



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.



Relation of perceived discrimination with depression, insomnia and post-traumatic stress in COVID-19 survivors

Adalberto Campo-Arias^{a,*}, John Carlos Pedrozo-Pupo^b,
Carmen Cecilia Caballero-Domínguez^c

^a MD, MSc, associate professor, Universidad del Magdalena, Santa Marta, Colombia

^b MD, FCCP, MSc, assistant professor, Universidad del Magdalena, Santa Marta, Colombia

^c Psicóloga, PhD, titular professor, Universidad del Magdalena, Santa Marta, Colombia

ARTICLE INFO

Keywords:

Coronavirus disease
Social stigma
Depression
Insomnia
Post-traumatic stress
Cross-sectional studies

ABSTRACT

The study's objective was to study the association of perceived discrimination with depression, insomnia and post-traumatic stress in people recovered from coronavirus disease (COVID-19) in Santa Marta, Colombia. COVID-19 survivors were invited to participate. The authors measured perceived discrimination related to COVID-19 (COVID-19 Perceived Stigma Scale), depression (PHQ-9), insomnia (Athens Insomnia Scale), and post-traumatic stress (Brief Davidson Trauma Scale). Three hundred thirty COVID-19 survivors participated in the research; the participants were between 18 and 89 years; 61.52% were females. 32.12% of the participants reported high perceived discrimination; 49.70%, depression; 60.61%, insomnia; and 13.33% post-traumatic stress. After adjusting for age, gender, and income, depression, insomnia, and post-traumatic stress were associated significantly with discrimination perceived by COVID-19. Perceived discrimination is a social stressor that affects the psychological well-being of people recovered from COVID-19. In the follow-up of this group of patients, it is important to consider the impact of perceived discrimination on psychological well-being.

According to social stress theory, people with a devalued social status are more likely to be exposed to stressors. They are more vulnerable to stress because they have limited psychosocial resources to deal with stressors. Consequently, socially devalued people are at increased risk of psychological distress or mental disorders (Pearlin, 1993). Depression, post-traumatic stress, and insomnia are related to biological traits that interact in complex ways with psychological, cultural, and social factors (Danylova, 2019).

Phelan et al. (2008) consider that stigmatization is configured as a mechanism of exploitation or domination, social control, or disease avoidance. Therefore, the fear of infection by coronavirus disease (COVID-19) explains the discrimination related to the pandemic (Casiani-Miranda et al., 2020), the negative attitude towards people of Asian origin due to the supposed origin of the virus (Trammell et al., 2021; Wen et al., 2020) and towards symptomatic people suspected of or diagnosed with COVID-19 (Nuckchady, 2021). In the same way, the fear of COVID-19 promoted violent actions towards health workers due to the employment relationship with the disease (Chanpa et al., 2020;

Miconi et al., 2021) and towards people who recovered from COVID-19 due to infection (Singh and Subedi, 2020).

Discrimination related to COVID-19 is a socio-cultural event with a significant negative impact on the pandemic (Bruns et al., 2020; Casiani-Miranda and Campo-Arias, 2020). Discrimination due to health status can be anticipated, internalized, or perceived (Pescosolido and Martin, 2015), consolidated as a significant stressor (Meyer, 2003) and, consequently, negatively compromise psychological well-being and increase the risk of meeting criteria for a mental disorder (Pascoe and Smart Richman, 2009). It is possible that in COVID-19 survivors, discrimination partially explains the high frequency of depression, post-traumatic stress disorder, and insomnia after remission of the infection; 31% report significant symptoms of depression, 28% post-traumatic stress and 40% insomnia (Mazza et al., 2020).

Little information is available on the relationship between discrimination and psychological distress during the COVID-19 pandemic. In China, Li et al. (2020), in 995 college students, with no history of COVID-19, researchers observed that 41% of the participants reported

* Corresponding author at: Programa de Medicina, Facultad Ciencias de la Salud, Universidad del Magdalena, Carrera 32 No 22-08, Santa Marta, Colombia 470004
E-mail addresses: acamboa@unimagdalen.edu.co (A. Campo-Arias), jpedrozo@unimagdalen.edu.co (J.C. Pedrozo-Pupo), ccaballero@unimagdalen.edu.co (C.C. Caballero-Domínguez).

