Puri BK, Miari A, Theodoratou M. Predictors of poor psychological functioning of healthcare workers based in Greece during the COVID-19 pandemic. *Health Psychology Research*. 2023;11. doi:10.52965/001c.91274

General

Predictors of poor psychological functioning of healthcare workers based in Greece during the COVID-19 pandemic

Basant K. Puri[1,2], Anastasia Miari[3], Maria Theodoratou[3,4]

[1] Winchester University, [2] C.A.R., Cambridge, [3] Social Sciences, Hellenic Open University, [4] Health Sciences, Neapolis University Pafos

Keywords: Health care workers, psychological functioning, psychological distress, coping, K-6 scale, Toulouse's scale for coping, Covid-19 pandemic

https://doi.org/10.52965/001c.91274

Health Psychology Research

Vol. 11, 2023

Background

Poor psychological functioning during the COVID-19 pandemic has been reported in several studies of healthcare workers from around the world. Factors that might predict this have yet to be established.

Objectives

First, to ascertain which factors were associated with poor psychological functioning in a cohort of healthcare workers during the COVID-19 pandemic. Second, to characterize key sociodemographic aspects of this cohort. Third, to determine the degree to which any predictors of poor psychological functioning were associated with each other.

Methods

A questionnaire-based cross-sectional study was conducted of 144 healthcare workers in Patras, Greece, during the COVID-19 pandemic. The questionnaire consisted of: (1) demographic survey questions; (2) the Psychological Consequences Questionnaire scale; (3) the Kessler Psychological Distress scale; and (4) Toulouse's scale for coping strategies. The data were analyzed using general linear modeling.

Results

The statistical model ($p < 10^{-10}$) indicated that smoking or taking drugs to calm anxiety, feeling ashamed, and being overwhelmed by one's feelings were all predictors of poor psychological functioning. Conversely, income was a protective factor. A *post hoc* network analysis showed that smoking or taking drugs to calm anxiety was relatively strongly associated with feeling ashamed; the latter was also associated with feeling overwhelmed. There was a weak negative association between income and feeling ashamed.

Conclusion

This study highlights the critical importance of psychological functioning in shaping the mental well-being of healthcare professionals during pandemics. Prioritizing the mental health of frontline workers is crucial for their well-being and for the overall functioning of healthcare systems.

INTRODUCTION

The COVID-19 pandemic caused unprecedented challenges for healthcare professionals worldwide, exposing them daily to highly stressful situations. To navigate these difficulties and maintain their well-being, healthcare professionals employed various coping strategies. One key protective factor was the maintenance of a positive attitude.[1] This optimistic outlook served as a shield against the detrimental effects of stress and helped healthcare professionals maintain their resilience. Other factors have also been found to play an important role in shaping the coping strategies of healthcare professionals. These include exposure level, working role, years of work experience, social and work support, job organization, quarantine, age, gender, marital status, and coping styles.[2] Understanding the impact of these factors allows healthcare organizations to provide targeted support and interventions to enhance coping abilities.

The concept of psychological functioning, encompassing emotional regulation, coping strategies, and overall well-being, becomes paramount in understanding how healthcare professionals navigate such unprecedented circum-

stances.[3] Gaining insight into the relationship between psychological functioning, coping strategies, and distress in this vulnerable population is crucial for designing evidence-based interventions to support their mental health during such a critical time.[4,5]

Coping strategies employed by individuals facing stressful events, such as the COVID-19 pandemic, can be broadly categorized into two higher-order groups: problem-focused and emotion-focused coping.[6] Problem-focused coping involves taking specific actions and engaging in cognitive processes to address the stressor, including problem definition, generating alternative solutions, evaluating their costs and benefits, and implementing realistic solutions.[6] Problem-focused coping strategies are negatively correlated with emotional exhaustion and positively associated with feelings of personal accomplishment.[7-10] Active coping, a form of problem-focused coping, has been found to have an inverse correlation with COVID-19-related anxiety.[11] On the other hand, emotion-focused coping pertains to the emotional response to a stressful event, which may involve avoidance, withdrawal, or expressing emotions.[6] Some emotion-focused coping strategies, such as positive reframing, growth, and acceptance, are considered functional as they help mitigate the negative impact of highly stressful situations, such as the recent pandemic, and facilitate adaptation.[7,12] However, researchers have noted that the distinction between problem-focused and emotion-focused coping strategies may not be straightforward, and some strategies can serve both functions simultaneously.[13-15] For instance, planning, typically considered a problem-focused strategy, can also have a calming effect on emotions. This suggests that coping strategies can transcend the boundaries of these two categories. Furthermore, a third category has been proposed, namely meaning-making coping strategies or cognitive reappraisal/restructuring.[16] These strategies involve focusing on the positive or meaningful aspects of a stressful situation. They have been associated with better psychological adjustment and a decrease in symptoms of depression and anxiety.[14]

