

Original Article
Psychiatry & Psychology



Effects of Depression and Resilience of Public Workers on Work-related Stress and Anxiety in Response to the COVID-19 Pandemic

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OPEN ACCESS

Received: Apr 14, 2021

Accepted: Sep 6, 2021

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ABSTRACT

Background: This study explored the clinical variables related to public workers' stress and anxiety regarding the viral epidemic, and the mediating effect of resilience on the relationship between their depression and anxiety in response to coronavirus disease 2019 (COVID-19) pandemic.

Methods: A total of 938 public workers answered anonymous questionnaires in May 2020. The survey included rating scales such as the Stress and Anxiety to Viral Epidemics-9 (SAVE-9), Patients Health Questionnaire-9 (PHQ-9), Generalized Anxiety Disorder-7 (GAD-7), and Connor-Davidson Resilience Scale 2 items (CD-RISC 2), and subjects also answered whether they were employed in COVID-19 related fields.

Results: Married, female, junior, public workers reported a higher level of stress and anxiety in response to the viral epidemic. Furthermore, high levels of stress and anxiety toward the epidemic are defined by high PHQ-9, high GAD-7, and low CD-RISC 2 scores. It could also be seen that resilience mediated the effect of depression in public workers and their stress and anxiety levels toward the epidemic.

Conclusion: It is important to reduce the psychological burden of public workers and manage their mental health to help them cope with the epidemic wisely and efficiently. Among many mental health factors, psychological resilience represents an essential target for psychological intervention among public workers.

Keywords: COVID-19 Resilience; Anxiety; Depression; Public Service

INTRODUCTION

The coronavirus disease 2019 (COVID-19), which began in 2019, remains a concern today. As of March 30, 2021, the cumulative number of confirmed cases worldwide is 127,349,248 with 2,787,593 fatalities.¹ Healthcare workers in the world have tried to manage infections and to prevent further spread, and numerous studies were conducted to explore the distress and burnout effect on healthcare workers.²⁻⁷ However, officials working on plans for preventing

Funding

This work was supported under the Framework of International Cooperation Program managed by the National Research Foundation of Korea [FY2020K2A9A1A01094956].

Disclosure

The authors have no potential conflicts of interest to disclose.

Author Contributions

Conceptualization: Ju G, Chung S, Suh S. Data curation: Ju G, Kim EJ. Formal analysis: Chung S, Lee J, Ahn MH. Funding acquisition: Suh S. Investigation: Kim EJ. Methodology: Ju G, Chung S. Software: Chung S. Validation: Lee J. Visualization: Lee J. Writing - original draft: Ju G, Ahn MH, Lee J. Writing - review & editing: Ju G, Suh S, Lee J, Chung S.

the spread of the virus have also suffered from severe distress symptoms such as depression, anxiety, or burnout.⁶

Effective administration of the COVID-19 response depends on the effort and capacity of public workers, from the frontlines to the central administration.⁸ For many public workers, COVID-19 has fundamentally changed where and how they work, and the demands of their jobs.⁸ Frontline public workers such as local government officials are in charge of transporting confirmed COVID-19 patients to dedicated hospitals in each region, designating hospitals in the event of group infections, direct management of social distancing, working at selective clinics, and managing self-isolation subjects.

The response to COVID-19 has presented a meaningful and rewarding challenges for public workers. However, firefighters, emergency medical technicians, social workers, and local provincial or city government officials have been directly exposed to harsh, unpredictable work environments such as lengthy working hours, increasing demands, vague roles and responsibilities, and exposure to human suffering. As a result, some likely suffer from anxiety regarding getting infected while transferring patients to hospitals and physical, and mental exhaustion due to excessive workload and the stress of not being able to take care of their families. Nevertheless, the stress experienced by public workers is easy to be taken for granted or to be interpreted as a problem for the future.

