ORIGINAL RESEARCH

COVID-19-Related Self-Stigma, Post-Traumatic Stress Disorder, Insomnia, and Smartphone Addiction Among Frontline Government Workers with COVID-19 Pandemic Control Duties

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Purpose: The duties related to COVID-19 control and prevention may have caused psychological stress for the individuals in charge (eg, frontline government workers) and have reportedly led to mental health issues, such as insomnia and post-traumatic stress disorder (PTSD). However, the prevalence of these COVID-19-related disorders and their associated factors remain unclear. Therefore, the purpose of the present study was to investigate the prevalence rates of insomnia, PTSD, COVID-19-related self-stigma, and smartphone addiction, along with the identification of risk factors and protective factors for Taiwan frontline government workers with COVID-19 pandemic control duties.

Methods: The survey was carried out with 151 participants between September and October 2021. All participants completed the Fear of COVID-19 Scale (assessing fear of COVID-19), Self-Stigma Scale (assessing self-stigma during the COVID-19 pandemic), Smartphone Application-Based Addiction Scale (assessing the risk of smartphone addiction), Insomnia Severity Index (assessing insomnia), Impacts of Event Scale-6 (assessing PTSD), and a self-designed set of questions assessing trait resilience.

Results: The results showed that the prevalence rate was 31.1% for insomnia and 33.8% for PTSD. Furthermore, service duration (adjusted odds ratio [AOR] = 0.93; 95% confidence interval [CI] = 0.86, 0.999) and trait resilience (AOR = 0.19; 95% CI = 0.08, 0.46) were protective factors and fear of COVID-19 (AOR = 1.91; 95% CI = 1.02, 3.57) was a risk factor for insomnia. Fear of COVID-19 (AOR = 2.63; 95% CI = 1.35, 5.14), self-stigma (AOR = 3.62; 95% CI = 1.19, 11.02), and smartphone addiction (AOR = 1.09, 95% CI = 1.001, 1.19) were risk factors, and trait resilience was a protective factor (AOR = 0.58; 95% CI = 0.29, 1.17) for PTSD.

Conclusion: The findings demonstrated a high prevalence of insomnia and PTSD. Risk-reducing strategies and protective factor promotion strategies are recommended to help reduce the symptoms of insomnia and PTSD among Taiwan frontline government workers.

Keywords: mental health, insomnia, post-traumatic stress disorder, smartphone addiction, village officer

Introduction

Coronavirus disease 2019 (COVID-19) has been transmitted worldwide for more than two years at the time of writing,[1] resulting in almost 617 million confirmed diagnoses and more than 6.5 million deaths globally[2] (by September 2022).

Although Taiwan was predicted to be one of the most affected areas,[3] the COVID-19 pandemic in Taiwan has led to 5 million confirmed cases and approximately 10,500 deaths[4] (by September 2022), which is comparably low globally.[2,5] Moreover, the Taiwanese government has taken precautionary action, including effective quarantine management, at the beginning of the pandemic.[6,7]

Individuals who were considered to be potentially infected (identified in an investigation by the government health authority) need to comply with a 14-day home quarantine. As a frontline government worker, village officers have the extra responsibility of managing quarantined residents. Job duties include such activities as monitoring the health status of quarantined residents, participating in the disinfection of confirmed case 'footprint areas' (ie, places where confirmed cases have been identified by using information supplied by individuals infected with COVID-19 via smartphone QR codes), and delivering meals to quarantined individuals.[8] Such duties appear to cause the same psychological responses (eg, fear, anxiety, depression) as those among frontline healthcare workers. In addition, they have made various complaints due to the stress and concerns regarding their COVID-19 responsibilities. The overwhelming workload,[9] insufficient knowledge of self-protection strategies,[10] and fear of exposure to the virus[11] may cause village officers to experience psychological distress,[12] anxiety,[9,12] depression,[10,12] and self-stigma,[13] which may further lead to the development of traumatizing symptoms such as insomnia[12] and/or post-traumatic stress disorder (PTSD).[13]