Research in this area has shed light on the multifaceted relationship between psychological functioning, coping strategies, and distress among healthcare professionals during the COVID-19 pandemic. Several key themes emerge from these studies in the areas of coping strategies and psychological functioning; emotional regulation and psychological functioning; and the protective role of support and resources. We shall consider each of these three in turn. First, research indicates that coping strategies significantly influence the psychological functioning of healthcare professionals. Maladaptive coping mechanisms, such as using substances or engaging in avoidant behaviors to manage anxiety, have been associated with poorer psychological functioning.[17-19] These coping strategies may offer temporary relief but can exacerbate distress, impair emotional regulation, and ultimately negatively impact overall mental well-being. Second, effective emotional regulation has emerged as a critical determinant of psychological functioning during the pandemic. Healthcare professionals who struggle with overwhelming emotions or experience feelings of shame are more likely to exhibit poorer psychological functioning.[20,21] Emotional regulation skills are essential for managing distress, maintaining resilience, and responding adaptively to the demanding and emotionally charged situations they face daily. Finally, studies have found that access to support, both personal and professional, and financial resources play a protective role in healthcare professionals' psychological functioning.[22,23] Adequate financial stability can alleviate stress related to economic concerns, while support from colleagues and institutions can provide valuable buffers against distress and contribute to better overall psychological well-being.

Psychological distress refers to a state of emotional or mental suffering, characterized by feelings of anxiety, depression, or overwhelming stress. It can manifest in various ways, impacting a person's ability to cope with challenging situations and affecting their overall psychological functioning. Psychological distress can result from various factors, such as personal experiences, work-related stress, traumatic events, or the impact of a global crisis like the COVID-19 pandemic. The relationship between distress and psychological functioning is intricate and bidirectional. Prolonged distress can lead to impaired psychological functioning, affecting the ability of professionals to cope with stressors effectively. Heightened emotional reactivity and reduced emotional regulation may result in burnout, compassion fatigue, and decreased job satisfaction. Conversely, the way healthcare professionals cope with distress significantly influences their psychological functioning. Adaptive coping strategies, such as seeking social support, engaging in problem-solving, and practicing mindfulness, can foster resilience and enhance overall well-being. These strategies empower professionals to manage stress effectively, leading to better psychological outcomes. In contrast, maladaptive coping mechanisms, such as avoidance or substance use, may provide temporary relief but exacerbate distress and impair psychological functioning in the long term. Inadequate coping responses can contribute to emotional exhaustion, negatively affecting decision-making abilities, and ultimately undermining patient care.

It is worth mentioning that Positive Psychological Functioning (PPF) plays a vital role in shaping individuals' well-being and overall functioning. It encompasses various indicators of psychological wellness, reflecting positive feelings and cognitive evaluations of one's life in a favorable light. People with high PPF levels tend to lead fulfilling lives, experience positive emotions, and possess the capacity to handle life challenges effectively. Key components of PPF include eudaimonic well-being, life satisfaction, experienced well-being, optimism, and emotional vitality, all contributing to a comprehensive understanding of psychological flourishing.

It is important to note that coping strategies vary among different healthcare professional groups and sociocultural settings.[24] Analysis of data collected between 2008 and 2010 from a large cohort of Norwegian nursing staff showed the importance of baseline psychological job demands on the levels of sickness absence.[25] Doctors, nurses, and other healthcare workers may employ distinct approaches to

manage stress and adapt to the challenges posed by the pandemic. Identifying predictors of poor psychological functioning can, in principle, help to tailor supportive mitigating measures to specific professional groups.