As the Pandemic situation continues, several previous studies have reported an increase in the prevalence of depression. The prevalence rate of depression among healthcare workers during COVID-19 is 22.8%,⁹ whereas during the same period, it was reported as 16.5–48.3% for the general population.^{10–13} In addition, the prevalence of anxiety is also rising to 22.6–36.3% in pandemic situations.^{10–12} Most of these studies are cross-sectional, and the effects of depression on anxiety responses to disease are unclear. It has been shown that depression and anxiety have worsened each other,¹⁴ and it is a foregone conclusion that cognitive negative distortion of depression affects individuals' anxiety response. They augment their anxieties by selective response and set up a vicious circle of anxiety, distorted perception, and increased anxiety.¹⁵ So, it would be very helpful for public workers to lower their anxiety responses to properly perform their duties in a pandemic situations.

In this context, the term resilience refers to one's ability to cope or adjust well to stressful events¹⁶. People are able to adapt well over time to stressful situations, adverse events, and trauma. Resilience has been defined in numerous ways. It is a concept relating to the ability to adjust quickly to the stressful events in one's life, and it includes personality, interpersonal relationships, and the temporal characteristics of the stressor.^{17,18} It is also an ability to accept stress as an opportunity, recognize one's limits to control stress reaction, become self-efficient, strengthen one's resistance to it, adapt, and develop a sense of humor.¹⁹ Resilience is also patience, tolerance toward negative effects, and adaptability to change.²⁰ Psychologically, resilience, as an adaptive coping strategy, may be helpful in reducing public workers' stress and psychiatric symptoms, still allowing them to work in this pandemic era.

We hypothesized that independent variables (public workers' depression) would have a negative direct effect on comorbid anxiety response to the viral epidemic, regarded as dependent variables, and that worker's resilience may serve as mediator of the relationship between independent and dependent variables. Therefore, to examine this hypothesis,

we explored the clinical variables related to public workers' stress and anxiety during the epidemic as well as the mediating effect of resilience on the relationship between their depression and anxiety.

METHODS

Participants and procedure

The current study's design is a retrospective review of the survey data on public workers who served in the provincial government of Chungcheongbuk-do, Korea. Public workers in this study, provide administrative support, health welfare, disaster management, among others. In each field, they work in many different areas (e.g., policy, communications, administrative support, disaster management, and health and welfare). This study included only participants who worked on COVID-19-related tasks, such as working at a screening clinic, transporting hospitals' COVID-19 confirmed patients to the dedicated hospitals in each region, designating hospitals in the event of group infections, direct management of social distancing, and managing self-isolation cases. The online survey was conducted in May 2020 by the Chungcheongbuk-do provincial mental health center.

Assessment

Stress and Anxiety to Viral Epidemics-9 (SAVE-9) Scale

The SAVE-9 scale was originally developed in Korean language for assessing healthcare workers' work-related stress and anxiety in response to the viral epidemic.²¹ It consisted of 9 items inquiring about individuals' thoughts about the risk of infection, the consequent influence on their physical health, work-related stress, or about avoidance of others in this pandemic era. This scale was translated into other languages²² and validated in Italian,²³ Russian,²⁴ and Japanese.²⁵ Among the sample of 1,019 Korean healthcare workers, the Cronbach's alpha was 0.795. Each item is rated on a 5-point Likert scale; 0 (never), 1 (rarely), 2 (sometimes), 3 (often), and 4 (always). Among healthcare workers, the cut-off score of 21 of the SAVE-9 total score was defined as having at least a mild degree of stress and anxiety in response to the epidemic.²¹ In this study, we used the SAVE-9 scale after changing item 7, "After this experience, do you think you will avoid treating patients with viral illnesses?" into "After this experience, do you think you will avoid attending clients with viral illnesses?."

