

PATH ANALYSIS OF FACTORS AFFECTING STRESS, ANXIETY AND DEPRESSION IN MEDICAL RESIDENTS DURING THE COVID-19 PANDEMIC

Aziza Matinu Karima,¹ Gst. Ayu Maharatih,² IGB. Indro Nugroho²

Correspondence: aziza.matinu.karima@gmail.com

1Department of Psychiatry, General Hospital Dr. Saiful Anwar, East Java, Indonesia

2Department of Psychiatry, Dr. Moewardi Regional General Hospital, Surakarta, Indonesia

RESEARCH

OPEN ACCESS

ABSTRACT

Introduction: The COVID-19 pandemic has significantly affected the mental health of medical personnel, particularly residents who face high clinical workloads, exposure risks, and academic pressures. The aim of this research to analyze direct and indirect determinants of stress, anxiety, and depression among medical residents using path analysis.

Methods: A cross-sectional study involving 437 residents at Dr. Moewardi Hospital was conducted in October–November 2020. Stress, anxiety, and depression were assessed using the DASS-21, while coping mechanisms were measured using the Brief COPE. Data analysis was conducted using path analysis.

Results: Stress ($\beta = 0.5$; $p < 0.001$) and anxiety ($\beta = 0.18$; $p < 0.001$) directly increased depression, while adaptive coping showed a negative association ($\beta = -1.2$; $p < 0.001$). Age, sex, comorbidities, and COVID-19 exposure had indirect effects mediated by stress and anxiety.

Discuss: The findings of this study underscore the importance of interventions that reinforce adaptive coping, including stress management training, *mindfulness*, peer support, and religious approaches.

Conclusion: Stress and anxiety significantly predicted depression, while adaptive coping had a protective effect.

Keywords: stress, anxiety, depression, coping, medical residents, COVID-19.

Article History:

Received: January 20, 2026

Accepted: March 28, 2026

Published: March 31, 2026

Cite this as: Karima, A.M., Maharatih, G.A., Nugroho, I.I. Path Analysis of Factors Affecting Stress, Anxiety and Depression in Medical Residents during the COVID-19 Pandemic. *Journal of Psychiatry, Psychology, and Behavioral Research*; 2026.7:1. p8-13.

INTRODUCTION

The Coronavirus Disease 2019 (COVID-19) pandemic has had a major impact on the healthcare system and the psychological well-being of medical personnel. Doctors and healthcare workers are on the front lines facing rising cases, limited facilities, and a high risk of infection exposure, all of which cause significant psychological pressure.¹⁻⁴ Various international studies indicate that more than half of healthcare workers experienced symptoms of stress, anxiety, and depression during the peak of the pandemic, making this group a highly vulnerable population.⁵⁻⁷

In Indonesia, doctors in the Specialist Doctor Education Program (PPDS/Residents) face a double burden of academic demands, long shift hours, and infection risk. A survey by the Indonesian Psychiatric Association (IPA as known as PDSKJI [Perhimpunan Dokter Kesehatan Jiwa Indonesia]) showed a high prevalence of anxiety, depression, and post-traumatic stress among healthcare workers during the pandemic.⁸ This condition places medical residents at risk of significant psychological distress.

Theoretically, stress, anxiety, and depression have a close interaction in emotional responses to environmental pressures. The *stress–appraisal–coping* model by Lazarus and Folkman explains that stress arises when environmental demands exceed an individual's ability to adapt.⁹ When chronic, stress can trigger anxiety and eventually develop into depression, consistent with physiological evidence regarding the dysregulation of the nervous system, neurotransmitters, and the hypothalamic-pituitary-adrenal (HPA) axis.¹⁰⁻¹³

Coping mechanisms play a crucial role in determining whether an individual can adapt in a healthy way. Adaptive coping strategies such as *planning*, *positive reframing*, and *religious coping* have been proven to reduce the risk of depression,¹⁴⁻¹⁶ whereas maladaptive coping strategies such as *denial*, *venting*, and *behavioral disengagement* actually increase the risk of psychological disorders.¹⁰⁻¹¹

Although many studies have reported high levels of psychological distress among healthcare workers during the pandemic,⁵⁻⁷ studies assessing the structural relationship between demographic factors, coping mechanisms, stress, anxiety, and depression among medical residents in Indonesia

remain limited. This study aims to evaluate the direct and indirect effects of these factors using path analysis.