A cross-sectional COVID-19 study in Tehran included 217 medical staff and reported that all suffered from stress, with 91% being found to have moderate to extremely severe levels; all from anxiety, with over 99% suffering from severe or extremely severe levels; and all from depression, with 85% suffering from severe or extremely severe levels.[26] The corresponding figures for a cohort of 174 non-medical and 296 medical healthcare workers in tertiary institutions in Singapore looking after COVID-19 patients reported the respective prevalence figures, in non-medical healthcare workers and medical healthcare workers, of stress to be 7% and 6%; anxiety 21 and 11%; and depression 10% and 8%.[27] In addition, post-traumatic stress disorder was found in 11% of the first group and 6% of the second.[27] A similar Chinese study, of 927 medical healthcare workers and 1255 non-medical healthcare workers, carried out during the COVID-19 pandemic, reported respective prevalence rates (medical healthcare workers first) for anxiety of 13% and 9%; 38% and 31% for insomnia; 12% and 10% for depression; 2% and almost zero for somatization symptoms; 5% and 2% for obsessive-compulsive symptoms; and 4% and 2% for phobic anxiety.[28] Risk factors for developing such symptoms included, for the medical healthcare workers, the presence of an organic disease, living in a rural area, female sex, and being at risk of making contact with COVID-19 patients; for the non-medical healthcare workers, the presence of an organic disease was a risk factor.[28] In a cross-sectional study of 271 healthcare workers, Kim and colleagues reported that, six months after the declaration of the COVID-19 pandemic, approximately one-third reported severe burnout, and moderate to severe anxiety and depression.[29] Predictors of good psychological functioning included feeling protected while working with patients affected by COVID-19, high family functioning, spirituality, satisfaction with the communications of the organization, and high resilience; thus, the opposite of each of these factors might be considered to be predictors of poor psychological functioning.[29] A cross-sectional COVID-19 study of 313 healthcare workers in Nigeria reported a prevalence of 47% for psychological distress, with risk factors including female sex; having contact with COVID-19 patients; and having a good knowledge of COVID-19.[30]

The main aim of this study was to determine predictors of poor psychological functioning in healthcare workers during the COVID-19 pandemic. In particular, unlike previous such studies, the greater statistical power afforded by general linear modeling was employed.[31] A further aim was to characterize key sociodemographic aspects of this cohort. A final aim was to determine the degree to which any predictors of poor psychological functioning were associated with each other.

METHODS

PARTICIPANTS AND PROCEDURE

The study was conducted in the city of Patras in Greece, and the study population consisted of 144 healthcare professionals, including doctors, nurses, and other allied health professionals. Participants were recruited through various healthcare facilities, including hospitals, clinics, and primary healthcare units. The inclusion criteria were being a healthcare professional working in the healthcare facilities of Patras and being willing to participate in the study.

The study was conducted using an internet-based questionnaire, which was distributed through email and various social media platforms. The questionnaire consisted of four parts: (1) demographic survey questions, (2) the Psychological Consequences Questionnaire (PCQ) scale, (3) the Kessler Psychological Distress scale (k6), and (4) Toulouse's scale for coping strategies (E.T.C.). The participants were informed that their data would be protected and anonymized. They consented to participate in the study by placing an X in the appropriate place.

The demographic survey questions collected information on the participants' age, gender, educational level, marital status, and professional status. The PCQ scale was used to measure the psychological consequences experienced by the participants during the pandemic. The k6 scale was used to assess the level of psychological distress experienced by the participants. Finally, Toulouse's scale for coping strategies was used to measure the coping strategies employed by the participants.

The PCQ scale is a self-report questionnaire that measures the psychological consequences of traumatic events.[32] It consists of 22 items, and the responses are rated on a 5-point Likert scale ranging from 0 (not at all) to 4 (extremely). The scale assesses four dimensions of psychological consequences: intrusion, avoidance, hyperarousal, and denial.

The k6 scale is a self-report questionnaire that measures psychological distress.[33] It consists of six items, and the responses are rated on a 5-point Likert scale ranging from 0 (none of the time) to 4 (all of the time).

Toulouse's scale for coping strategies (E.T.C.) is a self-report questionnaire that measures the coping strategies employed by individuals in stressful situations.[34,35] It consists of 20 items, and the responses are rated on a 4-point Likert scale ranging from 0 (never) to 3 (often). The scale assesses six dimensions of coping strategies: acceptance, active focus, cognitive focus, cognitive control and planning, emotional control, social informational support, and cooperation.

STATISTICAL ANALYSIS

A mixed stepwise multiple linear regression analysis, with poor psychological functioning as the dependent variable, was carried out. The Durbin-Watson statistic for the residuals in the resulting model was then calculated. Using the explanatory variables identified from this analysis, together with the dependent variable, a network analysis was then

carried out. The statistical analyses and network plotting were performed using R v. 4.2.1 and JASP 0.17.2.1.[36,37]

RESULTS

Results were obtained for 144 healthcare workers. There were no missing data. Their sociodemographic characteristics are detailed in Table 1.