Patient Health Questionnaire-9 items (PHQ-9)

The PHQ-9 is a rating scale developed for measuring the severity of depressive symptoms. Each of the 9 items are scored on a Likert scale (from 0 = not at all, to 3 = nearly every day), and the total score can range from 0 to 27. A higher score means greater symptom severity (0 to 4 = minimal depression, 5 to 9 = mild depression, 10 to 14 = moderate depression, 15 to 19 = moderately severe depression, and ≥ 20 = severe depression).²⁶ In this study, major depression was defined by a PHQ-9 score ≥ 10 .²⁷

Generalized Anxiety Disorder-7 items (GAD-7)

The GAD-7 is a rating scale developed for measuring the severity of generalized anxiety symptoms. Each of the 7 items are scored on a Likert scale (0 = not at all to 3 = nearly every day), and the total scores can range from 0 to 21. Higher scores reflect higher levels of anxiety (0 to 4 = minimal anxiety, 5 to 9 = mild anxiety, 10 to 14 = moderate anxiety, 15 to 21 = severe anxiety). In this study, we used a cut-off of ≥ 5 to identify cases associated with anxiety.²⁸

The two-item version of The Connor-Davidson Resilience Scale (CD-RISC 2)

The CD-RISC 2 scale is a 2-item shortened version of the original full 25-item CD-RISC used to assess one's resilience. The CD-RISC 2 is based on items 1 and 8 of the original scale. Respondents can answer the two items ranging from 0 to 8. In this study, the Korean version of CD-RISC 2 was applied.²⁹

Statistical analysis

The student's *t*-test for continuous variables and the χ^2 test for categorical variables were conducted for between-group analyses. The Spearman's correlation analysis was used to explore the relationship between the clinical characteristics and rating scales' scores, as the distributions of the PHQ-9 and GAD-7 scale scores were not within normal limits. A logistic regression analysis was conducted to explore the expected variables for the SAVE-9 scale score. To explore the mediating effect of resilience on depression linked to stress and anxiety toward the epidemic, the bootstrap method was implemented with 2,000 resamples. Statistical analyses were done using SPSS version 21.0 and AMOS version 27.0 for Windows (IBM Corp., Armonk, NY, USA). The clinical characteristics were presented as mean \pm standard deviation. The level of significance for all analyses was defined as two-tailed ($P < 0.05$).

Ethics statement

Written informed consent for participation was waived. This study was approved by the Institutional Review Board of the Chungbuk National University Hospital (IRB No. 2020-06-017).

RESULTS

Of 938 participants who completed this online survey, 62.6% were male, 35.5% were junior employees (20 to 39 years old), and 20.9% were single, and their mean years of employment were 11.5 ± 9.6 years. Additionally, 15.5% had jobs involving work related to COVID-19. Only 7.0% had a history of depression, anxiety, or insomnia (**Table 1**).

Table 1. Demographic characteristics of participants (n = 938)

Characteristics	Values
Gender (male)	587 (62.6)
Age, yr	
20–29	55 (5.9)
30–39	278 (29.6)
40–49	311 (33.2)
50–59	287 (30.6)
60–65	7 (0.7)
Marital status	
Single	196 (20.9)
Married without children	78 (8.3)
Married with children	657 (70.1)
Other	6 (0.6)
Did you experience or were you treated for depression, anxiety, or insomnia? (Yes)	65 (7.0)
Does your job involve work related to COVID-19? (Yes)	144 (15.5)
Years of employment, yr	11.5 \pm 9.6
Symptoms assessment questionnaires	
Patient Health Questionnaire-9 (PHQ-9)	4.1 \pm 5.0
Generalized Anxiety Disorder-7 (GAD-7)	3.3 \pm 4.2
Stress and Anxiety to Viral Epidemic-9 (SAVE-9)	20.8 \pm 6.7
Connor-Davidson Resilience Scale (K-CD-RISC2)	6.7 \pm 2.3

Values are presented as number (%) or mean \pm standard deviation.
COVID-19 = coronavirus disease 2019.