METHOD

Study Design

This research is a *cross-sectional* study conducted in October–November 2020 at Dr. Moewardi Regional General Hospital, Surakarta.

Population and Sample

The study population consisted of all active medical residents (PPDS I). A total of 437 respondents met the inclusion criteria and agreed to participate in the study.

Research Instruments

DASS-21 was developed by Lovibond & Lovibond. This instrument was used to assess stress, anxiety, and depression. The Indonesian version has been tested for validity and reliability by Damanik, with Cronbach's $\alpha > 0.70$ across all three subscales.

Brief COPE, based on the model by Lazarus & Folkman, was used to assess adaptive and maladaptive coping. Previous coping research has shown good construct validity, and *religious coping* has shown significant validity in the Indonesian population.

Conceptual Framework

The conceptual framework in this study explains that during the COVID-19 pandemic, all aspects of a person's life, starting from gender, age, how many semesters a resident has studied, marital status, family factors including living with family or not during specialist medical education, economic factors including school fees, smoking or alcohol consumption history, comorbid factors of a resident, how often and close to exposure to the coronavirus, and whether the resident has ever been infected with the coronavirus or not, will affect a person's coping mechanisms in facing this Covid-19 outbreak/phenomenon. The use of adaptive or maladaptive coping will certainly affect a person's stress level, so that it can result in him experiencing anxiety disorders and/or depression, or he can successfully overcome this COVID-19 pandemic phenomenon well. This has encouraged researchers to further investigate the direct and indirect influence of various variables on stress, anxiety, and depression in medical residents [Figure 1].

Analysis Procedure

Data analysis was performed using path analysis to test the direct and indirect influences between components. Bivariate tests (chi-square and Pearson correlation) were performed prior to modeling.

The path analysis procedure was chosen in this study because it allows testing causal relationships among variables with both direct and indirect influences (through intermediary variables). Furthermore, path analysis can provide us with a visualization of the causal relationship model between variables created from the research results

Ethical Consideration

Written informed consent for publication was obtained from the respondents after a full explanation of the purpose and scope of this research. Ethical clearance for this research was granted by the Health Research Ethics Committee, Dr. Moewardi General Hospital.

RESULT

Respondent Characteristics

The average age of respondents was 33 ± 3.6 years; 55.4% were male; 75.1% had high exposure to COVID-19 patients; and 22.65% had chronic comorbidities. Symptoms of stress were experienced by 58.6% of respondents, anxiety by 54%, and depression by 47.2%, with the majority falling into the mild-to-moderate category. Based on table 1 and 2, it can be seen that the majority of respondents are male (55.4%), most are in the middle semester between semesters 3 and 4 (27.2%), married (79.9%), live with family (55.1%), do not smoke (89.9%), do not drink alcohol (97.5%), funding source from parents/self (75.06), close to exposure to Covid (75.1%), do not have comorbid diseases (77.35%), have never been infected (95.9%), and the medical residents that most fills in is Psychiatry (17.2%).

Bivariate Results

Stress correlated positively with anxiety ($r = 0.69$; $p < 0.001$) and depression ($r = 0.61$; $p < 0.001$); then anxiety correlated positively with depression ($r = 0.69$; $p < 0.001$). Another result reveals that adaptive coping correlated negatively with depression ($r = -1.2$; $p < 0.001$), and then COVID-19 exposure, female gender, and comorbidities were significantly associated with stress and anxiety levels ($p < 0.05$). From Table 3, it can be seen that stress has a positive correlation with depression ($r = 0.61$; $p < 0.001$); coping mechanisms have a negative correlation ($r = -1.2$; $p < 0.0001$). From Table 4, it can be seen that stress has a positive correlation with anxiety ($r = 0.68$; $p < 0.001$). COVID-19 exposure, female gender, and comorbidities were significantly associated with stress and anxiety levels ($p < 0.05$).

