



# Mediating Effect of Public Service Motivation and Resilience on the Association Between Work-Related Stress and Work Engagement of Public Workers in the COVID-19 Pandemic

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**Objective** We aimed to explore the influence of public workers' distress or viral anxiety on their level of depression and work engagement during the coronavirus disease (COVID-19) pandemic. Additionally, we ascertain the mediation effect of resilience and public service motivation on this association.

**Methods** A total of 300 public workers participated in this online survey. Their demographic characteristics and responses to survey items were collected using the Stress and Anxiety to Viral Epidemics-6 items Scale, the Patient Health Questionnaire-9 items Scale, the Public Service Motivation (PSM) Scale, the Nine-item Utrecht Work Engagement Scale, the Korean Occupational Stress Scale-Short Form, and the Brief Resilience Scale.

**Results** Work engagement of public workers was expected by PSM ( $\beta=0.28$ ,  $p<0.001$ ), resilience ( $\beta=0.30$ ,  $p<0.001$ ), and work-related stress ( $\beta=-0.40$ ,  $p<0.001$ ) ( $F=57.4$ ,  $p<0.001$ ). Depression was expected by fewer years of employment ( $\beta=-0.12$ ,  $p=0.02$ ), viral anxiety ( $\beta=0.21$ ,  $p<0.001$ ), and low resilience ( $\beta=-0.42$ ,  $p<0.001$ ) ( $F=22.1$ ,  $p<0.001$ ). Resilience and PSM partially mediated the effects of work-related stress on work engagement. Depression was influenced by COVID-19-induced viral anxiety, and their resilience—but not PSM—mediated the association.

**Conclusion** Public workers' resilience and PSM partially mediated the effects of work-related stress on work engagement. The influence of viral anxiety on public workers' depression was mediated by their resilience but not PSM. **Psychiatry Investig 2022;19(7):501-510**

**Keywords** Stress; Psychological; Public; Work engagement; COVID-19.

## INTRODUCTION

On January 30, 2020, the World Health Organization (WHO) declared coronavirus disease (COVID-19) as a pandemic. The

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disease had first surfaced in Wuhan, China and soon engulfed the entire world.<sup>1</sup> As of May 2021, over 153 million cases and about 3.2 million (fatality of 2%) deaths related to COVID-19 were notified to the WHO.<sup>2</sup> Meanwhile, Korea reported a total of 367,974 confirmed cases and 2,874 deaths as of November, 2021.<sup>3</sup> This pandemic has greatly affected numerous of aspects of our society, and altered our personal lives and the public and global economies.<sup>4</sup> Although its impact on physical health is the most important issue, attention must be paid to its effect on psychological health also.<sup>5</sup> Vague fears about a protracted virus outbreak, limited movement owing to mass lockdowns, and economic recession have raised psychological distress in the society, which could lead to anxiety, depression, and even suicide.<sup>6</sup> A systematic meta-analysis by Salari et al.<sup>7</sup> identified the prevalence of stress (29.6%), anxiety (31.9%),

and depression (33.7%) in a general population sample during the COVID-19 pandemic.

### Public workers' distress, public service motivation, and work engagement in COVID-19

Public servants have experienced an enormous workload since the outbreak of COVID-19. The longer the pandemic persists, the longer they will have to grapple with crippling work pressure. A study has confirmed that such workplace-related changes might affect public workers' psychosocial abilities, which lead to burnouts, sick leave, and a decline in work performance and work motivation.<sup>8</sup>

Perry and Wise<sup>9</sup> defined public service motivation (PSM) as "an individual's predisposition to respond to motives grounded primarily or uniquely in public institutions and organizations." A concern for the community and an eagerness to serve the common interest seem to be the major driving factors for public employees, which refers to a work ethic that values extrinsic rewards over intrinsic rewards.<sup>10</sup> It has three motives: the rational motive, the norm-based motive, and the affective motive.<sup>11</sup> The rational motive reflects the individual's utility maximization, which enables them to engage in policymaking processes and defend special interests. The norm-based motive alludes to an aim for public interest and social equity and can be explained as patriotism and loyalty to the government.<sup>9</sup> The affective motive represents humanity, which refers to a volition to help others, and includes altruism, compassion (COM), and self-sacrifice (SS).<sup>9</sup>

Work engagement was first conceptualized by Kahn<sup>12</sup> as a state of total involvement in work-related roles physically and mentally. Later, it was categorized in three dimensions: vigor, dedication, and absorption.<sup>13</sup> Vigor is defined as high levels of energy and mental resilience during work time.<sup>14</sup> Dedication is strongly correlated with one's volition to work, experiencing a feeling of significance, enthusiasm, inspiration, and pride.<sup>14,15</sup> Absorption is characterized as being in a state of full concentration and devoting oneself happily to one's work, where time flies and it could become difficult to part from the endeavor.<sup>16,17</sup>

Studies have repeatedly disputed the associations between PSM and work engagement as well as the affecting factors for each during non-pandemic years. Deng et al.<sup>18</sup> reported that PSM is highly influenced by stress among Chinese healthcare workers—positively by challenge stress and negatively by hindrance stress. Hindrance stress includes unnecessary impediments that prevent career development and goal achievement, such as organizational politics, job insecurity, and role conflict.<sup>19,20</sup> However, PSM has a positive effect on job performance,<sup>21</sup> and each PSM dimension affects work engagement differently.<sup>22</sup> Additionally, it has been reported that work stress could directly or indirectly lower work efficiency by under-

mining PSM.<sup>23</sup> Resilience, which refers to one's ability to endure stressful situations or cope with environmental adversity,<sup>24</sup> was found to be a partial mediator between work stress and burnout symptoms among civil servants.<sup>25</sup> Work stress is, presumably, among the most significant antecedent factors that negatively affect work engagement, through the possible mediating parameters, PSM, or resilience during the pandemic era.