¹ The University of Magdalena supported this research

that they experienced discrimination due to having some relationship with Wuhan, the first city with a significant outbreak of COVID. Furthermore, they documented that internalized stigma was significantly related to anxiety, depression and insomnia.

In healthcare workers, [Zandifar et al. \(2020\)](#), in 894 participants in Iran, observed a high correlation between perceived stigma and post-traumatic stress scores. In Colombia, [Campo-Arias et al. \(2021\)](#), in 150 health workers, found that scores on perceived discrimination were positively correlated with scores on depressive symptoms among nursing assistants and physicians.

While among 844 people who recovered from COVID-19 in Iran, [Mahmoudi et al. \(2021\)](#) showed that internalized stigma scores were significantly correlated with insomnia and post-traumatic stress disorder.

This study explores the association of perceived stigma with depression, insomnia and post-traumatic stress in COVID-19 survivors in the cultural context of the Colombian Caribbean. The impact of culture on health is widely known because it conditions the social attitude towards the patient, the recognition of symptoms, the search for care and the acceptance of treatment ([Bruns et al., 2020](#)). Discrimination is a socio-cultural phenomenon that must be considered in infectious diseases such as COVID-19 ([Phelan et al., 2008](#)). It is crucial to carry out actions to reduce discrimination against COVID survivors since they negatively affect the quality of life and psychological well-being ([Pascoe and Smart Richman, 2009](#)). Depression, insomnia, and post-traumatic stress are clinical events that can significantly increase the risk of suicide in COVID-19 survivors ([Sher, 2021](#)).

The study aimed to measure the association of perceived discrimination with depression, insomnia and post-traumatic stress in COVID-19 survivors in Santa Marta, Colombia.

1. Method

1.1. Design and participants

A cross-sectional study was designed with a convenience sample. Researchers invited to participate patients who reported a history of COVID-19 confirmed by clinical symptoms, radiological findings, and a rapid positive test for SARS-CoV2 antigens [Standard Q COVID-AG®, sensitivity of 95.6% and specificity of 98.7% according to manufacturer]. Patients consulted spontaneously to a state hospital that offers III and IV levels of complexity to the population of Santa Marta and 29 other municipalities of the Department of Magdalena, Colombia. However, due to COVID-19 mobility restrictions and Internet access limitations for a large part of the municipalities, most of the patients resided in Santa Marta.

It was expected to have a sample of at least 300 COVID-19 survivors. This sample size is adequate to adjust with acceptable 95% confidence intervals (95% CI) for up to three variables, when the frequencies of the outcome variables reach at least 10%, at the rate of ten positive outcomes for each variable considered for adjustment ([Katz, 2006](#)).

1.2. Measurements

1.2.1. Perceived discrimination

Perceived discrimination was quantified with the COVID-19 Perceived Discrimination Scale (COVID-19 PDS). The COVID-19 PDS is a five-item instrument that offers four response options: never (0), sometimes (1), often (2), and always (3) that were adapted from the Tuberculosis Perceived Discrimination Scale ([Van Rie et al., 2008](#)). Total possible scores can be between 0 and 15. Scores equal to or greater than four were categorized as high perceived discrimination, based on the data distribution pattern from the third quartile. In the present study, the COVID-19 Perceived Discrimination Scale showed high internal consistency, Cronbach's alpha of 0.83.

1.2.2. Depression

Depression was quantified with the Patient Health Questionnaire (PHQ-9). The PHQ-9 is a nine-item scale that assesses depressive symptoms during the most recent two weeks. Each item offers four response possibilities scored from zero to three ([Kroenke et al., 2001](#)). Scores equal to or greater than seven were categorized as depression, the best cut-off point for depression in a previous Colombian study, with a sensitivity of 0.90 and a specificity of 0.82 ([Cassiani-Miranda et al., 2021](#)). This PHQ-9 presented high internal consistency, Cronbach's alpha of 0.85, in the current sample of COVID-19 survivors.