Furthermore, the COVID-19 pandemic has changed the lifestyle and psychosocial health of individuals.[14–21] The advice to "stay at home"[17] increased the use of the internet and smartphones because of its various functions (eg, online meetings, social interaction, online food shopping).[22,23] The psychological stress derived from COVID-19 may trigger problematic smartphone use (which in extreme cases has been referred to as "smartphone addiction") for a small minority.[24] Previous studies indicate that fear of COVID-19[25,26] and poor mental wellbeing such as anxiety or depression[27,28] may increase smartphone addiction because it allows the temporarily avoidance of reality.[28] Moreover, research also indicates the associations between smartphone addiction, psychological distress[25,27] and health issues such as insomnia via the influence on poor sleep quality[29] and sleep deprivation.[30]

The cognitive models of insomnia[31] and PTSD[32] suggest that the excessive negative emotions may increase health risks and impair the quality of life.[33,34] More specifically, worries and ruminations concerning the stressors may induce a series of psychological changes (eg, anxiety and depression) and eventually exacerbate the symptoms (eg, insomnia and PTSD). Trait resilience is a potential factor that could minimize the negative impacts of insomnia and PTSD[35] among individuals. Trait resilience has specifically been defined as a personal trait, which benefits individuals in coping with traumatic events[36] and provides the ability for self-adaptation to deal with stressors[37] and achieve positive adjustment.[36] Individuals who possess lower or weaker resilience are more likely to experience psychological distress.[38,39] In contrast, enhancing resilience level may help the individuals to deal with negative psychological mood states.[40]

The therapeutic process of prolonged exposure (PE) in the habituation model (ie, a behavioral model that allows individuals to become accustomed to a specific stimulus by repeated exposure to that stimulus) can help reduce negative psychological responses. The structural contact to the fear stimulus with minimal possibility of avoidance or escape[41] makes PE a commonly used treatment for PTSD with the reported effect of reducing emotional distress.[42] A recent study indicated that individuals have become accustomed to the "new way of living" with COVID-19 which has subsequently reduced their anxiety, consequently making "continued living with COVID-19" become a form of PE.[43] Similarly, service duration of village chiefs can be seen as a type of PE to the stimulus and could have an anticipatory benefit in reducing the level of psychological distress in relation to COVID-19 and the likelihood of insomnia and/or PTSD.

However, there are knowledge gaps among frontline government workers regarding (i) insomnia and PTSD during COVID-19 in Taiwan and (ii) potential risk factors and protective factors for insomnia and PTSD. Therefore, the main purpose of the present study was to estimate the prevalence rate of insomnia and PTSD, as well as the COVID-19-related self-stigma and smartphone addiction among frontline government workers during the COVID-19 pandemic in Taiwan. Among this cohort, the study also investigated the (i) association between psychological distress, insomnia, PTSD and smartphone addiction and (ii) protective effect of trait resilience and service duration on insomnia and PTSD.

Materials and Methods

Participants and Procedure in Data Collection

Village officers were chosen to represent the frontline government workers of Taiwan in the present study. Village officers are public employees in the local government and cooperate with village chiefs. Their job duties include serving residents, holding local meetings, and handling administration work. Extra assignments regarding quarantined residents, such as providing health tracking, delivering meals, and collecting trash, were required during the COVID-19 pandemic. The overall number of village officers in Taiwan is approximately 8000.

The present study's protocol was approved by Human Research Ethics Committee of NCKU (HREC ref: NCKU HREC-E-110-121-2). Moreover, the present study complied with the Declaration of Helsinki. The survey was administered directly to the village officers in the township office of Taipei and Tainan during September to October, 2021. All participants provided written informed consent for participation. A total of 181 village officers participated in the survey but 30 did not complete the whole survey. Therefore, a total of 151 completed surveys were used in the analysis.

Measures

Demographics and Job Duties

Demographic information including age, gender, educational level, service duration, marital status, and specific job duties (eg, caring for the quarantine residents) were collected to determine the characteristics of the participants.

