RESEARCH ARTICLE

The relationship between frontline nurses' psychosocial status, satisfaction with life and resilience during the prevalence of COVID-19 disease

Mohammad Ali Zakeri[1] [ID] | Sayed Mortaza Hossini Rafsanjanipoor[2] |
Maryam Zakeri[3] | Mahlagha Dehghan[4] [ID]

[1]Social Determinants of Health Research Centre, Non-Communicable Diseases Research Center, Rafsanjan University of Medical Sciences, Rafsanjan, Iran

[2]Social Determinants of Health Research Centre, Rafsanjan University of Medical Sciences, Rafsanjan, Iran

[3]Physiology-Pharmacology Research Center, Rafsanjan University of Medical Sciences, Rafsanjan, Iran

[4]Nursing Research Center, Kerman University of Medical Sciences, Kerman, Iran

Correspondence
Mahlagha Dehghan, Nursing Research Center, Razi Faculty of Nursing and Midwifery, Kerman University of Medical Sciences, Haft-Bagh Highway, Kerman, Iran.
Emails: m_dehghan86@yahoo.com; m_dehghan@kmu.ac.ir

Abstract

Aim: The present study aimed to investigate the association between frontline nurse's psychosocial status, satisfaction with life and resilience during the prevalence of COVID-19 disease.

Design: A cross-sectional study.

Methods: 185 frontline nurses taking care of the COVID-19 patients participated in the study from March to April 2020. The data were collected using demographic questionnaire, General Health Questionnaire (GHQ-28), Generalized Anxiety Disorder 7-item (GAD-7), Impact of Event Scale-Revised (IES-R), Satisfaction with Life Scale (SWLS) and Connor-Davidson Resilience Scale (CD-RISC).

Results: The results showed that not being at risk of coronavirus infection, poor/no satisfaction with life and non-resilience were significantly associated with higher psychological disorders. The coronavirus disease has significant consequences for the mental health of nurses. The factors affecting the mental health of nurses should be considered to support nurses in crises such as coronavirus. Provision of effective psychological interventions for nurses can be one of the effective solutions.

KEYWORDS
coronavirus, general health, generalized anxiety disorder, life satisfaction, nurse, post-traumatic stress disorder, resilience

1 | INTRODUCTION

Coronavirus disease (COVID-19), an acute respiratory illness, began with unknown causes in Wuhan, China in December 2019 (Huang, Wang, et al., 2020). The outbreak of COVID-19 infection quickly became a major epidemic threat in China. The mortality rate of the COVID-19 patients was 2.96% in Wuhan, China on February 14, 2020 (National Health Commission of the People's Republic of China, 2020). COVID-19 infection is associated with admission to the ICU and high mortality (Huang, Wang, et al., 2020). COVID-19 disease has become a major health-threatening problem due to the rapid spread (Gao et al., 2020). So far, more than 800 cases with COVID-19, including healthcare staff have been confirmed in Wuhan, China, other provinces of China and some countries, including Thailand (Novel Coronavirus – Thailand (ex-China), 2020), Japan (Japan National Commission, 2020), South Korea (Novel

Coronavirus – Republic of Korea (ex-China), 2020) and the United States (Haynes et al., 2020). Recent studies on healthcare providers have shown that the disease has also affected caregivers of patients with COVID-19 (China National Health Commission, 2020). Infections of health workers are an ominous finding in any emerging infection. Frontline healthcare providers are at risk of the disease when caring for patients with a respiratory infection (Wang, Horby, et al., 2020).

Healthcare providers are always at the forefront of any particular epidemic. To date, more than 3,000 medical personnel have infected with COVID-19, and some of them died because they were in close contact with patients. Therefore, they may have emotional problems during the COVID-19 epidemic, which challenge their duties (Huang, Lei, et al., 2020). Unfortunately, emotional disorders and mental health problems affect employees' function and working capacity, leading to absenteeism, job-seeking, increased accidents and reduced productivity. It is necessary to examine and monitor mental disorders and the factors affecting them in the workplace to improve the health of employees (Damari et al., 2019). Mental health is the state of someone who is functioning at a satisfactory level of emotional and behavioural adjustment (Kaveh, 2012). Occupational stress can endanger one's health by causing physical, psychological and behavioural outcomes. In addition, these pressures reduce the quality of work by threatening organizational goals (Asadi et al., 2019; Poursadeghiyan et al., 2016).