1.2.3. Insomnia

The Athens Insomnia Scale (AIS) is an eight-item instrument with zero to four response options. Total scores are between 0 and 24, and those equal to or greater than six are classified as insomnia ([Soldato et al., 2003](#)). The AIS has shown reasonable validity and reliability indicators in the Colombian population ([Campo-Arias et al., 2020](#)). In the present study, high internal consistency (Cronbach's alpha of 0.85) was observed for the AIS.

1.2.4. Post-traumatic stress

The Brief Davidson Trauma Scale (BDTS) is a four-item instrument with five response options: never (0), seldom (1), sometimes (2), many times (3) and always (4), with total scores between 0 and 20 ([Meltzer-Brody et al., 1999](#)). The BDTS showed high reliability, Cronbach's alpha of 0.81 ([Pineda et al., 2002](#)). Scores equal to or greater than twelve were categorized as post-traumatic stress, based on a previous Colombian study, which showed high internal consistency, Cronbach's alpha of 0.81 ([Pedrozo-Pupo and Campo-Arias, 2020](#)).

1.3. Procedure

The patients were contacted in the pulmonology outpatient service of three institutions between October 12, 2020, and April 30, 2021. 70% ($n=231$) of the patients were attended by teleconsultation and 30% ($n=99$) in face-to-face mode. The study's objectives were explained, and an online questionnaire was self-completed in the waiting room.

1.4. Data analysis

Frequencies and percentages were determined for the categorical variables, and mean (M), median (Me), standard deviation (SD) and interquartile range (IQR). The authors computed crude Odds Ratios (OR) and adjusted Odds Ratios (AOR) associations for age, gender, and income, between perceived discrimination, depression, insomnia, and post-traumatic stress disorder. Hosmer-Lemeshow's goodness-of-fit was calculated for each final model ([Hosmer et al., 1991](#)). The forward stepwise regression model was built following Greenland's recommendations to adjust only for those variables simultaneously associated with perceived discrimination and with depression, insomnia, and post-traumatic stress, which induced a variation in the OR more significant than 10% ([Greenland, 1989](#)). The analysis was completed using the IBM-SPSS program, version 22.0.

1.5. Ethical considerations

The study was reviewed and approved by a research ethics board of a state university in Colombia (Act 002 of March 26, 2020). All participants did so voluntarily. No incentives were offered and signed informed consent following national and international standards for the participation of humans in research.

2. Results

Three-hundred thirty-seven adults who reported a history of COVID were invited to participate; 97.92% ($n=330$) agreed to participate. The

participants were between 18 and 89 years old (Mean = 47.67, SD = 15.17); the highest percentage was under 60 years of age, women, university students and low income. See more information in Table 1.

Scores on the COVID-19 Perceived Discrimination Scale were observed to be between 0 and 15 (M= 2.70, SD = 2.94, Me = 2, IQR = 0 - 4). Qualitatively, 32.12% (n= 106) were categorized as high perceived discrimination.

Scores on the PHQ-9 were found to be between 0 and 27 (M= 7.41, SD = 5.53, Me = 6, IQR = 3–11). 49.67% (n= 164) of the survivors observed with depression.

Scores on the Athens Insomnia Scale were between 0 and 24 (M= 7.26, SD = 5.06, Me = 7, IQR = 3–10). Qualitatively, 60.61% (n= 200) of the participants were above the cut-off point for insomnia.

Scores on the Davidson Brief Trauma Scale scores in observed between 0 and 15 (M= 4.08, SD = 3.66, Me = 3, IQR = 1–6). By category, 13.33% (n= 44) scored high for post-traumatic stress.

The high perceived discrimination was significantly associated with depression, insomnia and post-traumatic stress crudely after adjusting for possible confounding variables: age, gender and income, depression. The crude and adjusted associations are presented in Table 2.

3. Discussion

In the present study, high perceived discrimination is significantly related to depression, insomnia and post-traumatic stress in COVID-19 survivors in the cultural context of the Colombian Caribbean.