Psychological distress associated with COVID-19 had a strong link with burnout symptoms according to a study in Turkey.<sup>26</sup> Another study of public servants had confirmed resilience as an effective mediator and moderator when explaining the association between stress, anxiety, and depression.<sup>27</sup> Similarly, we have investigated the role of resilience, which would intervene the relationship between depression and anxiety reactions during the pandemic.<sup>28</sup> We verified a hypothesis that resilience could provide appropriate coping strategies for public servants to overcome mental stress during the pandemic. Anxiety and depressive symptoms have not been debated as predicting factors for PSM, and, to the best of our knowledge, no study has yet investigated the relation between PSM and pandemic-induced stress. Although PSM has to be considered differently from ordinary job motivation, stress related to the pandemic might impair PSM, eventually provoking depression.

This study investigated the influence of public workers' work-related stress or viral anxiety on their depression and work engagement during the COVID-19 pandemic. Additionally, we explored whether their PSM or resilience mediates this association.

## METHODS

### Participants and procedure

This online survey study was conducted with the help of a professional survey company ([www.embrain.com](http://www.embrain.com)). The respondents were notified of the study's objective and enrollment procedure, and their participation was voluntary. The sample size was estimated based on the principles of 30 participants per cell.<sup>29</sup> We assigned 30 to 40 samples for each 10 cells, which were categorized by biological sex (two groups) and age (five groups). Approximately 5,000 to 6,000 public worker panelists received an email from the company for registration of the study. All 300 eligible participants' responses were collected among 1,451 panelist who showed interest in undertaking the survey. This stands for about 0.03% of all registered public workers (1,068,626 based on the census of public workers in 2018) in South Korea.<sup>30</sup>

From April 1 till April 12, 2021, 300 public workers were enrolled. The survey was conducted anonymously and no per-

sonal information was collected. The study protocol was approved by the Institutional Review Board (2021-0448) of the ASAN Medical Center, and the written informed consent requirement was waived. The survey form was developed according to the Checklist for Reporting Results of Internet e-Surveys guidelines,<sup>31</sup> and an investigator (S.C.) tested the usability and technical functionality prior to implementation. We collected information about the participants' age, sex, roles, years of employment, and marital status. Additionally, we included items related to COVID-19: "Did you experience being quarantined because of infection with COVID-19?" and "Did you experience being infected with COVID-19?" To ascertain their past and present psychiatric symptoms, we asked: "Have you experienced or undergone treatment for depression, anxiety, or insomnia?" and "Now, do you think you are depressed or anxious, or do you need help for your mood state?"

## Symptom assessment

### The Stress and Anxiety to Viral Epidemics–6 items scale

The Stress and Anxiety to Viral Epidemics–6 items (SAVE-6) scale was developed to measure the viral anxiety of the general population.<sup>32</sup> It was derived from the original Stress and Anxiety to Viral Epidemics-9 scale, which was developed by Chung et al.,<sup>33</sup> ASAN Medical Center, University of Ulsan College of Medicine, to measure healthcare workers' work-related stress and anxiety response during the COVID-19 pandemic. The respondents could answer each item on a 5-point Likert scale ranging from 0 (never) to 4 (always). Higher SAVE-6 total score reflected a severe degree of viral anxiety. The SAVE-6 scale was originally developed in the Korean language, and we applied the original version in this study. Cronbach's alpha was 0.817 among this sample.

### The Public Service Motivation scale

The PSM scale was first defined by Perry and Wise<sup>9</sup> based on the three motives, as explained in the introduction. It consists of four components: attraction to policy making (APM), commitment to public interest (CPI), COM, and SS. The original scale comprises 24 items: three items for APM, five for CPI, eight for COM, and eight for SS. A 5-point Likert scale was used to evaluate, ranging from 1 (strong disagreement) to 5 (strong agreement). In this study, we applied an abridged version of the PSM scale translated into Korean, with 10 items: three for APM, three for CPI, four for COM, and three for SS.<sup>3</sup> Cronbach's alpha was 0.801 among this sample.

### The Nine-item Utrecht Work Engagement Scale (UWES-9)

The Nine-item Utrecht Work Engagement Scale (UWES-9)

is a shortened version<sup>34,35</sup> of the original 17-item questionnaire (original 17-item Utrecht Work Engagement Scale), which measures work engagement.<sup>36</sup> It comprises nine items, which can be rated on a 7-point Likert scale ranging from 0 (never) to 6 (always). A higher total score on the UWES-9 reflects a high level of work engagement. We applied the Korean version of the UWES-9 in this study,<sup>37</sup> and Cronbach's alpha was 0.949 among this sample.

### The Korean Occupational Stress Scale–Short Form

Work-related stress was assessed using the Korean Occupational Stress Scale–Short Form (KOSS-SF), a 24-item self-rating scale developed for estimating occupational stress among Korean employee.<sup>38</sup> Each item was rated on a scale of 1 (not at all) to 4 (very much). A high total score reflected a high level of work-related stress. Cronbach's alpha was 0.646 among this sample.

### The Brief Resilience Scale

The Brief Resilience Scale (BRS) is a rating scale<sup>39</sup> for resilience, that is, the capacity to recover quickly from difficulties. The participants rated each question on a scale of 1 to 5, and score was calculated by reverse coding items 2, 4, and 6. A higher score (ranging from 6 to 30) reflects a high level of resilience. In this study, we applied the Korean version of the BRS.<sup>40</sup> Cronbach's alpha was 0.927 among this sample.