Fear of COVID-19

The Fear of COVID-19 Scale (FCV-19S), comprising seven items (eg, "I am afraid to lose my life because of COVID-19") rated on a five-point Likert scale (1 = strongly disagree; 5 = strongly agree) was used to assess the fear of COVID-19. The scores are summed and a higher score indicates a greater fear of COVID-19. The psychometric properties (including construct validity, concurrent validity, test–retest reliability, and internal consistency) of the FCV-19S have been found satisfactory in prior research.[44] The internal consistency of FCV-19S in the present study was excellent (α= 0.923).

Self-Stigma in COVID-19

The Self-Stigma Scale (SSS) was modified into a COVID-19 version.[45] Therefore, the Self-Stigma Scale for COVID-19 (SSS-COVID) comprising nine items (eg, "I don't feel comfortable around people because I am suspected of having COVID-19 infection") rated on a four-point Likert scale (1 = strongly disagree; 4 = strongly agree) was used to assess the level of self-stigma with regard to COVID-19. The scores are averaged, and a higher score indicates greater self-stigma derived from COVID-19. The psychometric properties (including construct validity, concurrent validity, test–retest reliability, and internal consistency) of the SSS have been found satisfactory in prior research.[45] The internal consistency of SSS-COVID in the present study was very good (α = 0.863).

Smartphone Addiction

The Smartphone Application-Based Addiction Scale (SABAS) comprising six items (eg, "My smartphone is the most important thing in my life") rated on a six-point Likert scale (1 = strongly disagree; 6 = strongly agree) was used to assess the risk of smartphone addiction. The scores are summed and a higher score indicates a higher possibility of being at risk of developing smartphone addiction. A cutoff score of 21 out of 36 is used to indicate the risk of smartphone addiction.[46] The psychometric properties (including construct validity, concurrent validity, test–retest reliability, and internal consistency) of the SABAS have been found satisfactory in prior research.[47] The internal consistency of SABAS in the present study was very good (α= 0.860).

Trait Resilience

Four self-developed items were used to assess trait resilience among participants. The four items were "I feel my physical health was better than other people before the COVID-19 pandemic"; "I feel my psychological health was better than other people before the COVID-19 pandemic"; "I feel my physical health was better than other people last week"; and "I feel my psychological health was better than other people last week". The items are rated on a five-point Likert scale (1 = strongly disagree; 5 = strongly agree). The score is averaged, and a higher score indicates better trait resilience in their physical or

psychological health status when comparing with others. The internal consistency of trait resilience in the present study was excellent (α= 0.909).

Insomnia

The Insomnia Severity Index (ISI) comprising seven items (eg, "I am satisfied with my current sleep pattern") rated on a five-point Likert scale (0 = strongly disagree; 4 = strongly agree) was used to assess the severity of insomnia. The scores are summed and a higher score indicates a higher level of insomnia. A cutoff score of 9 out of 28 is used to indicate insomnia.[48] The psychometric properties (including construct validity, concurrent validity, test–retest reliability, and internal consistency) of the ISI have been found satisfactory in prior research.[49] The internal consistency of ISI in the present study was very good (α= 0.874).

Post-Traumatic Stress Disorder (PTSD)

The Impacts of Event Scale-6 (IES-6) comprising six items (eg, "I had trouble concentrating") rated on a five-point Likert scale (0 = no affect; 4 = major affect), was modified to assess stress response after traumatic event (ie, COVID-19 in the present study) with the use of a stem sentence. The stem sentence of IES-6 was "Please answer the following questions considering yourself during the COVID-19 pandemic". The scores are averaged and a higher score indicates the higher level of experience regarding the episodes. A cutoff score of 1.75 indicates PTSD.[50] The psychometric properties (including construct validity, concurrent validity, test–retest reliability, and internal consistency) of the IES-6 have been found satisfactory in prior research.[51] The internal consistency of IES-6 in the present study was very good (α= 0.872).