The positive relationship between perceived discrimination and manifestations of psychological distress in COVID-19 survivors is incompletely understood. However, Mahmoudi et al. (2021), in COVID-19 survivors, documented that internalized stigma scores were statistically significantly associated with scores for insomnia and post-traumatic stress disorder. Likewise, Campo-Arias et al. (2021) observed, in health workers (nursing assistants and doctors), that a measure of perceived discrimination showed a significant positive correlation with depressive symptoms. Discrimination represents an additional critical stressor in any context (Meyer, 2003). Therefore, a high frequency of depression, post-traumatic stress and insomnia can be expected in COVID-19 survivors (Pascoe and Smart Richman, 2009) without ignoring the possible biological factors of COVID-19 infection in the central nervous system (Mazza et al., 2020; Nakamura et al., 2021).

Table 1
Description of participants (N= 330).

| Variable | Category | n | % |
|---|------------------------------|-----|-------|
| Age (years) | 18–59 | 263 | 79.70 |
| | 60 or older | 67 | 20.30 |
| Gender | Female | 203 | 61.51 |
| | Male | 127 | 38.49 |
| Education | Primary | 29 | 8.79 |
| | Secondary | 95 | 28.79 |
| | University | 206 | 62.42 |
| Income | Low | 235 | 71.21 |
| | High | 95 | 28.79 |
| Marital status | Married or free union | 218 | 66.01 |
| | Single, separated or widowed | 112 | 33.99 |
| Healthcare worker | Yes | 47 | 14.24 |
| | No | 283 | 85.76 |
| Comorbidity | Yes | 122 | 36.97 |
| | No | 208 | 63.03 |
| Clinical status | Asymptomatic or mild | 218 | 66.06 |
| | Moderate or severe | 112 | 33.94 |
| Asymptomatic or less than three weeks with symptoms | Yes | 264 | 80.00 |
| | No | 66 | 20.00 |
| Remission less than two months | Yes | 241 | 73.03 |
| | No | 89 | 26.97 |

Table 2

Crude and adjusted associations of perceived discrimination with psychological distress in COVID-19 survivors.

| Variable | Crude OR (95%CI) | Adjusted OR (95%CI) |
|-----------------------|--------------------|---------------------------------|
| Depression | 3.67 (2.23 – 6.03) | 3.79 (2.28 – 6.31) ¹ |
| Insomnia | 3.84 (2.23 – 6.62) | 4.23 (2.41 – 7.42) ² |
| Post-traumatic stress | 2.68 (1.41 – 5.10) | 2.52 (1.30 – 4.88) ³ |

¹Hosmer–Lemeshow’s test, X² = 1.74, df= 7, p= 0.97.

²Hosmer–Lemeshow’s test, X² = 0.62, df = 6, p= 0.99.

³Hosmer–Lemeshow’s test, X² = 4.79, df = 6, p= 0.57. They were adjusted by age, gender and income.

3.1. Practical implications

Social stress theory holds that conditions in the social environment, not just personal events, are stressors that negatively affect physical and mental health (Pearlin, 1993). Discrimination related to COVID-19 affects survivors’ psychological well-being (Mahmoudi et al., 2021). Discrimination represents a barrier to accessing health services since it can negatively affect the early search for care and treatment (Bruns et al., 2020). Furthermore, it should be borne in mind that depression, insomnia and post-traumatic stress are independent risk factors for self-injurious behaviours in the general population (Hawton and van Heeringen, 2009; O’Connor and Nock, 2014). The possible high risk of suicide in COVID-19 survivors is a situation that must be evaluated and weighed since it would add to the indirect results associated with the infection (Sher, 2021). Discharge preparation for COVID-19 survivors should include actions to reduce internalized stigma and prepare for effective coping with perceived stigma. Discrimination and psychological well-being should be discussed in the outpatient follow-up of COVID survivors (Nakamura et al., 2021), and related cultural aspects should also be addressed (Bruns et al., 2020).

3.2. Study strengths and limitations

This research is novel because it presents the relationship between socio-cultural aspects, such as discrimination and the emotional well-being of COVID-19 survivors, adjusted for possible confounding variables. Likewise, some limitations of the study should be considered. The history of psychological distress or previous mental disorder are not controlled since people with a history of mental disorder are at greater risk of psychological distress during the pandemic (Caballero-Domínguez et al., 2021). However, two essential aspects must be considered. The first is the OR of the association, which suggests that an additional adjustment for another variable, such as a history of mental disorder, would not possibly affect the magnitude of the relationship (Katz, 2011). Future research with larger samples may consider other variables that could affect the relationship between perceived discrimination and psychological distress, such as the number of days of hospitalization or admission to ICU, the amount of social support, or any recent history of trauma (Katz, 2006, 2011).

