


Proposal of a scale for COVID-19 stigma-discrimination toward health workers

Adalberto Campo-Arias ¹, Isabel Álvarez-Solorza,²
Andrés Felipe Tirado-Otálvaro,³ Carlos Arturo Cassiani-Miranda⁴

¹Programa de Medicina, Universidad del Magdalena, Santa Marta, Colombia
²Centro de Investigación y Estudios Avanzados en Salud Pública, Universidad Autónoma del Estado de México, Toluca, México, México
³Facultad de Enfermería, Universidad Pontificia Bolivariana, Medellín, Antioquia, Colombia
⁴Facultad de Ciencias de la Salud, Universidad de Santander – Campus Universitario Lagos del Cacique, Bucaramanga, Colombia

Correspondence to

Professor Adalberto Campo-Arias, Programa de Medicina, Universidad del Magdalena, Santa Marta 470004, Colombia; acampo@unimagdalen.edu.co

Accepted 10 November 2020

Stigma-discrimination occurs in three situations: exploitation-domination, social control, and avoiding diseases.¹ It has been thought that, as with other infectious diseases, COVID-19 would be a source of stigma-discrimination in affected people.² However, it was thought unlikely that stigma-discrimination would fall on health workers who care for patients with COVID-19.³ Stigma-discrimination may be associated with a high level of anxiety. Monterrosa-Castro *et al*⁴ recently reported a prevalence of 39% of symptoms of anxiety among Colombian general practitioners.

The study aimed to design a scale to quantify COVID-19 stigma-discrimination. An online psychometric study was performed, and the questionnaire included informed consent and demographic information, and was sent to students' email available on the institution's platform. The questionnaire was available from July 3 to August 10, 2020. The study included 1108 students of a university who take pregraduate and postgraduate programs; all were residents of Mexico and were aged between 18 and 60 years old (M=21.5, SD=4.4), 80.4% of whom were women and 97.0% with a bachelor's degree. The subjects completed an 18-point questionnaire with a dichotomous response pattern, and included questions about foreign people, patients with COVID-19, and health workers. **Table 1** presents all the items studied. Exploratory and confirmatory factor analyses were applied to select items with the best performance. Robust diagonally weighted least squares were used as the extraction method, with a tetrachoric correlation matrix for factor extraction; this method is specific for factor analysis of ordinal data.⁵ Internal consistency was tested using Kuder-Richardson's coefficient,⁶ an equivalent of Cronbach's alpha for a dichotomous answer,⁷ and McDonald's omega.⁸ Factor analyses were done in the Factor Analysis program,⁹ and internal consistency was computed in Jamovi V.1.2.27.0.¹⁰

Five items showed the best performance in the subsequent factor analysis. The polychoric correlation matrix showed good adequacy (Bartlett's $\chi^2=2184.5$, $df=10$, $p<0.001$, Kaiser-Meyer-Olkin test=0.83, 95% CI 0.81 to 0.860). The exploratory factor analysis showed one factor with eigenvalue of 3.07, which explained

Table 1 COVID-19 Stigma-Discrimination Toward Health Workers Scale

Item	Yes	No
1. Are all foreign nationals at higher risk of transmitting COVID-19?		
2. Is COVID-19 a divine punishment?		
3. Should people fear those who are sick with COVID-19?		
4. Are people sick with COVID-19 afraid to tell others that they have this disease?		
5. When I see news and stories about COVID-19 on television, press, or social media, do I get nervous or anxious?		
6. Is it embarrassing to be sick with COVID-19?		
7. Should people feel sorry for persons who are sick with COVID-19?		
8. Do people get sick with COVID-19 due to irresponsible behaviors?		
9. Should people who work in health services and are in contact with COVID-19 patients be isolated from society?*		
10. Should family members treat people with COVID-19 with less respect?		
11. Should people sick with COVID-19 be rejected by society?		
12. Can people sick with COVID-19 be neighbors of those who do not suffer from this disease?		
13. Am I afraid of being infected by the health personnel I meet in public transportation, on the street, or at home?*		
14. Are people sick with COVID-19 guilty of having acquired this disease?		
15. Should people who have recovered from COVID-19 stay away from their worksites?		
16. Should people who work in health services avoid using public transport so as not to infect the population?*		
17. Should health personnel avoid returning home so as not to infect their family?*		
18. Should health personnel avoid going out to the street so as not to infect the population?*		

*Items that showed better performance as a scale in the factor analysis.

61.3% of the variance. The confirmatory factor analysis confirmed the structure, and goodness-of-fit indicators were excellent (**table 2**). The Kuder-Richardson's coefficient was 0.67, while the McDonald's omega was 0.68.

Factor analysis is the best technique to construct health scales. The present investigation showed the scale on stigma-discrimination toward health personnel due to COVID-19 showed excellent goodness-of-fit indicators^{11 12}



© American Federation for Medical Research 2020. No commercial re-use. See rights and permissions. Published by BMJ.