### The Patient Health Questionnaire–9 items (PHQ-9) scale

The Patient Health Questionnaire–9 items (PHQ-9) is a rating scale<sup>41</sup> for depression, and items were rated on a scale of 0 (not at all) to 3 (nearly every day). High total score reflected high levels of depression (0 to 4, minimal depression; 5 to 9, mild depression; 10 to 14, moderate depression; 15 to 19, moderately severe depression; and  $\geq 20$ , severe depression). Cronbach's alpha was 0.914 among this sample.

## Statistical analysis

Statistical analysis was conducted using SPSS ver. 21.0, AMOS ver. 27 (for Windows; IBM Corp., Armonk, NY, USA), JASP ver. 0.14.1 (<https://jasp-stats.org/>), and Jamovi ver. 1.6.23 (<https://www.jamovi.org>). Clinical variables were summarized as mean $\pm$ standard deviation, and the significance level was defined as two-tailed,  $p < 0.05$ . To examine the expecting variables for public workers' work engagement, the participants were categorized into two groups: UWES-9 top 25% group and UWES-9 bottom 75% group. Chi-square tests for categorical variables and the Student t-test for continuous variables were performed to explore the between-group difference. Pearson's correlation analysis was performed to explore the correlations among clinical variables and rating scales

scores. The linear regression analysis revealed the expecting variables for the high work engagement. Finally, the bootstrap method with 2,000 resamples was implemented to explore the mediation effect of resilience on work-related stress with work engagement.

## RESULTS

Among the 300 participants, 166 (55.3%) were male, and 180 (60%) were national government workers; the mean age was 38.3±9.1 years old, and mean years of employment was 10.3±8.8 years. The respondents were sampled from Seoul (n=72, 24.0%), Pusan (n=18, 7.0%), Daegu (n=10, 3.3%), Daejeon (n=17, 5.7%), Gwangju (n=9, 3.0%), Incheon (n=15, 5.0%), Ulsan (n=4, 1.3%), Sejong (n=10, 3.3%), the Gyeonggi Province (n=51, 17.0%), the Chungcheong Province (n=18, 6.0%), the Jeolla Province (n=25, 8.3%), the Gyeongsang Province (n=28, 6.0%), the Gangwon Province (n=21, 7.0%), and the Jeju Province (n=2, 0.7%). When we grouped participants based on the degree of work engagement scale (UWES-9) top 25% and bottom 75% groups (Table 1), there was significant difference in sex (p=0.03) and the proportion of workers needing help for their mood state (p=0.04). Scores of the

PHQ-9 and the KOSS-SF were significantly lower, and BRS and PSM scale scores were significantly higher among public workers in the UWES-9 top 25% group. No significant difference was observed in the SAVE-6 scale score between the two groups.

Spearman’s correlation analysis (Table 2) showed that long years of employment were significantly associated with high work engagement and low levels of depression. However, the degree of association was weak, which needs to be interpreted cautiously. Work engagement was significantly associated with low level of depression and work-related stress, and high levels of service motivation and resilience. Viral anxiety was associated with high level of depression and low level of resilience. Public workers’ depression was correlated with low level of service motivation and resilience, and high level of work-related stress. PSM was associated with a high level of resilience and low level of work-related stress. Their resilience was associated with low level of work-related stress.

The linear regression analysis revealed that high level of work engagement of public workers was expected by high level of PSM (β=0.28, p<0.001), high level of resilience (β=0.30, p<0.001), and low level of work-related stress (β=-0.40, p<0.001) (F=57.4, p<0.001; Table 3). Public workers’ high level

**Table 1.** Demographic characteristics of subjects (N=300)

Variable	UWES-9 top 25% (N=74)	UWES-9 bottom 75% (N=226)	p-value
Sex (male)	49 (66.2)	117 (51.8)	0.03
Public worker			
National government worker	48 (64.9)	132 (58.4)	0.34
Local government worker	26 (35.1)	94 (41.6)	
Age (yr)	39.8±9.9	37.8±8.8	0.11
Year of employment	11.3±9.9	9.9±8.5	0.29
Marital status (married)	44 (59.5)	118 (52.2)	0.35
COVID-19 questions			
Did you have experience dealing with confirmed COVID-19 clients? (Yes)	19 (25.7)	64 (28.4)	0.77
Did you experience being quarantined due to infection with COVID-19? (Yes)	14 (18.9)	31 (13.7)	0.27
Psychiatric history			
Did you have experience or treated depression, anxiety, or insomnia? (Yes)	7 (9.5)	39 (17.3)	0.14
Now, do you think you are depressed or anxious, or do you need help for your mood state? (Yes)	4 (5.4)	33 (14.6)	0.04
Rating scales scores			
Stress and Anxiety to Viral Epidemics–6 items	16.6±4.9	16.6±3.9	0.88
Patient Health Questionnaire–9 items	5.8±6.0	7.8±5.9	0.01
Korean Occupational Stress Scale	56.3±5.3	61.4±5.5	<0.01
Public Service Motivation	32.9±5.2	28.0±5.1	<0.01
Brief Resilience Scale	21.6±4.3	17.7±4.3	<0.01

Values are presented as number (%) or mean±standard deviation. COVID-19, coronavirus disease; UWES-9; Nine-item Utrecht Work Engagement Scale