Data Analysis

The participants' characteristics (including their demographics, experiences, and psychological features) were analyzed using descriptive statistics, including means, standard deviations, frequencies, and percentages. Zero-order bivariate correlation coefficients were then calculated for the studied variables. Finally, two logistic regression models were constructed to understand the potential predictors for insomnia and PTSD among the village officers. More specifically, insomnia and PTSD were the two dependent variables for the logistic regression models. The two logistic regression models shared the same predictors (service duration, caring for quarantined residents, fear of COVID-19, self-stigma in COVID-19, smartphone addiction, and trait resilience) and controlled variables (age and sex). All the statistical analyses were performed using IBM SPSS 20.0 (IBM Corp., Armonk, NY).

Results

Nearly half of the participants were aged between 30 and 50 years (n = 74; 49.0%), and slightly more than half of the participants were males (n = 84; 55.6%). Most of the participants had obtained a degree from college including postgraduate degrees (n = 145; 96.0%) and had experiences of caring for quarantined residents (n = 143; 94.7%). On average, their service duration was 7.13 years (SD = 7.23); their fear of COVID-19 score was 19.63 out of 35 (SD = 6.24); their self-stigma toward COVID-19 score was 2.82 out of 5 (SD = 0.46); their smartphone addiction score was 20.41 out of 36 (SD = 5.71); and their trait resilience score was 3.04 out of 5 (SD = 0.63). Moreover, over 30% of the participants had insomnia (n = 47; 31.1%) or PTSD (n = 51; 33.8%). Nearly half of the participants were classed as being at risk of smartphone addiction (n = 73; 48.3%) (Table 1).

Table 2 demonstrates the correlations between the variables. Insomnia was significantly associated with fear of COVID-19 ($r = 0.19$; $p = 0.02$), smartphone addiction ($r = 0.20$; $p = 0.02$), and trait resilience ($r = −0.38$; $p < 0.001$). PTSD was significantly associated with fear of COVID-19 ($r = 0.46$; $p < 0.001$), self-stigma toward COVID-19 ($r = 0.35$; $p < 0.001$), and insomnia ($r = 0.28$; $p < 0.001$).

The first logistic regression model showed that longer service duration (adjusted odds ratio; AOR = 0.93; 95% confidence interval; CI = 0.86, 0.999) and trait resilience (AOR = 0.19; 95% CI = 0.08, 0.46) were significant protectors for insomnia. Fear of COVID-19 (AOR = 1.91; 95% CI = 1.02, 3.57) was a significant risk factor for insomnia. The second logistic regression model showed that fear of COVID-19 (AOR = 2.63; 95% CI = 1.35, 5.14), self-stigma

Table 1 Participants' Characteristics (N = 151)

Age; n (%)	
< 30 years	27 (17.9)
30–50 years	74 (49.0)
> 50 years	49 (32.5)
Sex; n (%)	
Male	84 (55.6)
Female	67 (44.4)
Service duration in years; M (SD)	7.13 (7.23)
Marital status; n (%)	
Single	71 (47.0)
Married	73 (48.3)
Other	6 (4.0)
Educational level; n (%)	
Senior high school	6 (4.0)
College or above	145 (96.0)
Caring for quarantined residents; n (%)	
No	7 (4.7)
Yes	143 (94.7)
Fear of COVID-19; M (SD)	19.63 (6.24)
Self-stigma; M (SD)	2.82 (0.46)
Smartphone addiction; M (SD)	20.41 (5.71)
No	78 (51.7)
Yes	73 (48.3)
Resilience; M (SD)	3.04 (0.63)
Insomnia; M (SD)	7.38 (5.06)
Insomnia; n (%)	
No	104 (68.9)
Yes	47 (31.1)
Post-traumatic stress disorder; M (SD)	1.44 (0.72)
Post-traumatic stress disorder; n (%)	
No	99 (65.6)
Yes	51 (33.8)

toward COVID-19 (AOR = 3.62; 95% CI = 1.19, 11.02), and smartphone addiction (AOR = 1.09, 95% CI = 1.001, 1.19) were significant risk factors for PTSD (Table 3).