Table 2. Group characteristics relating to stress and anxiety responses to COVID-19 based on SAVE-9 scores

Characteristics	SAVE-9 score	
	Mean ± SD	P value
Sex		< 0.001
Male (n = 587)	20.3 ± 6.8	
Female (n = 349)	21.8 ± 6.3	
Age		0.028
Junior, 20–39 (n = 333)	21.5 ± 6.6	
Senior, ≥ 40 (n = 605)	20.5 ± 6.6	
Marital status		0.030
Single (n = 196)	19.9 ± 6.7	
Married (n = 735)	21.1 ± 6.6	
Did you experience or were you treated for depression, anxiety, or insomnia? (Yes)		0.444
Yes (n = 65)	21.4 ± 6.8	
No (n = 865)	20.8 ± 6.6	
Does your job involve work related to COVID-19? (Yes)		0.480
Yes (n = 144)	20.5 ± 6.9	
No (n = 786)	20.9 ± 6.6	
Patient Health Questionnaire-9 (PHQ-9)		< 0.001
PHQ-9 < 9 (n = 817)	20.1 ± 6.4	
PHQ-9 ≥ 10 (n = 120)	26.3 ± 5.2	
Generalized Anxiety Disorder-7 (GAD-7)		< 0.001
GAD-7 < 9 (n = 847)	20.2 ± 6.4	
GAD-7 ≥ 10 (n = 91)	27.0 ± 5.6	

COVID-19 = coronavirus disease 2019, SAVE-9 = Stress and Anxiety to Viral Epidemics-9 items.

In the pandemic era, stress and anxiety levels were compared to the viral epidemic (Table 2), and it was observed that female (vs. male, $P < 0.001$), junior employees (vs. senior, $P = 0.028$), and married (vs. single, $P = 0.030$) reported the highest SAVE-9 scores. However, there was no significant difference in stress and anxiety levels between participant whose jobs involved or did not involve work related to COVID-19. Participants who were rated as having depression (PHQ-9 ≥ 10 , $P < 0.001$) or generalized anxiety (GAD-7 ≥ 10 , $P < 0.001$) reported higher SAVE-9 scores.

Spearman's correlation analysis showed that a high SAVE-9 score was significantly correlated with PHQ-9 ($r = 0.43$, $P < 0.01$) and GAD-7 scores ($r = 0.49$, $P < 0.01$), and PHQ-9 was significantly correlated with GAD-7 score as well ($r = 0.78$, $P < 0.01$). The level of resilience (CD-RISC scores) was positively correlated with longer values of years of employment ($r = 0.12$, $P < 0.01$) and negatively correlated with PHQ-9 ($r = -0.26$), SAVE-9 ($r = -0.22$), and GAD-7 ($r = -0.28$, all $P < 0.01$). The results are shown in Table 3.

Logistic regression analysis with forward selection was done and adjusted for age (junior vs senior), gender (male vs. female), marital status (single vs. married), jobs involving work related to COVID-19 (yes vs. no), past psychiatric history (yes vs. no), and years of

Table 3. Spearman's correlation coefficients of each variables

Variables	Year of employment	PHQ-9	SAVE-9	GAD-7	CD-RISC 2
Years of employment	1.000				
PHQ-9	-0.07	1.000			
SAVE-9	0.01	0.43**	1.000		
GAD-7	-0.05	0.78**	0.49**	1.000	
CD-RISC 2	0.12**	-0.26**	-0.22**	-0.28**	1.000

PHQ-9 = Patient Health Questionnaire-9, SAVE-9 = Stress and Anxiety to Viral Epidemic-9, GAD-7 = Generalized Anxiety Scale-7 items, CD-RISC 2 = Connor-Davidson Resilience Scale.

* $P < 0.05$, ** $P < 0.01$.

Table 4. Logistic regression analysis to explore the SAVE-9 variables expected in public workers (SAVE-9 ≥ 21)

Variables	Crude OR	95% CI	Adjusted OR	95% CI
Patient Health Questionnaire-9 score	1.21	1.17–1.26	1.07	1.01–1.14
Generalized Anxiety Disorder-7 score	1.30	1.24–1.37	1.22	1.13–1.31
Connor-Davidson Resilience Scale score	0.86	0.81–0.91	0.92	0.86–0.98

SAVE-9 = Stress and Anxiety to Viral Epidemics-9 items, OR = odds ratio, CI = confidence interval.