**Table 2.** Spearman correlation coefficients of each variables in all participants (N=300)

Variable	Year of employment	UWES-9	SAVE-6	PHQ-9	PSM	BRS	KOSS
Year of employment	1.00						
UWES-9	0.18**	1.00					
SAVE-6	0.08	0.02	1.00				
PHQ-9	-0.16**	-0.30**	0.26**	1.00			
PSM	0.11	0.50**	0.11	-0.20**	1.00		
BRS	0.10	0.49**	-0.14*	-0.50**	0.22**	1.00	
KOSS	-0.09	-0.58**	-0.11	0.12*	-0.34**	-0.25**	1.00

\* $p < 0.05$ ; \*\* $p < 0.01$ . UWES-9, Nine-item Utrecht Work Engagement Scale; SAVE-6, Stress and Anxiety to Viral Epidemics-6 items; PHQ-9, Patient Health Questionnaire-9 items; PSM, Public Service Motivation; BRS, Brief Resilience Scale; KOSS, Korean Occupational Stress Scale

**Table 3.** Linear regression analysis expecting high level of work engagement or depression of public workers in COVID-19 pandemic era

Dependent variable	Included parameter	Beta	p-value	Adjusted R <sup>2</sup>	F, p-value
A) UWES-9				0.53	F=57.4, $p < 0.001$
	Year of employment	0.08	0.05		
	PHQ-9	-0.03	0.49		
	SAVE-6	-0.02	0.61		
	KOSS	-0.40	<0.001		
	PSM	0.28	<0.001		
	BRS	0.30	<0.001		
B) PHQ-9				0.30	F=22.1, $p < 0.001$
	Year of employment	-0.12	0.02		
	UWES-9	-0.05	0.49		
	SAVE-6	0.21	<0.001		
	KOSS	-0.03	0.65		
	PSM	-0.10	0.08		
	BRS	-0.42	<0.001		

COVID-19, coronavirus disease; UWES-9, Nine-item Utrecht Work Engagement Scale; PHQ-9, Patient Health Questionnaire-9 items; SAVE-6, Stress and Anxiety to Viral Epidemics-6 items; KOSS, Korean Occupational Stress Scale; PSM, Public Service Motivation; BRS, Brief Resilience Scale

of depression was expected by fewer years of employment ( $\beta = -0.12$ ,  $p = 0.02$ ), high viral anxiety ( $\beta = 0.21$ ,  $p < 0.001$ ), and low resilience ( $\beta = -0.42$ ,  $p < 0.001$ ) ( $F = 22.1$ ,  $p < 0.001$ ).

The mediation analysis results showed that the complete pathway from work-related stress of public workers (independent variable) to their resilience and PSM (mediator) to work engagement (dependent variable) was significant ( $Z = -12.29$ ,  $p < 0.001$ ; Table 4). This result indicates that public workers' resilience and PSM partially mediate the effects of work-related stress on work engagement (Figure 1). Public workers' depression was influenced by viral anxiety in the COVID-19 pandemic, and their resilience mediated the association. However, PSM did not mediate the association (Table 4 and Figure 2).

## DISCUSSION

It was observed that public workers' work engagement was

predicted by PSM, resilience, and low level of work-related stress. Their depression was expected by fewer years of employment, high viral anxiety, and low resilience. Resilience and PSM partially mediate the effects of work-related stress on work engagement. Depression was influenced by viral anxiety during the COVID-19 pandemic, and resilience mediated the association. However, PSM did not mediate the association.

### Work-related stress, positive service motivation, resilience, and work engagement of public workers during the COVID-19 pandemic

It has already been reported that hindrance stress adversely impacts one's psychological state, thus causing exhaustion and loss of passion and drive to work.<sup>42</sup> We found that high levels of work-related stress was significantly related with low levels of work engagement, consistent with studies conducted before the COVID-19 pandemic. Our results were similar to those

**Table 4.** The results of direct, indirect, and total effects on mediation analysis

Effect	Standardized estimator	S.E.	Z-value	p	95% CI
<b>Work engagement</b>					
Direct effect					
KOSS → UWES-9	-0.40	0.08	-9.24	<0.001	-0.90 to -0.58
Indirect effect					
KOSS → BRS → UWES-9	-0.08	0.02	-3.91	<0.001	-0.10 to -0.03
KOSS → PSM → UWES-9	-0.10	0.02	-4.61	<0.001	-0.09 to -0.02
Component					
KOSS → BRS	-0.25	0.04	-4.53	<0.001	-0.28 to -0.11
BRS → UWES-9	0.32	0.10	7.87	<0.001	0.57 to 0.95
KOSS → PSM	-0.34	0.05	-6.25	<0.001	-0.42 to -0.22
PSM → UWES-9	0.30	0.08	6.94	<0.001	0.41 to 0.74
Total effect					
KOSS → UWES-9	-0.58	0.05	-12.29	<0.001	-0.67 to -0.49
<b>Depression</b>					
Direct effect					
SAVE-6 → PHQ-9	0.21	0.05	4.16	<0.001	-0.11 to -0.30
Indirect effect					
SAVE-6 → BRS → PHQ9	0.06	0.03	2.36	0.02	0.01 to 0.11
SAVE-6 → PSM → PHQ-9	-0.01	0.01	-1.49	0.14	-0.03 to -0.004
Component					
SAVE-6 → BRS	-0.14	0.06	-2.45	0.014	-0.28 to -0.03
BRS → PHQ-9	-0.45	0.06	-9.01	<0.001	-0.70 to -0.45
SAVE-6 → PSM	0.11	0.08	1.88	0.06	0.29 to 0.11
PSM → PHQ-9	-0.12	0.05	-2.52	0.01	-0.03 to -0.12
Total effect					
SAVE-6 → PHQ-9	0.26	0.06	4.56	<0.001	0.15 to 0.36