Discussion

The results of the present study provide evidence on the current situation regarding fear of COVID-19, self-stigma, insomnia, PTSD, and smartphone addiction for frontline government workers (ie, village officers) during the COVID-19 pandemic in Taiwan, a region with relatively low prevalence of COVID-19 infection.[5] The present study found that the prevalence of insomnia was 31.1%, which was similar to studies comprising healthcare workers (27.0%–34.0%),[52–54] but higher than other studies comprising general populations (7.3%–19.1%).[55–57] The prevalence of PTSD was 33.8%, which was comparable to similar studies comprising frontline healthcare workers (eg, doctors, nurses or other health care providers) (3.8%–37.1%).[13,57–59] The prevalence of risk of smartphone addiction was 48.3%, which was similar to different populations, comprising children/adolescents, university students, and general adults (45.1%–52.0%).[29,60,61]

    To the best of the present authors' knowledge, this is the first study investigating the prevalence of smartphone addiction risk among frontline government workers. In addition, insomnia was positively correlated to fear of COVID-19 and smartphone addiction, but negatively correlated to trait resilience. PTSD was positively correlated to fear of COVID-19, self-stigma, and insomnia. In addition, fear of COVID-19 was a risk factor for insomnia. Service duration and trait

Table 2 Correlation Coefficients Among Studied Variables (N = 151)

	r (*p*-value)									
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Age	–									
2. Sex	**−0.21 (0.01)**	–								
3. Service	**0.58 (<0.001)**	**−0.26 (0.002)**	–							
4. Caring	0.10 (0.25)	−0.03 (0.76)	0.01 (0.91)	–						
5. Fear	**0.19 (0.02)**	−0.06 (0.50)	0.02 (0.83)	0.08 (0.32)	–					
6. Self-stigma	0.15 (0.06)	−0.05 (0.52)	−0.06 (0.44)	0.09 (0.27)	**0.55 (<0.001)**	–				
7. SPA	−0.04 (0.66)	0.10 (0.25)	−0.12 (0.15)	0.02 (0.81)	**0.33 (<0.001)**	**0.17 (0.04)**	–			
8. Resilience	0.10 (0.23)	**−0.23 (0.01)**	0.04 (0.62)	0.10 (0.25)	0.08 (0.35)	0.10 (0.25)	−0.06 (0.49)	–		
9. Insomnia	0.03 (0.70)	0.08 (0.31)	−0.12 (0.14)	−0.04 (0.65)	**0.19 (0.02)**	0.15 (0.07)	**0.20 (0.02)**	**−0.38 (<0.001)**	–	
10. PTSD	0.13 (0.12)	0.04 (0.63)	−0.03 (0.76)	0.07 (0.39)	**0.46 (<0.001)**	**0.35 (<0.001)**	−0.03 (0.70)	−0.03 (0.70)	**0.28 (<0.001)**	–

Note: Significant correlation coefficients are in bold.
Abbreviations: Service, service duration in years; Caring, caring for quarantined residents; Fear, fear of COVID-19; SPA, smartphone addiction; PTSD, post-traumatic stress disorder.

Table 3 Logistic Regression Results in Explaining Insomnia and Post-Traumatic Stress Disorder (PTSD) (N = 151)

	Insomnia[a]		PTSD[b]	
	AOR	95% CI	AOR	95% CI
Age (Ref: < 30 years)				
30–50 years	0.44	0.11, 1.82	0.28	0.06, 1.37
> 50 years	**0.31**	**0.10, 0.90**	0.57	0.20, 1.66
Sex (Ref: male)	0.96	0.41, 2.26	0.71	0.29, 1.71
Service duration in years	**0.93**	**0.86, 0.999**	0.96	0.90, 1.04
Caring (Ref: no)	7.23	0.58, 90.63	6.45	0.30, 137.82
Fear of COVID-19	**1.91**	**1.02, 3.57**	**2.63**	**1.35, 5.14**
Self-stigma	1.09	0.38, 3.19	**3.62**	**1.19, 11.02**
Smartphone addiction	0.98	0.91, 1.06	**1.09**	**1.001, 1.19**
Resilience	**0.19**	**0.08, 0.46**	0.58	0.29, 1.17
	Model goodness of fit			
	−2 LL	Nagelkerke R^2	−2 LL	Nagelkerke R^2
	147.64	0.26	137.21	0.39