The second limitation would be the possible existence of perceived double stigma, or intersectional stigma, due to the previous mental disorder and the recent COVID-19 affectation (Kira et al., 2021). Stigmas often have an additive effect (Phelan et al., 2008). Likewise, it is necessary to remember that the evaluation of psychological outcomes was quantified with measurement scales that only approximate the clinical diagnosis. However, it must be considered that the instruments used show high sensitivity and specificity for formal clinical diagnoses (Cassiani-Miranda et al., 2021; Meltzer-Brody et al., 1999; Soldato et al., 2003). Finally, a convenience sample was taken, which might induce some biases; it is impossible to generalize the findings to the reference population (Katz, 2006).

4. Conclusions

It is concluded that perceived discrimination is a social stressor that affects a third of COVID-19 survivors and is significantly associated with depression, post-traumatic stress disorder, and insomnia. It is crucial to consider the impact of discrimination on psychological well-being when monitoring COVID-19 survivors. Future research should evaluate the relationship between COVID-19-related discrimination and other indicators of psychological distress such as anxiety and somatization.

5. Contributors

Adalberto Campo-Arias contributed to the study conception and conception, and data interpretation and statistical analysis, drafted the article, and revised and approved the final version. John Carlos Pedrozo-Pupo and Carmen Cecilia Caballero-Domínguez contributed to the study design, data interpretation, and revised the intellectual content and approved the final version.

Declaration of Competing Interest

The authors have no conflicts of interest to declare.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Acknowledgements