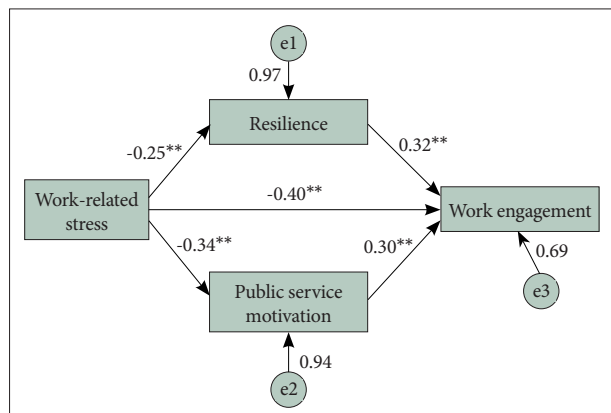
KOSS, Korean Occupational Stress Scale; UWES-9, Nine-item Utrecht Work Engagement Scale; BRS, Brief Resilience Scale; PSM, Public Service Motivation; SAVE-6, Stress and Anxiety to Viral Epidemics–6 items; PHQ-9, Patient Health Questionnaire–9 items; S.E., standard error; CI, confidence interval

of a study about the negative effects of stress and workload on work engagement of frontline nurses after the outbreak of COVID-19.<sup>43</sup>

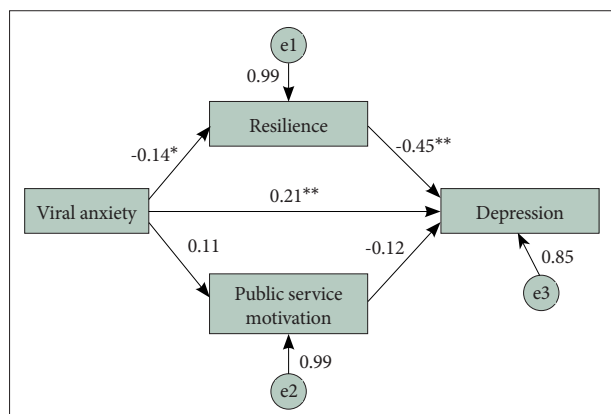
High levels of work-related stress had a negative effect on work engagement and mediated partially in PSM and resilience. Based on the results of this study, which show the difference of the two groups categorized by the degree of work engagement, work-related stress, PSM, and resilience were more comparably distinctive. As revealed in previous studies, PSM tends to decrease under the influence of work stress and undermined PSM may lower work performance.<sup>23</sup> In this work, PSM was highly correlated with work-related stress and work engagement compared to other parameters according to Spearman’s correlation analysis. Both the linear regression analysis and the mediating analysis showed that PSM could partially explain the relation between work-related stress and work en-

gagement of public workers. Resilience was closely correlated with work-related stress and work engagement, partially mediating the relation between them. This result corresponds with an earlier study<sup>25</sup> that suggested resilience as a mediating factor for explaining the relation between work stress and burnout during the non-pandemic era. There was no exact report regarding the relationship among the above-discussed factors for public workers during the pandemic. However, those relations were identically reproduced under the pandemic circumstances in our study, thereby suggesting that association between work-related stress and work engagement and mediating effect of PSM and resilience are not quite impacted by this extraordinary situation.

Although resilience and PSM were significant mediating factors, we should not overlook the fact that relationship between work-related stress and work engagement is mainly ex-



**Figure 1.** Mediation model showing that the effect of work-related stress (independent variable) on work engagement (outcome) is mediated by resilience and positive service motivation (mediator). \*\* $p < 0.01$ .



**Figure 2.** Mediation model showing that the effect of viral anxiety (independent variable) on depression (outcome) is mediated by resilience but not by positive service motivation (mediator). \* $p < 0.05$ ; \*\* $p < 0.01$ .

plained by the direct impact of work-related stress, rather than by partial mediating factors that reflect individual's characteristics. Further research focusing on the comparison of strength of the direct impact of work-related stress on work engagement before and after the outbreak would be valuable to evaluate the actual effect of the pandemic on those relationships.

Year of employment was positively associated with work engagement; however, its value was not prominent, and it was not a significant factor to expect the level of work engagement. Longer work periods would reflect their improved ability in work performance; conversely, physical or mental fatigue from long-lasting work could decrease the concentration on the task. These divergent explanations might have resulted in a weak association between the two factors.

Viral anxiety did not have a significant effect on public workers' work-related stress and work engagement, which was contrary to our expectation. South Korea has been recognized as an example to emulate in terms of promptly established pre-

ventive measures against the pandemic.<sup>44</sup> Moreover, the survey was conducted a year after the outbreak, by which time systemic changes had already been settled. Therefore, anxiety reactions might not have had actual effects on public workers' performance. However, it is noteworthy that participants' scores on the SAVE-6 scale were comparably higher than in previous reports of other occupational groups. While acknowledging that a simple comparison may be inappropriate in the following case, we share that the average score on the SAVE-6 scale for healthcare workers at two big hospitals in South Korea was  $14.4 \pm 4.5$ , whereas the average scores in case of the general South Korean population were  $14.4 \pm 4.5$  (male) and  $14.7 \pm 4.6$  (female),<sup>32</sup> which were lower than our results. If public workers' viral anxiety was substantially higher than other groups, consequent changes from anxiety to work engagement might not be apparent. Considering that viral anxiety was related with resilience and depression, which could further influence work engagement, it would be difficult to negate the possibility that viral anxiety might be a factor affecting work engagement.