The multiple linear regression analysis resulted in a highly significant statistical model, which is shown in Table 2 ($F_{4,139} = 16.44$, $p = 4.757 \times 10^{-11}$). It should be noted that the explanatory variables in this model have been treated as ordinal data. The adjusted R^2 value for this model was 0.302. A plot of the standardized residuals was approximately normal, with a Q-Q probability plot of the standardized residuals against theoretical quantiles being essentially linear. The Durbin-Watson analysis showed no evidence of autocorrelation in the residuals ($d = 1.874$, $p = 0.421$).

A *post hoc* network analysis was carried out which included the response variable and the four explanatory variables identified in the multiple linear regression analysis. A corresponding network plot is shown in Figure 1, with reddish-pink denoting a positive weighting and blue-purple a negative weighting. The corresponding symmetrical weights matrix is given in Table 3.

DISCUSSION

This cross-sectional study, during the COVID-19 pandemic, of 144 healthcare workers showed that smoking or taking drugs to calm anxiety, feeling ashamed, and being overwhelmed by one's feelings were all predictors of poor psychological functioning. Conversely, income was a protective factor; the higher the income, the better the psychological functioning. Furthermore, smoking or taking drugs to calm anxiety was relatively strongly associated with feeling ashamed; the latter was also associated with feeling overwhelmed. Finally, there was a weak negative association between income and feeling ashamed; the higher the income of a healthcare worker, the lower the degree of feeling ashamed.

Thus far, there is no robust evidence pointing to the role of smoking in this context. Indeed, a Mendelian randomization meta-analysis did not support a causal role of the heaviness of smoking in the development of anxiety and depression.[38] On the other hand, there is evidence of an association between drug use and poor psychological functioning, with, for example, a recent systematic review finding that university students at greatest risk of misusing opioids reported higher levels of poor psychological functioning.[39] A recent meta-analysis of the flow of compassion, assessed with the Fears of Compassion Scales, offered some support for the role of shame as a psychological vulnerability factor.[40] While the relationship of being overwhelmed by one's feelings with psychological functioning in healthcare workers has not hitherto been systematically studied, another recent meta-analysis has confirmed that burnout in physicians, which includes a feeling of overwhelming emotional exhaustion, is associated with poor professional functioning and poor job satisfaction; interestingly, from the viewpoint of the present study, physician burnout and poor job satisfaction were found to be greater in hospital settings than in general practice.[41] Regarding the protective effect of increased income on psychological functioning, many studies have reported a positive association between economic status and subjective well-being.[42]

The findings of this research highlight the complex relationship between psychological functioning, coping strategies, and distress among healthcare professionals during the COVID-19 pandemic. The study emphasizes the importance of adaptive coping strategies, effective emotional regulation, support and resources, and addressing distress in promoting the mental well-being of frontline workers.

Coping Strategies and Psychological Functioning: The study underscores the significant impact of coping strategies on the psychological functioning of healthcare professionals. Maladaptive coping mechanisms were associated with poorer psychological functioning, indicating the need to promote adaptive coping techniques. Providing training in problem-solving, cognitive reappraisal, and social support can enhance emotional regulation and resilience, leading to better overall mental well-being.

Emotional Regulation and Psychological Functioning: Effective emotional regulation plays a critical role in determining psychological functioning during the pandemic. Healthcare professionals who struggle with overwhelming emotions or experience feelings of shame are more likely to exhibit poorer psychological functioning. Supporting healthcare professionals in developing emotional regulation strategies, such as through counseling or mindfulness-based interventions, can help them navigate emotional challenges and cope with stress effectively.

Protective Role of Support and Resources: The study highlights the protective role of social and financial resources in influencing psychological functioning. Adequate financial stability and support from colleagues and institutions serve as valuable buffers against distress and contribute to better psychological well-being. Creating a supportive work environment that fosters teamwork, open communication, and psychological safety is crucial in supporting the mental health of healthcare professionals.

In conclusion, this study highlights the critical importance of psychological functioning in shaping the mental well-being of healthcare professionals during the COVID-19 pandemic. Continued research in this area is essential for identifying additional factors influencing psychological functioning and developing tailored interventions to support the unique needs of healthcare professionals. Prioritizing the mental health of frontline workers is crucial not only for their individual well-being but also for the overall functioning of healthcare systems.

Understanding this complex interplay is crucial for developing targeted interventions to support healthcare professionals. Providing access to mental health resources, offering resilience training, and fostering a supportive work environment can help bolster adaptive coping and mitigate

Table 1. Sociodemographic characteristics of the sample studied (*n* = 144; no missing data).