Path Analysis

The final model showed a good fit. Significant path coefficients included: Stress $\rightarrow$ Depression ($\beta = 0.5$; $p < 0.001$); Anxiety $\rightarrow$ Depression ($\beta = 0.18$; $p < 0.001$); Adaptive Coping $\rightarrow$ Depression ($\beta = -1.2$; $p < 0.001$); Demographic factors had indirect effects through stress and anxiety.

Figures 2 and 3 show that depression is directly influenced by anxiety, coping mechanisms, and stress. (a) Coping mechanisms directly decreased the likelihood of depression by 1.2 units and were statistically significant ($b = -1.17$; 95% CI = -1.59 to -0.75; $p = 0.000$); (b) Anxiety directly increased the likelihood of depression by 0.18 units and was statistically significant ($b = 0.18$; 95% CI = 0.07 to 0.28; $p = 0.001$). (c) Stress directly increased the likelihood of depression by 0.5 units, with a statistically significant effect ($b = 0.49$; 95% CI = 0.40 to 0.59; $p = 0.000$).

Depression is indirectly influenced by age, exposure, gender, and comorbidities, where: (a) Age increases the likelihood of using coping mechanisms by 0.13 units and is statistically highly significant ($b = 0.12$; 95% CI = 0.05 to 0.20; $p < 0.001$); (b) Coping mechanisms decrease the likelihood of stress by 3.2 units and is statistically significant ($b = -3.24$; 95% CI = -3.84 to -2.65; $p < 0.000$); (c) Coping mechanisms decrease the likelihood of anxiety by 0.38 units and is statistically highly significant ($b = -0.38$; 95% CI = -0.75 to -0.07; $p < 0.046$); (d) Stress increased the likelihood of anxiety by 0.68 units and was statistically highly significant ($b = 0.68$; 95% CI = 0.63 to 0.73; $p < 0.000$); (e) Exposure increased the likelihood of anxiety by 0.34 units and was statistically highly significant ($b = 0.34$; 95% CI = 0.02 to 0.65; $p < 0.032$); (f) Gender increased the likelihood of anxiety by 0.29 units and was statistically highly significant ($b = 0.28$; 95% CI = 0.01 to 0.56; $p < 0.001$); (g) Comorbidity increased the likelihood of anxiety by 0.32 units and was statistically significant ($b = 0.31$; 95% CI = -0.00 to 0.64; $p < 0.05$).

DISCUSS

This study demonstrates that stress and anxiety are strong predictors of depression in medical residents during the COVID-19 pandemic. These findings align with various international studies highlighting the high prevalence of mental health issues among healthcare workers during the pandemic.⁵⁻⁷ Increased workload, infection risk, and academic pressure reinforce medical residents' psychological vulnerability. The strong correlation between stress, anxiety, and depression supports the conceptual framework of Lazarus and Folkman,⁹ which emphasizes the role of coping mechanisms in determining individual emotional responses. Various previous studies have also shown the link between prolonged stress and the emergence of anxiety and depression,¹⁰⁻¹¹ illustrating a progressive pattern of psychological distress. Physiologically, chronic stress can cause continuous activation of the HPA axis, disturbances in cortisol secretion, and changes in neurotransmitter systems such as serotonin and dopamine. These mechanisms have been linked to the development of depression in neuropsychiatric literature.^{12,13}

This study also confirms the protective role of adaptive coping mechanisms. Strategies such as *planning*, *positive reframing*, and *religious coping* proved helpful for individuals in managing stress constructively. These findings are consistent

with previous research,¹⁴⁻¹⁶ showing that adaptive coping can reduce psychological distress in various populations, including healthcare workers. Conversely, maladaptive coping such as *denial* and *venting* is associated with increased emotional distress, as reported in prior studies.¹⁰⁻¹¹ This underscores that it is not only the level of stress that matters, but also how individuals interpret and respond to it. Demographic factors such as female gender and COVID-19 exposure showed indirect relationships with depression through increased stress and anxiety. This finding is consistent with international research regarding healthcare worker groups that have higher psychological risks.^{5,6}

The findings of this study underscore the importance of interventions that reinforce adaptive coping, including stress management training, *mindfulness*, peer support, and religious approaches. Evidence from research in Indonesia shows that *religious coping* is effective in reducing depressive symptoms during the pandemic.¹⁶

However, this study has limitations, including a cross-sectional design that does not allow for strong causal inference and reliance on self-report instruments, which are prone to bias. Nevertheless, the strength of this study lies in its large sample size and the use of path analysis, which can comprehensively describe the direct and indirect effects among variables.