### Viral anxiety, depression, and resilience of public workers during the COVID-19 pandemic

Pandemic-induced psychological distress was reportedly closely linked with mood symptoms.<sup>45,46</sup> According to a study about the mental health status of university students in Bangladesh, depressive symptoms were significantly expected by the perception of pandemic state and the concern for the severity of COVID-19.<sup>47</sup> In this study, we observed that viral anxiety significantly influenced depressive symptoms, and resilience mediated this association. We had previously reported similar results among other samples of public workers.<sup>28</sup> Similar results were also reported among schoolteachers.<sup>48</sup> Additionally, it has been noted that public servants' anxiety is highly correlated with depression and resilience mediated the association between stress, anxiety, and depression during the non-pandemic years.<sup>27</sup> Consequently, anxiety reaction, regardless of whether it was derived from the viral pandemic or not, contributes to depression and resilience acts as a mediator between them in case of public workers.

Resilience was strongly correlated with depression compared with other factors according to Pearson's correlation analysis. Further, the effect of resilience on depression was more prominent in the mediating analysis, while the direct effect of viral anxiety was also significant. Though viral anxiety might lower the individual capacity to endure stress state, which eventually decreases the susceptibility to depression, resilience itself independently exerts its power to reduce the probability of having depressive symptoms, which accords to previous reports.<sup>49,50</sup> Thus, caution should be exercised while

interpreting the results, as the role of personal vulnerability is also relevant.

Year of employment was negatively associated with depression, but the degree of the association was small, and it was not a meaningful factor to determine the level of work engagement. Work period was not related to viral anxiety and resilience, which were crucial underlying factors to determine the level of depression in our research. The individual capacity to endure stress and the lower level of anxiety might help one to work for longer periods, whereas other external factors such as a workload, relationships between coworkers, and organizational culture would exert negative influence on it. Moreover, despite the long career, an unfamiliar challenging state like the viral pandemic would be a difficult situation to endure. The year of employment is complicatedly determined through one's internal and external aspects; therefore, there is no single factor to explain the susceptibility to depression.

In this study, public workers' PSM did not mediate the association between their viral anxiety and depression. PSM was negatively correlated with depression, but the correlation coefficient was not substantial. Further, PSM was not a significant factor to determine the level of depression although it had a negative relationship with depression. It has several different interpretations. First, there was an insignificant positive correlation between PSM and viral anxiety. We can speculate that as public workers' viral anxiety increases because of aggravated social conditions under the pandemic, motivation to resolve the situation may also rise, because their duties primarily aim to promote public interest, not personal gain. A recent study explained that emotional disturbance due to a threatening situation, such as a pandemic, could provide the motivation to act.<sup>51</sup> However, considering earlier findings that anxiety has a negative relationship with motivation,<sup>52</sup> it would be reproduced in this situation where an emotionally unstable state along with viral anxiety might depress the workers' morale. These bidirectional approaches would form a non-explicit conclusion that public workers' PSM was not significantly affected by viral anxiety. Second, a comparatively higher level of PSM would be expected during the pandemic, if the initial response of the government was successful enough for the public to have confidence in the administration. As revealed in a study, public workers in China were highly motivated during the COVID-19 pandemic and their motivation had a positive correlation with public satisfaction and cooperation.<sup>53</sup> In our research, the PSM measured one year after the outbreak would be higher than the usual state, considering that Korea was regarded as a model of credible national quarantine system during that period. In case public workers have already been encouraged by external factors during the pandemic, consequent changes in PSM due to viral anxiety might

not be apparent.

This study has several limitations. First, the survey was conducted in April 2021—14 months after the pandemic's outbreak, which might influence the results. Public workers might have already adjusted to the pandemic situation, and that might be the reason for the lack of mediation effect of PSM on the relationship between viral anxiety and depression. Moreover, the Korean government announced the "living with COVID-19" policy on November 1, 2021, as the country logged about 7,000 daily confirmed cases.<sup>54</sup> The results can, therefore, vary depending on the severity of the pandemic situation. Second, we can speculate that the viral anxiety perceived by public workers can vary depending on their work role. Certain public workers might be in roles directly related with COVID-19, such as developing and executing the prevention policy, visiting or transferring infected persons, or cleaning and disinfecting. Similarly, others may be in roles not directly related with COVID-19. The results of this study, therefore, must be confirmed among public workers whose roles are directly related with COVID-19 in a further investigation. Third, this research was conducted via an anonymous online survey instead of face-to-face interviews to prevent the risk of a viral outbreak. However, the online survey might lead to a bias in the study design. Fourth, the relatively small sample size of the participants in this study can reduce its statistical power.

In conclusion, we observed that resilience and PSM partially mediate the effects of work-related stress on work engagement. Depression was influenced by COVID-19-induced viral anxiety, and resilience mediated this association. Especially in the relationship between viral anxiety and depression, resilience had a noticeable impact to lower the levels of depressed mood, which suggests that as a personal aspect, it might be one of the decisive factors to assess the susceptibility of depression. The results of this study might contribute to the development of a psychological support system for public workers in this pandemic era.

### Availability of Data and Material

The datasets generated or analyzed during the study are available from the corresponding author on reasonable request.

### Conflicts of Interest

Seockhoon Chung, a contributing editor of the *Psychiatry Investigation*, was not involved in the editorial evaluation or decision to publish this article. All remaining authors have declared no conflicts of interest.

