



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Brief report

Properties of a scale of concern for COVID-19: Exploratory analysis in a Peruvian sample[☆]



Percy G. Ruiz Mamani^{a,*}, Wilter C. Morales-García^b, Michael White^b, Mayte S. Marquez-Ruiz^c

^a Universidad Privada San Juan Bautista, Lima, Peru

^b Universidad Peruana Unión, Lima, Peru

^c Universidad Nacional de San Agustín de Arequipa, Arequipa, Peru

ARTICLE INFO

Article history:

Received 27 April 2020

Accepted 24 June 2020

Available online 22 November 2020

Keywords:

Sickness concern

COVID-19

Factor analysis

Reliability

Unidimensionality

ABSTRACT

Objective: Concern about getting sick could help prevent disease. The aim of this study was to analyze the psychometric properties of a COVID-19 concern scale (EPCov-19).

Materials and methods: This is an instrument-based study and information was collected from 224 people of Peruvian nationality in the context of social isolation. The items of the Cancer Concern Scale were adapted for this study.

Results: A scale with satisfactory psychometric properties was obtained. With a matrix of polychoric correlations, values higher than the standard were obtained in all 6 items ($r > 0.3$) and the reliability was acceptable ($\alpha = 0.866$; 95% CI = 0.83–0.89). Parallel analysis suggested unidimensionality of the EPCov-19, the variance explained was 79.7% and saturations were higher than 0.4. Goodness-of-fit indices were satisfactory (CFI = 0.995; GFI = 0.997; TLI = 0.991; and RMSEA = 0.059, 95% CI = 0.012–0.077).

Conclusions: This is a valid and reliable instrument for measuring concern about the spread of COVID-19 and can be used in future studies.

© 2020 Elsevier España, S.L.U. All rights reserved.

Propiedades de una escala de preocupación por la COVID-19: análisis exploratorio en una muestra peruana

RESUMEN

Objetivo: La preocupación por enfermarse podría ayudar a prevenir enfermedades. El objetivo de este estudio fue analizar las propiedades psicométricas de una escala de preocupación por la COVID-19 (EPCov-19).

Materiales y métodos: El estudio es de tipo instrumental y se recogió información de 224 personas de nacionalidad peruana en el contexto de aislamiento social. Se realizó una adaptación de los ítems de la escala de preocupación por el cáncer.

Resultados: Se obtuvo una escala con propiedades psicométricas satisfactorias. Con una matriz de correlaciones policóricas se obtuvieron valores superiores al estándar en los 6 ítems ($r > 0,3$) y la confiabilidad fue aceptable ($\alpha = 0,866$; IC del 95% = 0,83-0,89). El análisis paralelo sugirió la unidimensionalidad de la EPCov-19, la varianza explicada fue del 79,7% y las saturaciones fueron superiores a 0,4. Los índices de bondad de ajuste son satisfactorios (CFI = 0,995; GFI = 0,997; TLI = 0,991 y RMSEA = 0,059, IC del 95% = 0,012-0,077).

Conclusiones: Se presenta un instrumento válido y confiable para medir la preocupación por el contagio de COVID-19 y puede ser usados en futuros estudios.

© 2020 Elsevier España, S.L.U. Todos los derechos reservados.

Palabras clave:

Preocupación por enfermarse

COVID-19

Análisis factorial

Confiabilidad

Unidimensionalidad

[☆] Please cite this article as: Ruiz Mamani PG, Morales-García WC, White M, Marquez-Ruiz MS. Propiedades de una escala de preocupación por la COVID-19: análisis exploratorio en una muestra peruana. Med Clin (Barc). 2020;155:535–537.

* Corresponding author.

E-mail address: percygruiz@hotmail.com (P.G. Ruiz Mamani).

Introduction

The 2019 coronavirus disease (COVID-19) is an illness that has generated great concern among the population because of its quick spread and lethality, the fact that its transmission from asymptomatic infected people increases the likelihood of dissemination, and its difficult identification, which is why it is considered a public health problem.¹ This disease is caused by a new strain of coronavirus, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which causes severe lung damage, pneumonia, and even death.² Therefore, public health and infection control measures are needed to limit the overall spread of the virus,³ and all individuals exhibiting symptoms indicative of COVID-19 should adhere to basic prevention measures.⁴

However, with access to the Internet, people can acquire true or false information and consequently over- or underestimate the consequences of this disease. In addition, uncertainty about the treatment, symptoms, and duration of the illness can result in varying degrees of concern among the population.