Table 1. Characteristics of Subjects

No	Characteristic	Category	n	%
1	Gender	Male	242	55.4
		Female	195	44.6
2	Semester	Junior	106	24.3
		Middle	119	27.2
		Senior	110	25.2
		Chief	74	16.9
		>8 semesters	28	6.4
3	Marital Status	Single	86	19.7
		Married	349	79.9
		Widowed/Divorced	2	0.5
4	Residence	Alone	196	44.9
		With Family	241	55.1
5	Tuition Funding	Self	104	23.8
		Parents	224	51.3
		Scholarship	109	24.9
6	Smoking History	Never	393	89.9
		< 2 cigarettes	35	8.0
		1 pack	9	2.1
7	Alcohol History	Never	426	97.5
		Rare	9	2.1
		Several drinks/week	2	0.5
8	COVID Exposure	Not Close	109	24.9
		Close	197	45.1
		Very Close	131	30.0
9	Comorbidities	None	338	77.35
		Present	99	22.65
10	Infected with COVID	No	419	95.9
		Sick	18	4.1
11	Study program	Cardiovascular Disease	30	7,0
		Anesthesiology	44	10
		Internal Medicine	58	13,2
		Radiology	25	5,9
		Psychiatry	74	17,2
		THT-KL Health Sciences	16	3,7
		Obstetrics and Gynecology	22	5,1
		Surgery	48	11
		Orthopedics and Traumatology	10	2,2
		Pediatrics	16	3,7
		Pulmonology	50	11,3
		Neurology	24	5,3

Dermatology and Venereology	13	2,9
Clinical Pathology	7	1,5
Total	437	100.0

Table 2. Univariate Analysis Results of Categorical Data

Variable	Frequency (n)	Percentage (%)	Variable	Frequency (n)	Percentage (%)
Gender			Alcohol Consumption		
Female	195	44.62	No	426	97.48
Male	242	55.38	Yes	11	2.52
Marital Status			Funding Source		
Married	349	79.86	Scholarship	109	24.94
Single	88	20.14	Self/Parents	328	75.06
Residence			COVID-19 Exposure Risk		
Alone	196	44.85	Low	109	24.94
With family	241	55.15	High	328	75.06
Smoking			COVID-19 Infection Status		
No	393	89.93	No	419	95.88
Yes	44	10.07	Yes	18	4.12

Table 3. Characteristics of the relationship between stress, coping mechanisms, gender, comorbidities, COVID-19 infection, exposure, smoking, marriage, residence, age, semester, financing with depression.

Depression				
Variable	b	[95% CI]		p
Stress	.6151555	.5544661	.6758448	0.000
Coping Mechanisms	-1.279779	-1.710275	-.8492837	0.000
Gender	.1819551	-.1497083	.5136185	0.281
Comorbidities	-.2012416	-.5735332	.17105	0.289
COVID-19 Infection	-.3120397	-1.085226	.4611464	0.428
Exposure	.0089474	-.3567176	.3746125	0.962
Smoking	-.0274976	-.5654345	.5104392	0.920
Marriage	-.5393122	-.9785967	-.1000277	0.016
Residence	.0786791	-.2609736	.4183319	0.649
Age	.0239612	-.0309273	.0788497	0.391
Semester	.0304702	-.039697	.1006374	0.394
Financing	.3200648	-.087856	.7279856	0.124
Scholarship	.1088478	-.3391427	.5568382	0.633

Table 4. Characteristics of the relationship between stress, coping mechanisms, gender, comorbidities, COVID-19 infection, exposure, smoking, marriage, residence, age, semester, and financing with anxiety.