None

References

- Bruns, D.P., Kraguljac, N.V., Bruns, T.R., 2020. COVID-19: facts, cultural considerations, and risk of stigmatization. *J. Transcult. Nurs.* 31, 326–332 <https://doi.org/10.1177/1043659620917724>.
- Caballero-Domínguez, C.C., Pedrozo-Pupo, J.C., Campo-Arias, A., 2021. Risk of a major depressive episode in asthma and COPD patients amidst Colombian SAR-CoV-2 confinement. *Psychiatr. Danub.* 33, 101–106 <https://doi.org/10.24869/psyd.2021.101>.
- Campo-Arias, A., Jiménez-Villamizar, M.P., Caballero-Domínguez, C.C., 2021. Healthcare workers' distress and perceived discrimination related to COVID-19 in Colombia. *Nurs. Health. Sci.* 23, 763–767 <https://doi.org/10.1111/nhs.12854>.
- Campo-Arias, A., Monterosa-Castro, A., Herazo, E., et al., 2020. Consistency and internal structure of the Athens Insomnia Scale in Colombian climacteric women. *Eur. Gynecol. Obstet.* 2, 123–136.
- Cassiani-Miranda, C.A., Campo-Arias, A., Tirado-Otálvaro, A.F., et al., 2020. Stigmatization associated with COVID-19 in the general Colombian population. *Int. J. Soc. Psychiatry.* <https://doi.org/10.1177/0020764020972445>.
- Cassiani-Miranda, C.A., Cuadros-Cruz, A.K., Torres-Pinzón, H., et al., 2021. Validez del Cuestionario de salud del paciente-9 (PHQ-9) para cribado de depresión en adultos usuarios de Atención Primaria en Bucaramanga, Colombia [Validity of the Patient Health Questionnaire-9 (PHQ-9) for depression screening in adult primary care users in Bucaramanga, Colombia]. *Rev. Colomb. Psiquiatr.* 50, 11–21 <https://doi.org/10.1016/j.rcp.2019.09.001>.
- Cassiani-Miranda, C., Campo-Arias, A., 2020. Stigma-discrimination: significant collateral damage of COVID-19. *Indian J. Psychiatry.* 62, 610–611 https://doi.org/10.4103/psychiatry.IndianJPsychiatry_506_20.
- Chanpa, N.B., Kotecha, I., Kumar, P., et al., 2020. Stigma and discrimination among doctors toward healthcare staff working at COVID-19 sites. *Arch. Ment. Health.* 21, 77–82 https://doi.org/10.4103/AMH.AMH_48_20.
- Danylova, T., 2019. Moving beyond the “nature-nurture” dichotomy: a holistic approach to mental health. *Res. Revol.* 7, 1–5.
- Greenland, S., 1989. Modeling and variable selection in epidemiologic analysis. *Am. J. Public. Health.* 79, 340–349 <https://doi.org/10.2105/AJPH.79.3.340>.
- Hawton, K., van Heeringen, K., 2009. Suicide. *Lancet* 373, 1372–1381 [https://doi.org/10.1016/S0140-6736\(09\)60372-X](https://doi.org/10.1016/S0140-6736(09)60372-X).
- Hosmer, D.W., Taber, S., Lemeshow, S., 1991. The importance of assessing the fit of logistic regression models: a case study. *Am. J. Public. Health.* 81, 1630–1635 <https://doi.org/10.2105/ajph.81.12.1630>.
- Katz, M.H., 2011. *Multivariable analysis: a Practical Guide For Clinicians and Public Health Researchers.* Cambridge university press, Cambridge.
- Katz, M.H., 2006. *Study Design and Statistical analysis: a Practical Guide For Clinicians.* Cambridge university press, Cambridge.
- Kira, I.A., Shuwiekh, H.A., Alhuwailah, A., et al., 2021. The effects of COVID-19 and collective identity trauma (intersectional discrimination) on social status and well-being. *Traumatology (Tallahass Fla)* 27, 29–39 <https://doi.org/10.1037/trm000289>.
- Kroenke, K., Spitzer, R.L., Williams, J.B., 2001. The PHQ-9: validity of a brief depression severity measure. *J. Gen. Intern. Med.* 16, 606–613 <https://doi.org/10.1046/j.1525-1497.2001.016009606.x>.
- Li, H., Zheng, L., Le, H., et al., 2020. The mediating role of internalized stigma and shame on the relationship between COVID-19 related discrimination and mental health outcomes among back-to-school students in Wuhan. *Int. J. Environ. Res. Public. Health.* 17, 9237 <https://doi.org/10.3390/ijerph17249237>.
- Mahmoudi, H., Saffari, M., Movahedi, M., et al., 2021. A mediating role for mental health in associations between COVID-19-related self-stigma, PTSD, quality of life, and insomnia among patients recovered from COVID-19. *Brain. Behav.* e02138 <https://doi.org/10.1002/brb3.2138>.
- Mazza, M.G., De Lorenzo, R., Conte, C., et al., 2020. Anxiety and depression in COVID-19 survivors: role of inflammatory and clinical predictors. *Brain. Behav. Immun.* 89, 594–600 <https://doi.org/10.1016/j.bbi.2020.07.037>.