2 | BACKGROUND

Due to the prevalence of COVID-19, healthcare providers caring for patients with COVID-19 are exposed to special stress and post-traumatic stress disorder in the workplace. Huang et al. show that COVID-19 develops anxiety, anger and various degrees of psychological crisis in the medical staff, and it increases the need for psychological protective measures to reduce its psychological effects on healthcare providers (Huang, Wang, et al., 2020). Guo et al. (2020) showed that 13.47% of the respondents had reported moderate-high levels of depression and 4.98% had reported moderate-high levels of anxiety since the outbreak of COVID-19 (Guo et al., 2020). Sun et al. (2020) in China found that the prevalence of PTSS among Chinese people was 4.6% 1 month after the COVID-19 prevalence (Sun et al., 2020). Dai et al. (2020) also found that healthcare providers had significant concerns about the disease (Dai et al., 2020), which could lead to psychological disorders (Tirgari et al., 2016). To the best of our knowledge, there are many unknowns about the psychological effects of the COVID-19 that need to be realized in future studies (Huang, Wang, et al., 2020). Therefore, due to the prevalence of COVID-19 in Iran and the need to investigate the effects of COVID-19 on frontline nurses, the present study was conducted with the following specific objectives during the prevalence of COVID-19. (a) Assessing the level of psychological disorders based on the GHQ-28, Generalized Anxiety Disorder, and Impact of Event, (b) assessing the level of satisfaction with life and resilience,(c) assessing the

association between demographic characteristics and psychological disorders, (d) comparing satisfaction with life and resilience scores between nurses with and without psychological disorders, and (e) assessing the association of all important study variables with psychological disorders (Yes/No) using multivariate logistic regression.

3 | METHODS

3.1 | Study design and participants

A cross-sectional study was used to investigate the psychological effect of COVID-19 prevalence on the nurses in Ali Ebn Abi Taleb Hospital in southern Iran. Out of 1,467 cases suspected of COVID-19 diseases on 12 July 2020 in Rafsanjan, 353 positive cases and 24 deaths were reported.

3.2 | Sample size and sampling

The research population included 300 frontline nurses caring for COVID-19 patients in the intensive care units, the general ward and other related medical departments. Ali Ebn Abi Taleb Hospital is the only direct medical service centre for COVID-19 patients in the city, which has 350 active treatment beds. The total number of medical staff of this centre is 500 people, of whom 300 nurses are working in medical wards. Sampling was performed using census. In other words, all frontline nurses were included in the study. Inclusion criteria included nurses taking care of the COVID-19 patients with 1 year of work experience who were working in the hospital at least 3 months before the COVID-19 outbreak and nurses with a history of mental disorders (self-reported) and incomplete questionnaires were excluded from the study. Thirty hundred questionnaires were distributed among nurses. The response rate was 71%. Two hundred and thirteen questionnaires were studied out of which 28 incomplete questionnaires were removed. After exclusion of the incomplete questionnaires, data from 185 participants were used in the final analyses.

3.3 | Measurements

Data were collected using six questionnaires, including socio-demographic form, General Health Questionnaire (GHQ-28), Generalized Anxiety Disorder 7-item (GAD-7), Impact of Event Scale (IES), Satisfaction with Life Scale (SWLS) and Connor-Davidson Resilience Scale (CD-RISC).

3.3.1 | Socio-demographic form

Participants' demographic information includes age, gender, marital status, level of education, income level, type of employment, work

experience, ward, shift, overtime, job satisfaction, direct contact with the COVID-19 patients, having relatives/ friends infected with the coronavirus, being at risk of coronavirus infection and the most important concern about the coronavirus.

3.3.2 | General health questionnaire (GHQ-28)

The GHQ-28 was developed by Goldberg in 1972 to assess the general health of individuals and to diagnose mental disorders in the last month (Goldberg, 1972). This questionnaire has 28 items with four subscales of somatic symptoms (7 items), anxiety and insomnia (7 items), social impairment (7 items) and depression (7 items). Each item is graded from 0 to 3. Therefore, the total scores of GHQ range from 0 to 84 with higher scores reflecting greater psychological disorder. In addition, scores ≥23 indicate people with psychological disorder (Rahmani et al., 2010). In Rahmani et al.'s study, the validity of the questionnaire was 0.90 using a correlation coefficient and the reliability was 0.85 using Cronbach's alpha (Rahmani et al., 2010). In the present study, the Cronbach's alpha for GHQ was 0.93.