Anxiety				
Variabel	b	[95% CI]		p
Stress	.6856228	.6310693	.7401762	0.000
Coping Mechanisms	-.3600699	-.7470411	.0269013	0.068
Gender	.3344045	.0362732	.6325358	0.028
Comorbidities	.3328898	-.0017621	.6675417	0.051
COVID-19 Infection	.2154371	-.4795778	.9104519	0.543
Exposure	.3743061	.0456108	.7030015	0.026
Smoking	.1959717	-.2875783	.6795217	0.426
Marriage	.1581992	-.2366724	.5530709	0.431
Residence	.0722147	-.2330983	.3775277	0.642
Age	-.0037983	-.0531375	.0455408	0.880
Semester	-.0347348	-.0978079	.0283383	0.280
Financing	.0136684	-.316182	.4171759	0.787
Scholarship	-1.390919	-.389029	.4163659	0.947

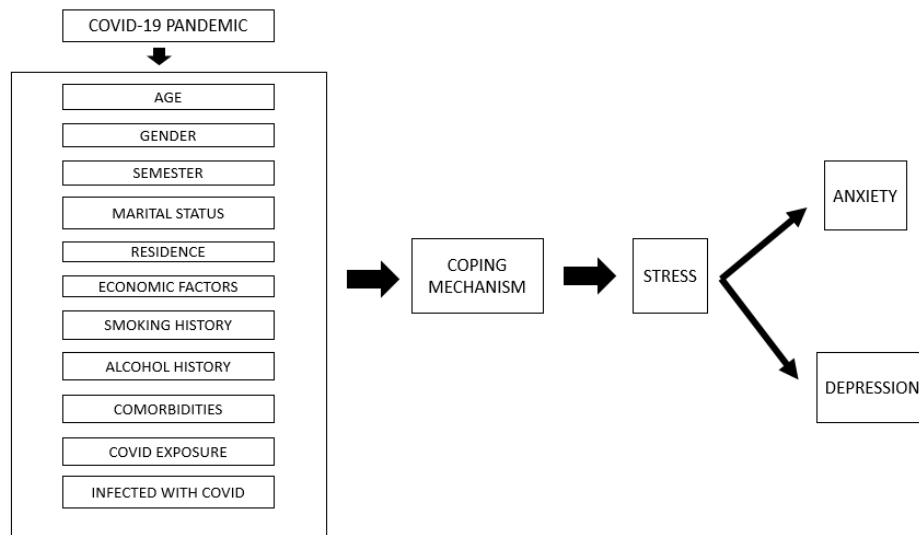


Figure 1. Conceptual Framework

Dependent variable	Independent variable	Coef. (b)	CI 95%		p
			Lower limit	Upper limit	
<i>Direct effect</i> Depression	← Anxiety	.1810074	.0781595	.2838552	0.001
	← Coping mechanism	-1.1792	-1.598538	-.7598621	0.000
	← Stress	.4984563	.4063569	.5905558	0.000
<i>Indirect effect</i> Anxiety	← Coping mechanism	-.3834155	-.7597163	-.0071146	0.046
	← Stress	.6831669	.6301349	.7361989	0.000
	← Exposure	.3442842	.0288016	.6597669	0.032
	← Age	.2877649	.0123324	.5631975	0.041
	← Comorbidities	.3186659	-.0077825	.6451143	0.056
Coping mechanism	← Age	.1256233	.0507036	.200543	0.001
Stress	← Coping mechanism	-3.247006	-3.842243	-2.651769	0.000

N observations= 437
 p= 0.171
 RMSEA= 0.029
 CFI= 0.99
 TLI= 0.99
 SRMR= 0.03
 CD= 0.05
 AIC= 8018.547
 BIC= 8149.104

Figure 2. Results of path analysis between stress, anxiety, depression, coping mechanisms, age, exposure, gender, and comorbidities.

