, new confirmatory studies with other types of samples (adolescents, general population, adults) are required in the future. It is also important to compare the validity of the scale with other versions of the GHQ, such as the 12 or 60-item version, to know the behaviour of the measure in its different versions, and to see the degree of adjustment in the Ecuadorian population. In the same way, it is important to investigate the equivalence of measurement of the test among groups classified by sex, socio-demographic conditions, nationality, and others to strengthen comparative studies.

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Psihometrijska svojstva Upitnika općega zdravlja (GHQ-28) kod ekvadorskih studenata

Sažetak

Cilj je rada bio analiza unutarnje strukture verzije Upitnika općega zdravlja od 28 čestica (GHQ-28), kao i njegove pouzdanosti i valjanosti na uzorku ekvadorskih studenata. Primijenjena je konfirmatorna faktorska analiza, uz korištenje algoritma WLSMV (engl. *weighted least square mean and variance adjusted*), a izračunane su pouzdanost te konvergentna i diskriminacijska valjanost. Uzorak se sastojao od 495 studenata (56.6 % žena), starosti između 18 i 35 godina (M = 24.1 godina; SD = 2.1), polaznika triju sveučilišta u Ekvadoru (59.6 % državnih). Prema dobivenim rezultatima bifaktorski model upitnika GHQ-28 pokazuje najbolje indekse pristajanja; $\chi^2 = 357.81$; $p > 0.05$; $df = 322$; $\chi^2/df = 1.11$; CFI = .991; TLI = .989; SRMR = 0,059; RMSEA = .015 [.000 – .023]; ω_H = .93; ECV = 0.90; PUC = .78. Upitnik GHQ-28 pouzdana je mjera koja u smislu konvergentne valjanosti značajno i negativno korelira s mentalnim zdravljem, procijenjenim pomoću upitnika MHC-SF, te uspješno diskriminira rizične i nerizične slučajeve. Na temelju svega navedenoga zaključuje se da bifaktorski model GHQ-28 najbolje pristaje podacima dobivenima na uzorku ekvadorskih studenata.

Ključne riječi: bifaktorski model, faktorska analiza, mentalno zdravlje, pouzdanost, valjanost

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