3.3.3 | Generalized anxiety disorder 7-item (GAD-7)

Spitzer et al. developed the GAD-7 to measure anxiety symptoms. The instrument has seven main items and one additional question to measure the degree of anxiety interference with a person's functioning. The questions are graded from 0 to 3. Therefore, the total score of GAD ranges from 0 to 21, with higher scores reflecting greater anxiety. Scores ≥10 are considered in the clinical range, that is the positive generalized anxiety disorder (Spitzer et al., 2006). The GAD-7 has shown good reliability and validity (Kroenke et al., 2007; Löwe et al., 2008). The validity and reliability of this instrument were confirmed in Iran and the Cronbach's alpha for the GAD-7 scale was 0.74 (Naeinian et al., 2011). In the present study, the Cronbach's alpha for the GAD-7 scale was 0.90.

3.3.4 | Impact of event scale (IES)

Weiss and Marmar developed the IES in 1997 to measure psychological symptoms after a specific traumatic event. The scale has 22 items with three subscales of avoidance (8 items), intrusion (7 items) and hyperarousal (7 items). The questions are graded from 0 to 4. Therefore, the total score of IES ranges from 0 to 88, with higher scores reflecting greater post-traumatic syndrome disorder. Scores ≥33 indicate people with PTSD (Weiss & Marmar, 1997). The IES has shown good reliability and validity (Creamer et al., 2003). The validity and reliability of this instrument were confirmed in Iran, and the Cronbach's alpha for the IES was 0.87 (Iranmanesh et al., 2015). In the present study, the Cronbach's alpha for the IES was 0.81.

3.3.5 | Satisfaction with Life scale (SWLS)

Diener et al. (1985) designed SWLS to measure life satisfaction. The SWLS has shown good reliability and validity (Diener et al., 1985). The scale has five items, which are graded from one (strongly disagree) to seven (strongly agree). Therefore, the total score of SWLS ranges from five to 35, with higher scores reflecting satisfaction with life. Scores ≥26 indicate people satisfied/very satisfied with their life (Vassar et al., 2008). The validity and reliability of this instrument were confirmed in Iran and the Cronbach's alpha for the SWLS was 0.85–0.90 (Tagharrobi et al., 2012). In the present study, the Cronbach's alpha for the SWLS was 0.85.

3.3.6 | Connor-davidson resilience scale (CD-RISC)

The Connor-Davidson resilience scale (CD-RISC) was used to measure the level of resilience (Connor & Davidson, 2003). Factor analysis of the original scale produced five factors: (1) personal competence, high standards and tenacity, (2) trust in one's instincts, tolerance of negative affect and strengthened effects of stress, (3) positive acceptance of change and secure relationships, (4) control and (5) spiritual influences. This questionnaire consists of 25 items on a five-point Likert scale (0–4). The total score ranges from zero to 100, with higher scores indicating a higher resilience and scores >50 indicate resilience. The internal consistency (Cronbach's α) for the full scale was 0.89. Test–retest reliability was confirmed with a correlation coefficient of 0.87. For convergent validity, CD-RISC scores have been positively correlated with hardiness scores ($r = .83$) (Connor & Davidson, 2003). The validity and reliability of the scale have been confirmed in Iran (Ahangarzadeh Rezaei & Rsoli, 2015). In addition, the Cronbach's alpha of this scale in the current study was 0.93.

3.4 | Data collection and analysis

Data were collected from March to April 2020. After obtaining the necessary permits, the researcher went to the research settings and began sampling when the nurses were able to complete the questionnaire. The questionnaires were distributed among the eligible samples. The research samples completed the questionnaires in the presence of the researcher. Two trained researchers, who were familiar with the objectives of the study, distributed the questionnaire to collect information faster and on a specific schedule.

SPSS 25 was used for data analysis. Frequency, percentage, mean and standard deviation were used to describe the sample characteristics, the GHQ score, the GAD score, the PTSD score, the SWLS score and the CD-RISC score. Participants, who had disorders according to each of the GHQ, GAD and PTSD questionnaires, considered as participants with psychological disorders. Chi-squared test was used to check the association between qualitative variables and psychosocial disorders (yes/no). According to Kolmogorov–Smirnov test, the SWLS score was normally distributed, but CD-RISC score

was not. Independent *t* test and Mann–Whitney *U* test were used to compare the SWLS score and the CD-RISC score between participants with and without psychosocial disorders, respectively. Multivariate logistic regression was used to determine the association between significant variables and the risk of psychosocial disorders. Significance level was considered 0.05. In addition, there were less than 1.5% missing values in the main questionnaires, which were replaced with median.