Although the concern people have about the likelihood of becoming sick can bring about changes in their attitudes and behaviors is mentioned,⁵ there are insufficient studies proving this hypothesis. Furthermore, no instruments have been developed as of yet to measure people's level of concern with respect to the disease, particularly COVID-19. Therefore, instruments should be developed or adapted to assess people's concern about the likelihood of becoming ill with COVID-19 in order for them to be used in new studies aimed at obtaining a greater knowledge of the problem and, thus, implement actions that contribute to improving the mental health of the overall population. The aim of this study is to analyze the psychometric properties of a one-dimensional scale of concern for COVID-19 (Cov-19CS).

Materials and methods

Participants

This was an instrumental study in which information was collected from 224 Peruvian nationals, of whom 116 were women (51.7%) and 108 men (48.3%), with an age ranging from 16 to 74 years (mean = 32.14 [standard deviation (SD) = 11.6]). Based on their level of education, 22 completed a basal level of education (9.8%), 36 completed a professional degree (16.1%), and 167 completed university studies (74.5%).

Procedure

The study was carried out in the social isolation context decreed by the Peruvian Government. A questionnaire was developed in a Google form (available from 13 to 22 March 2020) and disseminated through social networks (Facebook and WhatsApp), and individuals who had access to information about the study's research purposes, commitment to privacy, and informed consent were asked to voluntarily participate in it. Only those who agreed to participate in the study and approved the informed consent answered the questionnaire.

Instruments

The Cov-19CS features 6 questions that measure how often people worry about developing COVID-19, its impact on their mood and daily activities, their concern about a future infection, and the importance of the concern about the disease perceived by the individual. The scale is an adaptation of the Cancer Concern Scale (CCS) that was validated in an English population and translated into Spanish.⁶ The questions were adapted based on the time and context by a committee comprised by 3 experts, and only the answer options were retained.

Table 1

Adaptation of the Cov-19CS items from the CCS.

CCS	Cov-19CS
During the past month, how often have you thought about your chances of developing cancer?	<i>During the past week, how often have you thought about your chances of becoming infected with coronavirus?</i>
During the past month, has thinking about the chances of developing cancer affected your mood?	<i>During the last week, has thinking about your chances of becoming infected with coronavirus affected your mood?</i>
During the past month, has thinking about your chances of developing cancer affected your ability to perform your daily activities?	<i>During the last week, has thinking about your chances of becoming infected with coronavirus affected your ability to perform your daily activities?</i>
How concerned are you about your chances of developing cancer someday?	<i>How concerned are you about your chances of becoming infected with coronavirus someday?</i>
How often do you worry about your chances of developing cancer?	<i>How often do you worry about your chances of becoming infected with coronavirus?</i>
Is being worried about developing cancer a major problem for you?	<i>Is being worried about becoming infected with coronavirus a major problem for you?</i>

The italics denote the change.

CCS: Cancer Concern Scale; Cov-19CS: COVID-19 concern scale.

Statistical analysis

A descriptive analysis was performed, whereby asymmetry and kurtosis coefficients were considered for the choice of the correlation matrix or item elimination (absolute value > or <1). The adequacy of the sample was assessed using the Bartlett sphericity test, in which a *p*-value <0.05 indicated that the matrix was adequate due to the high correlations between the variables, and the Kaiser-Meyer-Olkin (KMO) test, in which a value of at least 0.7 indicated that partial correlations between the variables were acceptable. A parallel analysis, the weighted least-squares method, and a Promin oblique rotation were used. Consistent indices were also calculated, such as the comparative fit index (CFI), the goodness of fit index (GFI), the Tucker-Lewis index (TLI), in which values above 0.90 indicated an acceptable fit, and the root mean square error or approximation (RMSEA), which considers an acceptable fit with lower values between 0.5 and 0.8. The descriptors and estimates of the factorial analysis were obtained with software Factor Analysis, version 10.1 (Rovira i Virgili University, Tarragona), and the correlations between the questions and their respective reliability coefficients were calculated with software SPSS 24.0 (IBM).