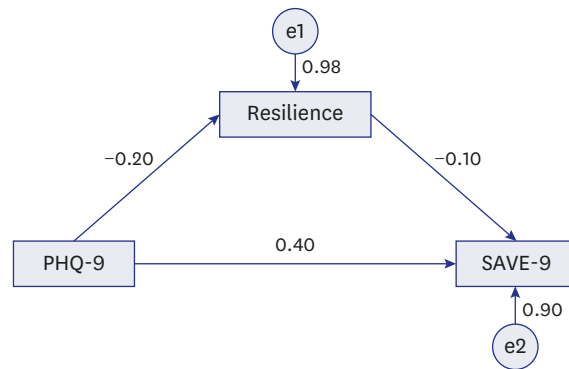


Fig. 1. Mediation model showing that the effect of depression (independent variables) on stress and anxiety to viral epidemic (outcome) is mediated by resilience (mediator).

PHQ-9 = Patient Health Questionnaire-9, SAVE-9 = Stress and Anxiety to Viral Epidemics-9.

employment (Table 4). Logistic regression analysis showed high PHQ-9 scores (adjusted odds ratio [aOR], 1.07; 95% CI, 1.01–1.14), high GAD-7 scores (aOR, 1.22; 95% CI, 1.13–1.31), and low resilience (aOR, 0.92; 95% CI, 0.86–0.98).

In mediation analysis, the complete pathway from depression (independent variable) to resilience (mediator) to stress and anxiety in response to the epidemic (dependent variable) was significant ($z = 11.83, P < 0.001$), as shown in Table 5; thus indicating that resilience partially mediates the effects of depression on stress and anxiety regarding the epidemic (Fig. 1, Table 5).

DISCUSSION

This study investigated clinical variables related to stress and anxiety regarding the viral epidemic among public workers, with focus on the mediating effects of resilience. Public workers who were female, junior, or married reported significantly higher SAVE-9 scores. High levels of stress and anxiety to the viral epidemic are defined by high PHQ-9, high GAD-7, and low CD-RISC 2 scores. As resilience mediates depression, stress, and anxiety regarding the epidemic, these findings suggest that psychological resilience may be an essential target for effective psychological interventions for public workers during this period.

Consistent with previous studies among healthcare workers,^{2,9} our findings show that female and junior public workers were more vulnerable to stress and anxiety during the pandemic.

Table 5. The direct, indirect, and total effects on mediation analysis

Effect	Estimator	S.E.	Z-value	P value	95% CI
Direct effect: PHQ-9 → SAVE-9	0.40	0.04	10.68	< 0.001	0.33–0.47
Indirect effect: PHQ-9 → Resilience → SAVE-9	-0.20	0.02	2.79	0.005	0.006–0.03
Total effect: PHQ-9 → SAVE-9	0.42	0.04	11.83	< 0.001	0.35–0.49

S.E. = standard error, CI = confidence interval, PHQ-9 = Patient Health Questionnaire-9, SAVE-9 = Stress and Anxiety to Viral Epidemics-9.

This implies that female and junior public workers may have more concerns about becoming infected and are more sensitive to minor physical symptoms. In Korea, public workers are a professional group that guarantees a stable employment situation, but even in the same working environment, there might exist differences between gender and age in terms of contracts and working conditions.³⁰