Sociodemographic variable		Number (%)
Sex	Male	40 (28)
	Female	104 (72)
Age (y)	< 25	4 (3)
	25 to 30	15 (10)
	31 to 40	60 (42)
	41 to 50	51 (35)
	51 to 60	13 (9)
	>60	1 (1)
Marital status	Never married	40 (28)
	Married	91 (63)
	Divorced	10 (7)
	Widowed	3 (2)
Highest education level	Post-secondary graduate education	12 (8)
	University or technical college graduate	70 (49)
	Postgraduate degree	48 (33)
	Doctoral degree	8 (6)
Residential area	Urban	129 (90)
	Semi-urban	12 (8)
	Rural	3 (2)
Monthly income (€)	≤ 500	6 (4)
	501 to 1000	59 (41)
	1001 to 1500	58 (40)
	1501 to 2000	14 (10)
	> 2000	6 (4)
Number of children	0	50 (35)
	1	34 (24)
	2	48 (33)
	≥ 3	12 (8)
Occupation	Nurse	81 (56)
	Psychologist	4 (3)
	Pathologist	6 (4)
	Medical laboratory technologist	5 (4)
	General practitioner	8 (6)
	Paramedic	5 (4)
	Other	35 (24)
Workplace	Intensive care unit	16 (11)
	COVID-19 clinic	11 (8)
	Health center	16 (11)
	Emergency department	7 (5)
	Surgical department	9 (6)
	Pathology	12 (8)
	Medical laboratory	3 (2)
	Other	70 (49)
Work experience (y)	≤ 5	35 (24)
	6 to 10	29 (20)
	11 to 20	57 (40)
	≥ 21	23 (16)

Table 2. Coefficients and constant term in the regression model.

	Coefficient	Standard error	*t*	*p*
Intercept	1.994	0.254	7.851	< 0.001
Income	-0.129	0.055	-2.337	0.021
Smoking or taking drugs to calm anxiety	0.123	0.045	2.724	0.007
Feeling ashamed	0.116	0.054	2.156	0.033
Being overwhelmed by one's feelings	0.224	0.044	5.047	< 0.001

Table 3. Weights matrix for the network analysis.

Variable	Poor psychological functioning	Feeling ashamed	Being overwhelmed by one's feelings	Smoking or taking drugs to calm anxiety	Income
Poor psychological functioning	0	0.217	0.344	0.153	-0.118
Feeling ashamed	0.217	0	0.148	0.307	-0.050
Being overwhelmed by one's feelings	0.344	0.148	0	0	0
Smoking or taking drugs to calm anxiety	0.153	0.307	0	0	0
Income	-0.118	-0.050	0	0	0

the adverse impact of distress on psychological functioning.

Based on our findings, the following interventions might help to mitigate poor psychological functioning in healthcare workers during stressful periods (such as during a pandemic). First, actively discouraging staff from smoking or abusing drugs. It should be noted, however, that the direction of causality here is not clear. It may well be that some healthcare workers smoke or use drugs because of poor psychological functioning. Second, offering psychological support and interventions proactively to staff members, which would help reduce feelings of shame and being overwhelmed by one's feelings. Regular psychological assessments could help identify particularly vulnerable individuals, although such assessments are likely to be unpopular and resisted by many healthcare workers. Finally, increasing the income of staff members would be beneficial. However, this is likely to be the most difficult measure to implement given budgetary constraints.

The four explanatory variables in our statistical model only accounted for 30% of the variability of the psychological functioning of the healthcare workers studied. Therefore, there are one or more other explanatory variables which need to be investigated. We would therefore recommend that a future study of this subject include additional potential explanatory variables. This might require face-to-face psychological interviews and neuropsychological assessments.

Overall, this growing body of research underscores the critical role of psychological functioning in shaping the mental well-being of healthcare professionals during the COVID-19 pandemic. Effective coping strategies, emotional regulation, access to support, and ethical decision-making support are integral components in maintaining psychological well-being amidst the challenges and uncertainties faced by frontline workers.

Incorporating these findings into evidence-based interventions is vital for promoting the psychological well-being of healthcare professionals. Targeted mental health support, including psychological counseling, resilience training, and mindfulness practices, can equip healthcare professionals with the necessary tools to cope effectively with stress and distress during this crisis.[43,44]

Furthermore, ongoing research in this area is essential for identifying additional factors that influence psychological functioning in healthcare professionals. Understanding the complex interplay of personal, professional, and contextual factors can inform the development of comprehensive interventions tailored to the unique needs of frontline workers.[45,46]