Results

The Cov-19CS scale is a version adapted for the current time and context. Thus, introductory phrases "During the past month. . ." in items 1–3 were replaced by "During the past week. . .", and phrases "develop cancer" in items 1–6 were replaced by "becoming infected with coronavirus" (Table 1).

Descriptive analysis

Since items 2, 3 and 6 include asymmetry or kurtosis coefficients with an absolute value above 1 (Table 2), we considered performing an exploratory factorial analysis (EFA) with a matrix of polychoric correlations and, therefore, removed no items. The correlations of the items with the scale's total were above 0.3. The reliability coefficients of the items were higher than 0.8. The full scale yielded a Cronbach's alpha measurement of 0.866 (95% confidence interval [CI] = 0.83–0.89), thus indicating an adequate internal consistency of the instrument.

Table 2
Descriptive variables of the Cov-19CS items.

Variable	M	SD	As	K	r itc	α
Item 1	2.121	0.876	0.484	-0.399	0.503	0.869
Item 2	1.728	0.835	1.194	1.042	0.747	0.829
Item 3	1.781	0.955	1.068	0.113	0.571	0.859
Item 4	2.371	0.825	0.467	0.293	0.765	0.827
Item 5	2.134	0.896	0.331	0.721	0.752	0.827
Item 6	2.540	1.068	0.005	1.240	0.671	0.843

As: asymmetry coefficient; SD: standard deviation; M: mean; K: kurtosis coefficient; r itc: corrected total item correlation; α : Cronbach's alpha.

Table 3
Correlation between the items and factorial analysis of the Cov-19CS.

Variable	1	2	3	4	5	6	Factor 1	h
Item 1	-						0.590	0.348
Item 2	0.553	-					0.888	0.788
Item 3	0.390	0.713	-				0.697	0.485
Item 4	0.538	0.747	0.611	-			0.888	0.788
Item 5	0.523	0.703	0.576	0.809	-		0.868	0.754
Item 6	0.434	0.728	0.510	0.713	0.747	-	0.803	0.644

Goodness of fit indices (CFI=0.995, GFI=0.997, TLI=0.991, and RMSEA=0.059 [95% CI=0.012–0.077]).

Factorial analysis

The KMO (0.864) and Bartlett statistics ($p < 0.000$) allowed for performing a factorial analysis. The results of the parallel analysis suggested the one-dimensionality of the Cov-19CS, and the resulting variance was 79.7%, which supports the one-dimensional proposal.

The polychoric correlations between the items ranged from 0.390 to 0.809, which are deemed adequate (Table 3). In addition, all items yielded saturations greater than 0.4 in a single factor and the values of the common variance of the items were greater than 0.3. The consistent indices for the factorial analysis were satisfactory (CFI=0.995, GFI=0.997, TLI=0.991, and RMSEA=0.059 [95% CI=0.012–0.077]).

Discussion

In this study we analyzed the psychometric properties of the Cov-19CS. This study presents evidence of the scale's construct validity. The results of the EFA of the scale are similar to those reported in the Spanish version of the CCS validation study⁶; for example, the one-dimensionality of the scales is established in both studies, as the items yielded factorial loads greater than 0.5 and reliability coefficients greater than 0.8. However, the total variance of the Cov-19CS is 26.63% higher than that of the CCS and provides greater evidence of unidimensionality,⁷ although it should be noted that the analytical methods used in both studies differ.

It is currently recognized that the validation of an instrument requires an analytical process for which several methods can be used. The CCS was examined using a principal component analysis with varimax rotation, whereas, in the psychometric analysis of the Cov-19CS scale, a matrix of polychoric relationships was used applying the items' behavior (asymmetry and kurtosis) as a criterion, and one-dimensionality was established through a parallel analysis,⁸ the unweighted least-squares method, and a Promin oblique rotation. The differences between these methodologies are clearly discussed in the psychometric literature,⁹ which recommends avoiding the use of the principal component analysis method and resorting to a parallel analysis using the unweighted least-squares method.