### Author Contributions

Conceptualization: Seockhoon Chung, Soyoun Yoo. Data curation: Dongyeon Jeong, Inn-Kyu Cho, Kyumin Kim, Jung Mun Choi, Jiyeon Kim, Joohee Lee. Formal analysis: Seockhoon Chung, Soyoun Yoo, Dongyeon Jeong. Methodology: Seockhoon Chung, Changnam Kim, Dongyeon Jeong. Visualization: Jung Mun Choi, Jiyeon Kim, Inn-Kyu Cho, Kyumin Kim,



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## REFERENCES

- Lai CC, Shih TP, Ko WC, Tang HJ, Hsueh PR. Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and coronavirus disease-2019 (COVID-19): the epidemic and the challenges. *Int J Antimicrob Agents* 2020;55:105924.
- Carleton RN. The intolerance of uncertainty construct in the context of anxiety disorders: theoretical and practical perspectives. *Expert Rev Neurother* 2012;12:937-947.
- Perry JL. Measuring public service motivation: an assessment of construct reliability and validity. *J Public Adm Res Theory* 1996;6:5-22.
- Xiong J, Lipsitz O, Nasri F, Lui LMW, Gill H, Phan L, et al. Impact of COVID-19 pandemic on mental health in the general population: a systematic review. *J Affect Disord* 2020;277:55-64.
- Luo M, Guo L, Yu M, Jiang W, Wang H. The psychological and mental impact of coronavirus disease 2019 (COVID-19) on medical staff and general public - a systematic review and meta-analysis. *Psychiatry Res* 2020;291:113190.
- Bohlken J, Schömig F, Lemke MR, Pumberger M, Riedel-Heller SG. [COVID-19 pandemic: stress experience of healthcare workers—a short current review]. *Psychiatr Prax* 2020;47:190-197. German.
- Salari N, Hosseini-Far A, Jalali R, Vaisi-Raygani A, Rasoulopoor S, Mohammadi M, et al. Prevalence of stress, anxiety, depression among the general population during the COVID-19 pandemic: a systematic review and meta-analysis. *Global Health* 2020;16:57.
- Schuster C, Weitzman L, Sass Mikkelson K, Meyer-Sahling J, Bersch K, Fukuyama F, et al. Responding to COVID-19 through surveys of public servants. *Public Adm Rev* 2020;80:792-796.
- Perry JL, Wise LR. The motivational bases of public service. *Public Adm Rev* 1990;50:367-373.
- Crewson PE. Public-service motivation: building empirical evidence of incidence and effect. *J Public Adm Res Theory* 1997;7:499-518.
- Knobe D, Wright II. Individual motives and organizational incentive systems. *Res Sociol Organ* 1982;1:209-254.
- Kahn WA. Psychological conditions of personal engagement and disengagement at work. *Acad Manage J* 1990;33:692-724.
- Nerstad CG, Richardsen AM, Martinussen M. Factorial validity of the Utrecht Work Engagement Scale (UWES) across occupational groups in Norway. *Scand J Psychol* 2010;51:326-333.
- Hakanen JJ, Bakker AB, Schaufeli WB. Burnout and work engagement among teachers. *J Sch Psychol* 2006;43:495-513.
- Llorens S, Schaufeli W, Bakker A, Salanova M. Does a positive gain spiral of resources, efficacy beliefs and engagement exist? *Comput Hum Behav* 2007;23:825-841.
- Bakker AB, Schaufeli WB, Leiter MP, Taris TW. Work engagement: an emerging concept in occupational health psychology. *Work Stress* 2008; 22:187-200.
- González-Romá V, Schaufeli WB, Bakker AB, Lloret S. Burnout and work engagement: independent factors or opposite poles? *J Vocat Behav* 2006;68:165-174.
- Deng J, Guo Y, Ma T, Yang T, Tian X. How job stress influences job performance among Chinese healthcare workers: a cross-sectional study. *Environ Health Prev Med* 2019;24:1-11.
- Yang T, Guo Y, Ma M, Li Y, Tian H, Deng J. Job stress and presenteeism among Chinese healthcare workers: the mediating effects of affective commitment. *Int J Environ Res Public Health* 2017;14:978.
- Cavanaugh MA, Boswell WR, Roehling MV, Boudreau JW. An empirical examination of self-reported work stress among U.S. managers. *J Appl Psychol* 2000;85:65-74.
- Leisink P, Steijn B. Public service motivation and job performance of public sector employees in the Netherlands. *Int Rev Adm Sci* 2009;75: 35-52.
- Borst RT. Comparing work engagement in people-changing and people-processing service providers: a mediation model with red tape, autonomy, dimensions of PSM, and performance. *Public Pers Manage* 2018;47:287-313.
- Deng J, Li Y, Sun Y, Lei R, Yang T. Public service motivation as a mediator of the relationship between job stress and presenteeism: a cross-sectional study from Chinese public hospitals. *BMC Health Serv Res* 2019;19:625.
- Bowes L, Jaffee SR. Biology, genes, and resilience: toward a multidisciplinary approach. *Trauma Violence Abuse* 2013;14:195-208.
- Hao S, Hong W, Xu H, Zhou L, Xie Z. Relationship between resilience, stress and burnout among civil servants in Beijing, China: mediating and moderating effect analysis. *Pers Individ Differ* 2015;83:65-71.
- Yıldırım M, Solmaz F. COVID-19 burnout, COVID-19 stress and resilience: initial psychometric properties of COVID-19 burnout scale. *Death Stud* 2022;46:524-532.
- Song H, Zhang M, Wang Y, Yang L, Wang Y, Li Y. The impact of resilience on anxiety and depression among grass-roots civil servants in China. *BMC Public Health* 2021;21:710.
- Ju G, Lee J, Ahn MH, Lee J, Kim EJ, Suh S, et al. Effects of depression and resilience of public workers on work-related stress and anxiety in response to the COVID-19 pandemic. *J Korean Med Sci* 2021;36:e262.
- Cohen J. *Statistical power analysis for the behavioral sciences*. Hillsdale: Lawrence Erlbaum; 1988.
- Benfante A, Di Tella M, Romeo A, Castelli L. Traumatic stress in healthcare workers during COVID-19 pandemic: a review of the immediate impact. *Front Psychol* 2020;11:569935.
- Eysenbach G. Improving the quality of web surveys: the Checklist for Reporting Results of Internet E-Surveys (CHERRIES). *J Med Internet Res* 2004;6:e34.
- Ahn J, Lee J, Hong Y, Park J, Chung S. Stress and anxiety to viral epidemics-6 for medical students: psychometric properties of the anxiety measure for the COVID-19 pandemic. *Front Psychiatry* 2021;12:705805.
- Chung S, Kim HJ, Ahn MH, Yeo S, Lee J, Kim K, et al. Development of the Stress and Anxiety to Viral Epidemics-9 (SAVE-9) scale for assessing work-related stress and anxiety in healthcare workers in response to viral epidemics. *J Korean Med Sci* 2021;36:e319.
- Willmer M, Westerberg Jacobson J, Lindberg M. Exploratory and confirmatory factor analysis of the 9-item Utrecht work engagement scale in a multi-occupational female sample: a cross-sectional study. *Front Psychol* 2019;10:2771.
- Schaufeli WB, Bakker AB, Salanova M. The measurement of work engagement with a short questionnaire: a cross-national study. *Educ Psychol Meas* 2006;66:701-716.
- Schaufeli WB, Salanova M, González-Romá V, Bakker AB. The measurement of engagement and burnout: a two sample confirmatory factor analytic approach. *J Happiness Stud* 2002;3:71-92.
- Kim WH, Park JG, Kwon B. Work engagement in South Korea: validation of the Korean version 9-item Utrecht work engagement scale. *Psychol Rep* 2017;120:561-578.