Notes: Caring, caring for quarantined residents; AOR, adjusted odds ratio; −2LL, −2 log likelihood value; significant AORs are in bold. [a]Using dichotomized insomnia; cutoff at Insomnia Severity Index score > 9. [b]Using dichotomized PTSD; cutoff at Impact Events Scale-Revised 6 > 1.75.

resilience were protective factors for insomnia, while fear of COVID-19, self-stigma, and smartphone addiction were risk factors for PTSD.

Village officers in Taiwan took on extra job duties for the disease control and prevention during the COVID-19 pandemic. The consequent fear of COVID-19, along with psychological distress (eg, anxiety, depression) has initiated a series of psychological changes contributing to the poor health (eg, insomnia and PTSD).[12,13,62] The fear originating from being near to possibly infected quarantine residents (ie, delivering meals or collecting daily trash), as well as the self-stigma derived from a public perspective, has become a large psychological burden on frontline workers (eg, healthcare providers),[13] as seems to be the case among village officers in Taiwan. Moreover, excessive worry caused by the fear of COVID-19[56] was one of the predominant factors that contributed to clinical insomnia.[63] It has affected sleep quality[58] and has led to hyperarousal,[64,65] which has been reported in the pathophysiology of insomnia[64] and is also a theoretical subtype of PTSD.[65] In addition, the symptom of hyperarousal has been reported to be more highly prevalent among healthcare workers who experience high exposure to stressors.[58,66] Therefore, it is anticipated that these psychological distresses and poor mental health can gradually develop into advanced health issues of insomnia and PTSD due to the long-term ongoing nature of the COVID-19 pandemic.

Studies have reported that fear (an immediate and intensive emotion which was particularly derived from medical vulnerability or excessive worries) is one of the critical factors associated with PTSD,[66] self-stigma,[67] and smartphone addiction.[61] The present study's findings agree with these prior findings.[61,66,67] Discrimination from the public (eg, unfriendly attitudes) caused unpleasant psychological burden and has provoked self-stigma among frontline workers.[69,70] It also influences the perception and understanding regarding the disease,[71] and may further result in vulnerability of individuals facing the potential consequences, including self-stigma and smartphone addiction.[71] A higher level of self-stigma has been reported to be associated with psychological distress,[72] which might elicit a series of pathological changes to develop into PTSD.[58]

To the best of the present authors' knowledge, this is also the first study to investigate smartphone addiction among frontline workers during the COVID-19 pandemic. Smartphone use provides a temporary escape and psychological support[28] for individuals to cope with psychological stress[25,26,61] and avoiding negative emotion.[68] However, the increasing frequency and duration of smartphone use might be associated with problematic use.[73] Moreover, smartphone addiction has been reported to be a mediator in the association between COVID-19 and PTSD.[68] Individuals with smartphone addiction have been reported as lacking impulsive control,[74] which is also a subcategory of PTSD.[75] In

addition, exposure to artificial light,[79] especially at-night blue light from the smartphone,[80] may increase the incidence rate of sleep disorder and further lead to insomnia.[79] Consequently, smartphone addiction may exacerbate the development of insomnia and PTSD.

Resilience was identified as a protector of insomnia and PTSD in the present study, which concurs with the findings of several previous studies.[38,39,76] This indicates that trait resilience acts as a self-protector[38] to benefit individuals in stressful situations. Studies show that individuals with higher resilience have a lower chance of developing negative emotional symptoms[39] and higher resilience successfully predicts lower levels of PTSD symptoms.[76] Some researchers believe that resilience protects individuals by enhancing self-esteem[77] and positive influence,[78] while others believe that resilience "restrains" individuals from being trapped in negative thoughts.[81] Both beliefs explain the ability of resilience to protect individuals from developing negative psychological mood states and inhibiting the occurrence of insomnia and PTSD.