The limitations of this study are focused on the absence of a content validity analysis, given that only the 6 items of the CCS (with content validity) were adapted to the current COVID-19 context. Nevertheless, this does not underestimate its measurement capacity, considering that, conceptually, worry is a state of anxiety or uneasiness caused by a certain event or situation that threatens human well-being.¹⁰ The 6 items of the Cov-19CS scale specifically measure the frequency, impact, and importance that people place on the likelihood of becoming ill with COVID-19.

Although this study was performed with volunteer participants recruited through social networks, the results are similar to those of the CCS study carried out with participants who attended doctors' offices in person. This study opens up a new line of research whereby future studies might demonstrate the validity of the scale in different populations and epidemiological contexts. In addition, because it is a short and easy-to-apply scale, it can be used in several studies focused on the prevention of COVID-19 and its impact on mental health.

This study provides a solid alternative for the measurement of people's concern regarding COVID-19. The conduct of further studies demonstrating predictive and discriminative validity through a confirmatory factorial analysis is also recommended.

Funding

This study was self-funded by the researchers.

Conflict of interest

The authors declare no conflict of interest.

Acknowledgments

We would like to thank all people who agreed to voluntarily participate in the study and who shared the online form with others through Facebook and WhatsApp.

References

- Al-Tawfiq JA. Asymptomatic coronavirus infection: MERS-CoV and SARS-CoV-2 (COVID-19). *Travel Med Infect Dis.* 2020;35:101608. <http://dx.doi.org/10.1016/j.tmaid.2020.101608>.
- Shereen MA, Khan S, Kazmi A, Bashir N, Siddique R. COVID-19 infection: origin, transmission, and characteristics of human coronaviruses. *J Adv Res.* 2020;24:91–8. <http://dx.doi.org/10.1016/j.jare.2020.03.005>.
- Xu Z, Shi L, Wang Y, Zhang J, Huang L, Zhang C, et al. Pathological findings of COVID-19 associated with acute respiratory distress syndrome. *Lancet Respir Med.* 2020;8:420–2. [http://dx.doi.org/10.1016/S2213-2600\(20\)30076-X](http://dx.doi.org/10.1016/S2213-2600(20)30076-X).
- Chavez S, Long B, Kozyfman A, Liang SY. Coronavirus Disease (COVID-19): a primer for emergency physicians. *Am J Emerg Med.* 2020. <http://dx.doi.org/10.1016/j.ajem.2020.03.036> [in press].
- Chen Q, Liang M, Li Y, Guo J, Fei D, Wang L, et al. Mental health care for medical staff in China during the COVID-19 outbreak. *Lancet Psychiat.* 2020;7:e15–6. [http://dx.doi.org/10.1016/S2215-0366\(20\)30078-X](http://dx.doi.org/10.1016/S2215-0366(20)30078-X).
- Cabrera E, Zabalegui A, Blanco I. Versión española de la Cancer Worry Scale (escala de preocupación por el cáncer: adaptación cultural y análisis de la validez y la fiabilidad). *Med Clin (Barc).* 2011;136:8–12. <http://dx.doi.org/10.1016/j.medcli.2010.04.015>.
- Ferrando PPJ. Evaluación de la unidimensionalidad de los ítems mediante análisis factorial. *Psicothema.* 1996;8:397–410.
- Buja A, Eyuboglu N. Remarks on parallel analysis. *Multivariate Behav Res.* 1992;27:509–40. http://dx.doi.org/10.1207/s15327906mbr2704_2.
- Lloret-Segura S, Ferreres-Traver A, Hernández-Baeza A, Tomás-Marco I. Exploratory item factor analysis: a practical guide revised and up-dated. *An Psicol.* 2014;30:1151–69. <http://dx.doi.org/10.6018/analesps.30.3.199361>.
- Freeston MH, Rhéaume J, Letarte H, Dugas MJ, Ladouceur R. Why do people worry? *Pers Individ Dif.* 1994;17:791–802. [http://dx.doi.org/10.1016/0191-8869\(94\)90048-5](http://dx.doi.org/10.1016/0191-8869(94)90048-5).