To cite: Campo-Arias A, Álvarez-Solorza I, Tirado-Otálvaro AF, *et al*. *J Investig Med* Epub ahead of print: [please include Day Month Year]. doi:10.1136/jim-2020-001647

Table 2 Goodness-of-fit indicators

Indicator	Value
Robust mean and variance-adjusted χ^2	10.2, df=5, p=0.07
Root mean square error of approximation	0.03 (95% CI 0.00 to 0.05)
Comparative fit index	0.99
Tucker-Lewis index	0.99
Weighted root mean square residual	0.02 (95% CI 0.01 to 0.03)

and acceptable internal consistency.¹³ It is crucial to have an instrument that measures stigma-discrimination toward health professionals during the COVID-19 epidemic as negative attitudes can affect healthcare-seeking and increase COVID-19 collateral damage.¹⁴ It also opens the possibility of stigma-discrimination persisting among professionals who work in areas with people with different types of infections. Stigma-discrimination is a stressor with a negative impact on the health of the victims.¹⁵ The findings of this study suggest that this scale can be used to quantify stigma-discrimination toward health workers.

Contributors AC-A contributed to study conception, design, data interpretation and statistical analysis, drafted the article, and approved the final version. IA-S contributed to study conception, design, data interpretation and statistical analysis, revised the intellectual content, and approved the final version. AFT-O and CAC-M contributed to study conception, design and data interpretation, revised the intellectual content critically, and approved the final version.

Funding The Research Vice-Rector of the Universidad del Magdalena supported AC-A through Resolution 266 of 2020.

Competing interests None declared.

Patient consent for publication Not required.

Ethics approval The research was reviewed and approved by an independent research ethics committee (Universidad del Magdalena, Act 004, May 13, 2020). The secretary for research and advanced studies (Universidad Autónoma del Estado de Mexico) approved the study.

Provenance and peer review Not commissioned; externally peer reviewed.

This article is made freely available for use in accordance with BMJ's website terms and conditions for the duration of the covid-19 pandemic or until otherwise determined by BMJ. You may use, download and print the article for

any lawful, non-commercial purpose (including text and data mining) provided that all copyright notices and trade marks are retained.

ORCID iD

Adalberto Campo-Arias <http://orcid.org/0000-0003-2201-7404>

REFERENCES

- Phelan JC, Link BG, Dovidio JF. Stigma and prejudice: one animal or two? *Soc Sci Med* 2008;67:358–67 <https://doi.org/>
- Baldassarre A, Giorgi G, Alessio F, et al. Stigma and discrimination (SAD) at the time of the SARS-CoV-2 pandemic. *Int J Environ Res Public Health* 2020;17:6341 <https://doi.org/>
- Cassiani-Miranda C, Campo-Arias A. Stigma-discrimination: significant collateral damage of COVID-19. *Indian J Psychiatry* 2020;62:610–1 <https://doi.org/>
- Monterrosa-Castro A, Redondo-Mendoza V, Mercado-Lara M. Psychosocial factors associated with symptoms of generalized anxiety disorder in general practitioners during the COVID-19 pandemic. *J Investig Med* 2020;68:1228–34.
- Li C-H. Confirmatory factor analysis with ordinal data: comparing robust maximum likelihood and diagonally weighted least squares. *Behav Res Methods* 2016;48:936–49 <https://doi.org/>
- Kuder GF, Richardson MW. The theory of the estimation of test reliability. *Psychometrika* 1937;2:151–60 <https://doi.org/>
- Cronbach LJ. Coefficient alpha and the internal structure of tests. *Psychometrika* 1951;16:297–334 <https://doi.org/>
- McDonald RP. The theoretical foundations of principal factor analysis, canonical factor analysis, and alpha factor analysis. *Br J Math Stat Psychol* 1970;23:1–21 <https://doi.org/>
- Lorenzo-Seva U, Ferrando PJ. Factor analysis (statistical program): Tarragona: Rovira i Virgili University, 2020. Available: <http://psico.fcep.urv.es/utilitats/factor/Bibliography.html>
- Jamovi Project. Jamovi. (Version 1.2) [Computer Software], 2020. Available: <https://www.jamovi.org>
- LT H, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Struct Equat Model* 1999;6:1–55 <https://doi.org/>
- Yu C, Muthen B. *Evaluation of model fit indices for latent variable models with categorical and continuous outcomes*. New Orleans, LA: Paper presented at the annual meeting of the American Educational Research Association, 2002.
- Keszei AP, Novak M, Streiner DL. Introduction to health measurement scales. *J Psychosom Res* 2010;68:319–23 <https://doi.org/>
- Duan W, Bu H, Chen Z. COVID-19-related stigma profiles and risk factors among people who are at high risk of contagion. *Soc Sci Med* 2020;266:113425 <https://doi.org/>
- Stuber J, Meyer I, Link B. Stigma, prejudice, discrimination and health. *Soc Sci Med* 2008;67:351–7 <https://doi.org/>