Submitted: July 27, 2023 EST, Accepted: October 14, 2023 EST

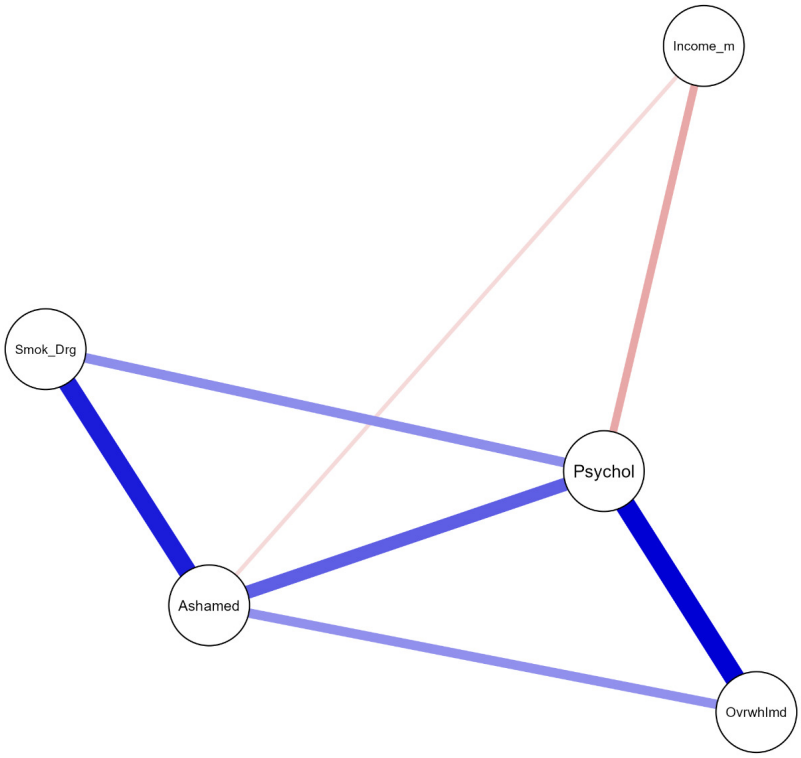

Figure 1. Network analysis, with positive weights shown in reddish-pink, and negative weights in blue-purple. The thickness of each line between any two variables indicates the strength of the weight between those two variables.

Psychol – poor psychological functioning; Ashamed – feeling ashamed; Overwhlmd - being overwhelmed by one's feelings; Smok_Drg - smoking or taking drugs to calm anxiety; Income_m – income (monthly).

REFERENCES

1. Babore A, Lombardi L, Viceconti ML, et al. Psychological effects of the COVID-2019 pandemic: Perceived stress and coping strategies among healthcare professionals. *Psychiatry Res*. 2020;293:113366. doi:10.1016/j.psychres.2020.113366

2. Carmassi C, Foghi C, Dell'Oste V, et al. PTSD symptoms in healthcare workers facing the three coronavirus outbreaks: What can we expect after the COVID-19 pandemic. *Psychiatry Res*. 2020;292:113312. doi:10.1016/j.psychres.2020.113312

3. Kadović M, Mikšić Š, Lovrić R. Ability of emotional regulation and control as a stress predictor in healthcare professionals. *Int J Environ Res Public Health*. 2022;20(1):541. doi:10.3390/ijerph20010541

4. Ngere AO, Waithima C, Karume M, Kihara M. The association between levels of psychological distress due to COVID-19 and psychological coping strategies among Nairobi residents. *East Afr J Health Sci*. 2023;6(1):55-61. doi:10.37284/eajhs.6.1.1113

5. Nielsen MB, Knardahl S. Coping strategies: a prospective study of patterns, stability, and relationships with psychological distress. *Scand J Psychol*. 2014;55(2):142-150. doi:10.1111/sjop.12103

6. Lazarus RS, Folkman S. *Stress, Appraisal, and Coping*. Springer; 1984.

7. Israelashvili J. More Positive Emotions During the COVID-19 Pandemic Are Associated With Better Resilience, Especially for Those Experiencing More Negative Emotions. *Front Psychol*. 2021;12:648112. doi:10.3389/fpsyg.2021.648112

8. Landy JF, Shigeto A, Laxman DJ, Scheier LM. Typologies of stress appraisal and problem-focused coping: associations with compliance with public health recommendations during the COVID-19 pandemic. *BMC Public Health*. 2022;22(1):784. doi:10.1186/s12889-022-13161-5

9. Theodoratou M, Kalpini Papadopoulou CH, Kiritsi V, et al. Novel insights on Greek students' coping strategies. *J Psychol Clin Psychiatry*. 2017;8(1). doi:10.15406/jpcpy.2017.08.00473