Contrary to our expectations, married public workers reported a higher level of stress and anxiety in response to the epidemic. This result was inconsistent with prior research,³¹ which had suggested that marriage might serve as a protective factor against stressful experiences during the epidemic among nursing healthcare workers. However, in general, married people may worry not only about their own protection, but also about the safety of their family members, including children.^{32,33} These findings indicate that the groups need psychological support, differences exist between occupational groups, and interventions are required accordingly. In this study there were no significant differences in the levels of stress and anxiety to viral epidemic between participants whose jobs did or did not involve work related to COVID-19. Further, we observed that there were no significant differences in the levels of stress and anxiety to the viral epidemic between participant who had experience or been treated depression, anxiety, or insomnia, and those who had not. Although we could not identify the reasons based on this study's data, we can hypothesize that the job itself did not have an influence on the anxiety levels, as this survey was conducted during May 2020 when the workers may have suffered from anxiety due to the viral epidemic, regardless of their work roles. Similarly, we can merely speculate that their past psychiatric history did not affect their anxiety level in this serious situation.

This study also found that depression not only contributes to resilience, but that this resilience may also help to explain the robust relationship between depression and stress and anxiety and the epidemic. According to previous studies about the effect of resilience among healthcare workers, resilience plays an important role in overcoming distress. Similarly, during the COVID-19 pandemic era, resilience and anxiety level have reportedly had inverse relationship among physicians,³⁴ front-line nurses,³⁵ and overall healthcare professionals.^{36,37} Moreover, a recent study suggested that among general populations, more resilient adults experienced a lesser rate of burnout and distress during the pandemic, which is consistent with the previous finding that resilience had a reverse association with burnout among physicians.^{38,39} However, although local public workers are working on the frontlines to prevent the spread of infectious diseases, research on their concerns about infection is still insufficient. Our findings add to the growing body of literature supporting the relationship between depression and anxiety and the viral pandemic. Furthermore, this study establishes that resilience serves as an important variable to mediate anxiety about infection and depression.

Finally, our results suggest that COVID-19 infection has had a significant impact on the mental health of Korean public workers. In particular, May 2020, when this study was conducted, was a period in which the number of infections in Korea was declining; however, since then, it has peaked again, and hence it was expected that public workers would continue to be exhausted. Therefore, the findings can be seen as a reflection of their burnout. The influence of resilience on depression and anxiety is a vicious cycle. Depression reduces resilience as an individual's psychological ability is exhausted, and if resilience is reduced, depression may worsen as an individual fails to cope with stress. In the systemic model of resilience proposed by Ungar and Theron,⁴⁰ the ability of an individual to respond to stress is formed in a complex system in which the individual's biological and psychological

systems and the social and ecological environment are influenced by one another. The social environment affects not only vulnerable individuals but also the general population, and this environment is created by all. During this period, a preventive intervention could be offered for public workers to increase their resilience, such as a program to improve positive emotions (including optimism and humor), cognitive flexibility (including positive explanatory style, positive appraisal, and acceptance), meaning (including religion, spirituality and altruism), social support (including role models), and an active coping style (including exercise and training).⁴¹ Such interventions could reduce the risk of developing mental disorders and experiencing other negative consequences by enhancing protective factors.⁴² In this context, psychological resilience is an essential target for psychological intervention for public workers.

The limitations of this study are as follows. First, the general population as a control group did not participate in this study, although we can assume that anxiety and stress levels of public workers are higher than those of the general population. Second, as a limitation of conducting a self-report survey study, fully detailed interviews were not conducted. However, during this pandemic, an online survey rather than face-to-face interviews was necessary to prevent the spread of the virus. Third, the application of the SAVE-9 scale that was specifically developed to assess work-related stress and anxiety of healthcare workers in response to the viral epidemic in this pandemic era might have been another limitation. However, the SAVE-9 scale was used in this study because we did not have any other rating scale for public workers. Further study is needed to validate the SAVE-9 scale for public workers.

In conclusion, female and junior public workers suffer more from work-related stress. Their stress and anxiety in response to the pandemic was related to their gender, regarding their workplace as dangerous, and experiencing depression. Thus, during the COVID-19 pandemic, it is necessary to closely observe the patterns of work-related stress and anxiety reactions among public workers and to devise a plan to reduce burnout.

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