38. Chang SJ, Koh SB, Kang D, Kim SA, Kang MG, Lee CG, et al. Developing an occupational stress scale for Korean employees. *Korean J Occup Environ Med* 2005;17:297-317.
39. Smith BW, Dalen J, Wiggins K, Tooley E, Christopher P, Bernard J. The brief resilience scale: assessing the ability to bounce back. *Int J Behav Med* 2008;15:194-200.
40. Choi N, Leach SM, Hart JM, Woo H. Further validation of the Brief Resilience Scale from a Korean college sample. *J Asia Pac Couns* 2019; 9:39-56.
41. Kroenke K, Spitzer RL, Williams JB. The PHQ-9: validity of a brief depression severity measure. *J Gen Intern Med* 2001;16:606-613.
42. Yao AY, Jamal M, Demerouti E. Relationship of challenge and hindrance stressors with burnout and its three dimensions. *J Pers Psychol* 2015;14:203-212.
43. Zhang M, Zhang P, Liu Y, Wang H, Hu K, Du M. Influence of perceived stress and workload on work engagement in front-line nurses during COVID-19 pandemic. *J Clin Nurs* 2021;30:1584-1595.
44. Kim Y, Oh SS, Wang C. From uncoordinated patchworks to a coordinated system: MERS-CoV to COVID-19 in Korea. *Am Rev Public Adm* 2020;50:736-742.
45. Gualano MR, Lo Moro G, Voglino G, Bert F, Siliquini R. Effects of Covid-19 lockdown on mental health and sleep disturbances in Italy. *Int J Environ Res Public Health* 2020;17:4779.
46. Stanton R, To QG, Khalesi S, Williams SL, Alley SJ, Thwaite TL, et al. Depression, anxiety and stress during COVID-19: associations with changes in physical activity, sleep, tobacco and alcohol use in Australian adults. *Int J Environ Res Public Health* 2020;17:4065.
47. Faisal RA, Jobe MC, Ahmed O, Sharker T. Mental health status, anxiety, and depression levels of Bangladeshi university students during the COVID-19 pandemic. *Int J Ment Health Addict* 2021 Jan 4 [Epub]. <https://doi.org/10.1007/s11469-020-00458-y>.
48. Yoo S, Lee J, Ju G, Lee S, Suh S, Chung S. The Schoolteachers' version of the stress and anxiety to viral epidemics-9 (SAVE-9) scale for assessing stress and anxiety during the COVID-19 pandemic. *Front Psychiatry* 2021;12:712670.
49. Edward KL. Resilience: a protector from depression. *J Am Psychiatr Nurses Assoc* 2005;11:241-243.
50. Southwick SM, Charney DS. The science of resilience: implications for the prevention and treatment of depression. *Science* 2012;338:79-82.
51. Cypryńska M, Nežlek JB. Anxiety as a mediator of relationships between perceptions of the threat of COVID-19 and coping behaviors during the onset of the pandemic in Poland. *PLoS One* 2020;15:e0241464.
52. Al Majali S. Positive anxiety and its role in motivation and achievements among university students. *Int J Instr* 2020;13:975-986.
53. Zhang S, Wang X, Shi Y, Liu B, Huang X, Wang H, et al. What motivates individual public service motivation and cooperation at the initial stage of the COVID-19 outbreak: a cross-sectional survey. *Int J Health Plann Manage* 2022;37:513-527.
54. Silva WAD, de Sampaio Brito TR, Pereira CR. COVID-19 anxiety scale (CAS): development and psychometric properties. *Curr Psychol* 2020 Nov 13 [Epub]. <https://doi.org/10.1007/s12144-020-01195-0>.