10. Theodoratou M, Farmakopoulou I, Kougioumtzis G, et al. Emotion-focused coping, social support and active coping among university students: Gender differences. *J Psychol Clin Psychiatry*. 2023;14(1):5-9. doi:10.15406/jpcpy.2023.14.00720

11. Lara R, Fernández-Daza M, Zabarain-Cogollo S, et al. Active Coping and Anxiety Symptoms during the COVID-19 Pandemic in Spanish Adults. *Int J Environ Res Public Health*. 2021;18(16):8240. doi:10.3390/ijerph18168240

12. Fredrickson BL. Cultivating positive emotions to optimize health and well-being. *Prev Treat*. 2000;3(1). doi:10.1037/1522-3736.3.1.31a

13. Compas BE, Connor-Smith JK, Saltzman H, Thomsen AH, Wadsworth ME. Coping with stress during childhood and adolescence: problems, progress, and potential in theory and research. *Psychol Bull*. 2001;127(1):87-127. doi:10.1037/0033-2909.127.1.87

14. Compas BE, Jaser SS, Dunbar JP, et al. Coping and Emotion Regulation from Childhood to Early Adulthood: Points of Convergence and Divergence. *Aust J Psychol*. 2014;66(2):71-81. doi:10.1111/ajpy.12043

15. Skinner EA, Edge K, Altman J, Sherwood H. Searching for the structure of coping: a review and critique of category systems for classifying ways of coping. *Psychol Bull*. 2003;129(2):216-269. doi:10.1037/0033-2909.129.2.216

16. Folkman S, Moskowitz JT. Positive affect and meaning-focused coping during significant psychological stress. In: Hewstone M, Schut HAW, De Wit JBF, van den Bos K, Stroebe MS, eds. *The Scope of Social Psychology: Theory and Applications*. Psychology Press; 2007:193-208.

17. Linden B, Monaghan C, Zheng S, Rose J, Mahar A. A cross-sectional analysis of the impact of COVID-19 related stressors on Canadian university students' mental health and wellbeing (Preprint). doi:10.21203/rs.3.rs-971271/v1

18. Oh H, Marinovich C, Rajkumar R, et al. COVID-19 dimensions are related to depression and anxiety among US college students: Findings from the Healthy Minds Survey 2020. *J Affect Disord*. 2021;292:270-275. doi:10.1016/j.jad.2021.05.121

19. Taylor SE, Stanton AL. Coping resources, coping processes, and mental health. *Annu Rev Clin Psychol*. 2007;3:377-401. doi:10.1146/annurev.clinpsy.3.022806.091520

20. Greenberg N, Docherty M, Gnanapragasam S, Wessely S. Managing mental health challenges faced by healthcare workers during covid-19 pandemic. *BMJ*. 2020;368:m1211. doi:10.1136/bmj.m1211

21. Li Z, Ge J, Yang M, et al. Vicarious traumatization in the general public, members, and non-members of medical teams aiding in COVID-19 control. *Brain Behav Immun*. 2020;88:916-919. doi:10.1016/j.bbi.2020.03.007

22. Que J, Shi L, Deng J, et al. Psychological impact of the COVID-19 pandemic on healthcare workers: a cross-sectional study in China. *Gen Psychiatry*. 2020;33(3):e100259. doi:10.1136/gpsych-2020-100259

23. Zhang Y, Ma ZF. Impact of the COVID-19 pandemic on mental health and quality of life among local residents in Liaoning Province, China: a cross-sectional study. *Int J Environ Res Public Health*. 2020;17(7):2381. doi:10.3390/ijerph17072381

24. Cabarkapa S, Nadjidai SE, Murgier J, Ng CH. The psychological impact of COVID-19 and other viral epidemics on frontline healthcare workers and ways to address it: A rapid systematic review. *Brain Behav Immun - Health*. 2020;8:100144. doi:10.1016/j.bbih.2020.100144

25. Roelen C, van Rhenen W, Schaufeli W, et al. Mental and physical health-related functioning mediates between psychological job demands and sickness absence among nurses. *J Adv Nurs*. 2014;70(8):1780-1792. doi:10.1111/jan.12335

26. Vahedian-Azimi A, Moayed MS, Rahimibashar F, Shojaei S, Ashtari S, Pourhoseingholi MA. Comparison of the severity of psychological distress among four groups of an Iranian population regarding COVID-19 pandemic. *BMC Psychiatry*. 2020;20(1):402. doi:10.1186/s12888-020-02804-9

27. Tan BYQ, Chew NWS, Lee GKH, et al. Psychological impact of the COVID-19 pandemic on health care workers in Singapore. *Ann Intern Med*. 2020;173(4):317-320. doi:10.7326/m20-1083