- Meltzer-Brody, S., Churchill, E., Davidson, J.R., 1999. Derivation of the SPAN, a brief diagnostic screening test for post-traumatic stress disorder. *Psychiatry Res* 88, 63–70 [https://doi.org/10.1016/S0165-1781\(99\)00070-0](https://doi.org/10.1016/S0165-1781(99)00070-0).
- Meyer, I.H., 2003. Prejudice as stress: conceptual and measurement problems. *Am. J. Public. Health.* 93, 262–265 <https://doi.org/10.2105/ajph.93.2.262>.
- Miconi, D., Li, Z.Y., Frounfelker, R.L., Venkatesh, V., et al., 2021. Socio-cultural correlates of self-reported experiences of discrimination related to COVID-19 in a culturally diverse sample of Canadian adults. *Int. J. Intercult. Relation.* 81, 176–192 <https://doi.org/10.1016/j.ijintrel.2021.01.013>.
- Nakamura, Z.M., Nash, R.P., Laughon, S.L., et al., 2021. Neuropsychiatric complications of COVID-19. *Curr. Psychiatry. Report.* 23, 1–9 <https://doi.org/10.1007/s11920-021-01237-9>.
- Nuckchady, D.C., 2021. Stigma linked to COVID-19. *Int. Neuropsychiatr. Dis.* 15, 29–38 <https://doi.org/10.9734/INDJ/2021/v15i130144>.
- O'Connor, R.C., Nock, M.K., 2014. The psychology of suicidal behaviour. *Lancet. Psychiatry.* 1, 73–85 [https://doi.org/10.1016/S2215-0366\(14\)70222-6](https://doi.org/10.1016/S2215-0366(14)70222-6).
- Pascoe, E.A., Smart Richman, L., 2009. Perceived discrimination and health: a meta-analytic review. *Psychol. Bull.* 135, 531–554 <https://doi.org/10.1037/a0016059>.
- Pearlin, L.I., 1993. The social context of stress. In: Goldberger, L., Breznitz, S. (Eds.), *Handbook of Stress: Theoretical and Clinical Aspects.* The Free Press, New York, pp. 303–315, 2nd ed.
- Pedrozo-Pupo, J.C., Campo-Arias, A., 2020. Depression, perceived stress related to COVID, post-traumatic stress, and insomnia among asthma and COPD patients during the COVID-19 pandemic. *Chron. Respir. Dis.* 17, 1479973120962800 <https://doi.org/10.1177/1479973120962800>.
- Pescosolido, B.A., Martin, J.K., 2015. The stigma complex. *Ann. Rev. Sociol.* 41, 87–116 <https://doi.org/10.1146/annurev-soc-071312-145702>.
- Phelan, J.C., Link, B.G., Dovidio, J.F., 2008. Stigma and prejudice: one animal or two? *Soc. Sci. Med.* 67, 358–367 <https://doi.org/10.1016/j.socscimed.2008.03.022>.
- Pineda, D.A., Guerrero, O.L., Pinilla, M.L., et al., 2002. Utilidad de un cuestionario para rastreo del estrés postraumático en una población colombiana [Usefulness of a questionnaire for tracking post-traumatic stress in a Colombian population]. *Revista de Neurología* 18 (3), 132–138 <https://doi.org/10.33588/rn.3410.2002009>.
- Sher, L., 2021. Post-COVID syndrome and suicide risk. *QJM Int. J. Med.* 114, 95–98 <https://doi.org/10.1093/qjmed/hcab007>.
- Singh, R., Subedi, M., 2020. COVID-19 and stigma: social discrimination towards frontline healthcare providers and COVID-19 recovered patients in Nepal. *Asian J. Psychiatry.* 53, 102222 <https://doi.org/10.1016/j.ajp.2020.102222>.
- Soldatos, C.R., Dikeos, D.G., Paparrigopoulos, T.J., 2003. The diagnostic validity of the Athens Insomnia Scale. *J. Psychosom. Res.* 55, 263–267 [https://doi.org/10.1016/S0022-3999\(02\)00604-9](https://doi.org/10.1016/S0022-3999(02)00604-9).
- Trammell, J.P., Joseph, N.T., Harriger, J.A., 2021. Racial and ethnic minority disparities in COVID-19 related health, health beliefs and behaviors, and well-being among students. *J. Am. Coll. Health.* <https://doi.org/10.1080/07448481.2021.1890606>.
- Van Rie, A., Sengupta, S., Pungrassami, P., et al., 2008. Measuring stigma associated with tuberculosis and HIV/AIDS in southern Thailand: exploratory and confirmatory factor analyses of two new scales. *Trop. Med. Int. Health.* 13, 21–30 <https://doi.org/10.1111/j.1365-3156.2007.01971.x>.
- Wen, J., Aston, J., Liu, X., et al., 2020. Effects of misleading media coverage on public health crisis: a case of the 2019 novel coronavirus outbreak in China. *Anatolia* 31, 331–336 <https://doi.org/10.1080/13032917.2020.1730621>.
- Zandifar, A., Badrfam, R., Khonsari, N.M., et al., 2020. Prevalence and associated factors of post-traumatic stress symptoms and stigma among health care workers in contact with COVID-19 patients. *Iran. J. Psychiatry.* 15, 340 <https://doi.org/10.1080/10.18502/ijps.v15i4.4303>.