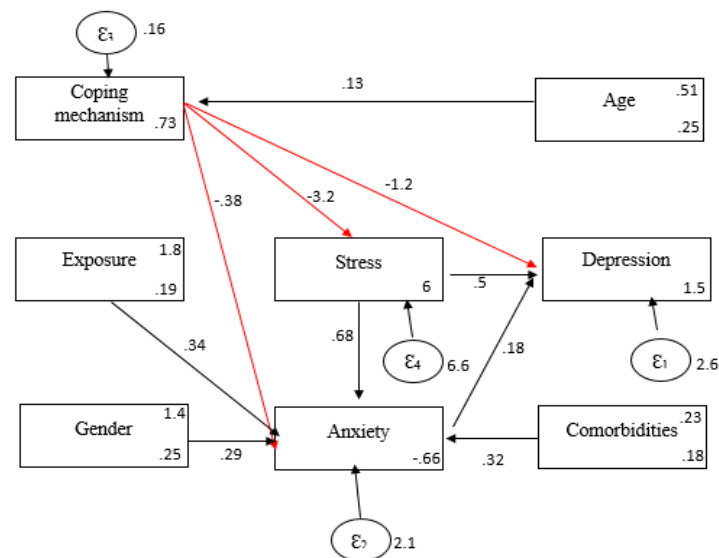


Figure 3. Path analysis model of stress, anxiety, and depression with coping mechanisms and demographic factors

CONCLUSION

Stress and anxiety are the main predictors of depression in medical residents during the COVID-19 pandemic, while adaptive coping mechanisms have a significant protective effect. Demographic factors have an indirect effect on depression through stress and anxiety.

Medical education institutions and hospitals need to develop comprehensive psychological support programs, including stress management training, strengthening of adaptive coping, spiritual support, and peer support systems. Longitudinal research is needed to assess long-term psychological dynamics.

REFERENCES

1. Cascella M, Rajnik M, Cuomo A, Dulebohn SC, Di Napoli R. Features, evaluation and treatment of coronavirus (COVID-19). StatPearls; 2020.
2. Perlman S, Netland J. Coronaviruses post-SARS: update on replication and pathogenesis. *Nat Rev Microbiol*. 2009;7(6):439-50.
3. Renu K, Prasanna PL, Gopalakrishnan AV. Coronaviruses pathogenesis, comorbidities and multi-organ damage. *Life Sci*. 2020;255:117839.
4. Meyer NJ, et al. The role of cytokine storm in ARDS and COVID-19. *Chest*. 2021;159(3):1050-65.
5. Alonso J, Vilagut G, Mortier P, et al. Mental health impact of COVID-19 on healthcare workers. *J Affect Disord*. 2021;278:103-11.
6. Lai J, Ma S, Wang Y, et al. Factors associated with mental health outcomes among healthcare workers. *JAMA Netw Open*. 2020;3(3):e203976.
7. Spoorthy MS, Pratapa SK, Mahant S. Mental health problems faced by healthcare workers due to COVID-19. *Asian J Psychiatry*. 2020;51:102119.
8. Handayani RT, et al. Kondisi dan strategi penanganan kecemasan tenaga kesehatan. *Front Psychol*. 2020;11:789.
9. Lazarus RS, Folkman S. Stress, Appraisal, and Coping. New York: Springer; 1984.
10. Orzechowska A, et al. Depression and ways of coping with stress. *Med Sci Monit*. 2013;19:1050-6.
11. Ogińska-Bulik N, Juczyński Z. Personality, stress and health. Warsaw: Difin; 2008.
12. Nesrin HS, Gülseren M. Cognitive intelligence, emotional intelligence, coping and stress. *Turk J Psychiatry*. 2009;20(1):1-10.
13. Popoli M. Synaptic stress and neuropsychiatric disorders. In: *Synaptic Stress and Neuropsychiatric Disorders*. Springer; 2014.
14. Dewe P, Cooper CL. Coping research and measurement in work-related stress. Wiley; 2007.
15. Cox T, Griffiths A. Work-related stress: theoretical perspective. Wiley-Blackwell; 2010.
16. Syakurah RA, Masyitha I, Rachmawati P. Religious coping and depression among healthcare workers. *Front Psychol*. 2021;12:789-95.
17. Damanik ED. Reliabilitas dan validitas DASS-21 versi Indonesia. Universitas Indonesia; 2006.
18. Lovibond SH, Lovibond PF. Manual for the Depression Anxiety Stress Scales. Sydney: Psychology Foundation; 1996.
19. Mirwanti D, et al. Hubungan cemas dan depresi pada pasien jantung koroner. *Medisains*. 2017;15(1):10-16.