28. Zhang WR, Wang K, Yin L, et al. Mental health and psychosocial problems of medical health workers during the COVID-19 epidemic in China. *Psychother Psychosom*. 2020;89(4):242-250. doi:10.1159/000507639

29. Kim SC, Sloan C, Chechel L, Redila M, Ferguson J. Severe burnout and poor mental health among healthcare workers 6 months after COVID-19 pandemic declaration: what can we learn for future emergencies? *J Nurs Adm*. 2021;51(11):554-560. doi:10.1097/nna.0000000000001063

30. Badru OA, Oloko KO, Hassan AO, Yusuf OB, Abdur-Razaq UA, Yakub S. Prevalence and correlates of psychological distress amongst healthcare workers during the COVID-19 pandemic: An online survey. *South Afr J Psychiatry*. 2021;27:1617. doi:10.4102/sajpsychiatry.v27i0.1617

31. McCullagh P, Nelder JA. *Generalized Linear Models*. 2nd ed. Chapman and Hall; 1989. doi:10.1007/978-1-4899-3242-6

32. Cockburn J, De Luise T, Hurley S, Clover K. Development and validation of the PCQ: a questionnaire to measure the psychological consequences of screening mammography. *Soc Sci Med 1982*. 1992;34(10):1129-1134. doi:10.1016/0277-9536(92)90286-y

33. Kessler RC, Barker PR, Colpe LJ, et al. Screening for serious mental illness in the general population. *Arch Gen Psychiatry*. 2003;60(2):184-189. doi:10.1001/archpsyc.60.2.184

34. Tap P, Esparbès S, Sordes-Ader F. Coping strategies and personalization. *Bulg J Psychol*. 1995;2:59-80.

35. Theodoratou M. Scale of Evaluating Coping Strategies. In: Stalikas A, Triliva S, Roussi P, eds. *Psychometric Tools in Greece*. Ellinika Grammata; 1999.

36. JASP Team. *JASP (Version 0.17.2.1)*.; 2023.

37. R Core Team. *R: A Language and Environment for Statistical Computing*. R Foundation for Statistical Computing; 2022.

38. Taylor AE, Fluharty ME, Bjørngaard JH, et al. Investigating the possible causal association of smoking with depression and anxiety using Mendelian randomisation meta-analysis: the CARTA consortium. *BMJ Open*. 2014;4(10):e006141. doi:10.1136/bmjopen-2014-006141

39. Weyandt LL, Gudmundsdottir BG, Holding EZ, et al. Prescription opioid misuse among university students: A systematic review. *J Am Coll Health*. 2022;70(4):1119-1137. doi:10.1080/07448481.2020.1786095

40. Kirby JN, Day J, Sagar V. The “flow” of compassion: A meta-analysis of the fears of compassion scales and psychological functioning. *Clin Psychol Rev*. 2019;70:26-39. doi:10.1016/j.cpr.2019.03.001

41. Hodkinson A, Zhou, A, Johnson J, et al. Associations of physician burnout with career engagement and quality of patient care: systematic review and meta-analysis. *BMJ*. 2022;378:e070442. doi:10.1136/bmj-2022-070442

42. Howell RT, Howell CJ. The relation of economic status to subjective well-being in developing countries: a meta-analysis. *Psychol Bull*. 2008;134(4):536-560. doi:10.1037/0033-2909.134.4.536

43. Wang Y, Ma S, Yang C, et al. Acute psychological effects of Coronavirus Disease 2019 outbreak among healthcare workers in China: a cross-sectional study. *Transl Psychiatry*. 2020;10(1):348. doi:10.1038/s41398-020-01031-w

44. Wu C, Liu Y, Ma S, et al. The mediating roles of coping styles and resilience in the relationship between perceived social support and posttraumatic growth among primary caregivers of schizophrenic patients: a cross-sectional study. *BMC Psychiatry*. 2021;21(1):58. doi:10.1186/s12888-021-03058-9

45. Pollock A, Campbell P, Cheyne J, et al. Interventions to support the resilience and mental health of frontline health and social care professionals during and after a disease outbreak, epidemic or pandemic: a mixed methods systematic review. *Cochrane Database Syst Rev*. 2020;11(11):CD013779. doi:10.1002/14651858.cd013779

46. Zhang XT, Shi SS, Qin Ren Y, Wang L. The traumatic experience of clinical nurses during the COVID-19 pandemic: which factors are related to post-traumatic growth? *Risk Manag Healthc Policy*. 2021;14:2145-2151. doi:10.2147/rmhp.s307294