It is likely that the longer service duration allows village officers to have more experience in dealing the stress event (ie, the village officers experience PE and become habituated as a consequence of their job duties). One study reported that repeated and prolonged exposure to a stressor enables individuals to build up the tolerance to psychological distress (eg, anxiety) as a corrective learning.[42] Interestingly, individuals who do not present with diminishing psychological distress can still have reduced post-traumatic symptoms.[82] That is, even though there was no improvement in reducing psychological distress, individuals might still benefit from PE by having decreased unpleasant psychological responses. The key point may be attributed to habituation,[83] which allows individuals to tolerate negative psychological impacts[43,83] and weakens the effect of stress.

The results of the present study have implications in helping reduce the symptoms of insomnia and PTSD among frontline government workers. For example, the risk factor of fear of COVID-19 could be reduced by providing knowledge regarding information concerning COVID-19 (such as personal hygiene as an effective COVID-19 preventive strategy)[63] or providing essential protective equipment to reduce excessive worries and anxiety. Additionally, destigmatization may benefit the individuals[84] via the improvement of public's disease perceptions[83] or stigma coping skills such as empowerment or help-seeking behavior.[84] All these interventions can potentially alleviate the psychological distress[85] while conducting job duties of disease control and prevention. Furthermore, strategies (such as mindfulness) to improve the protective factors (eg, resilience) are recommended to help enhance the individual's ability to cope with the stressor. Maintaining routine physical activity[86] or providing psychological support for the frontline government workers[40] could help promote self-control and allow the individuals to gain positive effects, further improving resilience.

The present study has several limitations. First, the study used convenience sampling to collect the data. Therefore, the results might be limited due to the similar context and features of regional effect and were not representative for the results to be generalized to other countries. Second, a cross-sectional design was adopted. Therefore, the study was unable to determine the cause-and-effect relationship and protective effect of increasing service duration. Third, the measures in the present study used self-reported evaluation, which might have self-report bias. Fourth, the present study had a relatively small sample size. More specifically, the responses collected comprised less than 13% of the total population of village officers in the areas examined. The relatively small number of participants may result in a weaker statistical power and a biased estimation in the prevalence reported in the present study.

Conclusion

The present study investigated the situation of insomnia and PTSD during the COVID-19 pandemic among frontline government workers in Taiwan during a period of relatively low COVID-19 prevalence. The results suggest that despite the relatively low infection rate, frontline government workers had a relatively high prevalence of insomnia, PTSD, and risk of smartphone addiction. Moreover, fear of COVID-19, self-stigma, and risk of smartphone addiction were potential risk factors for insomnia or PTSD, while trait resilience and service duration were potential protective factors. Based on the findings, the psychological health of frontline government workers should be taken seriously. Strategies to reduce the fear of COVID-19, such as providing knowledge regarding COVID-19, or strategies to improve resilience, such as

maintaining daily physical activity, would likely benefit individuals and further reduce the incidence of insomnia or PTSD among this particular cohort.

Abbreviations

PTSD, Post-traumatic stress disorder; FCV-19S, Fear of COVID-19 Scale; SSS, Self-Stigma Scale; SSS-COVID, Self-Stigma Scale for COVID-19; SABAS, Smartphone Application-Based Addiction Scale; ISI, Insomnia Severity Index; IES-6, Impacts of Event Scale-6.

Data Sharing Statement

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

Ethics Approval and Consent to Participate

The study protocol was approved by Human Research Ethics Committee of NCKU (HREC ref: NCKU HREC-E-110-121-2) and all the participants signed a written informed consent before participation. All methods were performed in accordance with the Declaration of Helsinki, and participants could withdraw consent at any time.

Disclosure

The authors report no conflicts of interest in this work.

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