3.5 | Ethical considerations

The Ethics Committee of Rafsanjan University of Medical Sciences approved the study protocol (IR.RUMS.REC.1399.004). At the beginning of the study and before the sampling, informed consent was obtained from the nurses. The objectives of the study, confidentiality and anonymity of the information were explained and the nurses could withdraw from the study at any time.

4 | RESULTS

The demographic characteristics of the nurses are listed in Table 1. The mean score of general health was 24.11 ± 12.52. Of 185 participants, 93 (50.3%) had psychological disorders. Among the GHQ subscales, the social impairment had the highest score and depression had the lowest score. On the other hand, 68.1% of the participants had social impairment, 49.2% had somatic symptoms, 49.7 had anxiety and insomnia, and 18.4% had severe depression. In addition, 28.6% of the nurses had GAD and 34.6% had PTSD (Table 2). Totally, 41.1% (*n* = 76) of the participants had no psychological disorders, 21.1% (*n* = 39) had one psychological disorder, 21.1% (*n* = 39) had two psychological disorders, and 16.8% (*n* = 31) had all three psychological disorders.

The mean score of satisfaction with life was 23.60 ± 6.14 (Min = 8 and Max = 35). Of 185 participants, 84 (45.4%) were satisfied/very satisfied with their lives. The mean score of resilience was 64.07 ± 15.74 (Min = 2 and Max = 100). Of 185 participants, 152 (82.2%) were resilient.

Nurses without psychological disorders had significantly higher satisfaction with life and resilience than those with psychological disorders (*p* < .001) (Table 3).

The bivariate analysis showed a significant association between psychosocial disorders, gender, work experience, being at risk of the coronavirus infection, satisfaction with life and resilience (Tables 1 and 3). Multivariate logistic regression with backward method was conducted for further analysis. All variables with p value <0.2 in bivariate analysis included in the multivariate logistic regression model (i.e. gender, income, work experience, overtime, job satisfaction, being at risk of the coronavirus infection, satisfaction with life and resilience). The results showed that being at risk of the coronavirus infection, satisfaction with life and resilience were significantly associated with psychological disorders. On the other hand, the risk of

psychological disorders was 2.56 times higher in nurses, who were not at risk of the coronavirus infection than those, who were at risk of the coronavirus infection (95% confidence interval for odds ratio: 1.05–624, *p* = .04). In addition, the risk of psychological disorders was 6.0 times higher in non-resilient nurses than in resilient nurses (95% confidence interval for odds ratio: 1.43–25.26, *p* = .02). The risk of psychological disorders was 2.42 times higher in nurses, who were poorly/not satisfied with their lives than those, who were satisfied/very satisfied with their lives (95% confidence interval for odds ratio: 1.15–5.07, *p* = .02).

5 | DISCUSSION

The COVID-19 outbreak around the world has challenged the mental health of healthcare workers, especially the frontline nurses. Frontline nursing staff developed psychological distress, including fear, anxiety, depression, psychological symptoms and post-traumatic symptoms during the outbreak of previous similar illnesses, such as severe acute respiratory syndrome (SARS) (Wu et al., 2009). The present study investigated the psychological status of the Iranian frontline nurses and the factors affecting it during the COVID-19 outbreak.

In the present study, 50.3% of the nurses had a psychological disorder. Kang et al. studied the prevalence of corona outbreak in the frontline nurses in Wuhan, China and showed that 34.4% had mild disorders, 22.4% had moderate disorders, and 6.2% had severe disorders (using the PHQ-9 questionnaire) (Kang et al., 2020). The results of the present study show that the nurses' contact with the COVID-19 patients and hard working conditions increase the risk of psychological disorders in nurses, so it is necessary to perform psychotherapy interventions for frontline nurses. However, studies show low nurses' participation in counselling and psychotherapy and they did not pay attention to psychotherapeutic interventions. In the study of Kang et al., only 17.5% of the nurses participated in counselling and psychotherapy (Kang et al., 2020), which can exacerbate these complications in the long term and have a devastating effect on the lives of nurses, so future studies should consider the reasons why nurses do not pay attention to psychotherapeutic interventions.

In SARS epidemic, 23.4% of the rehabilitation staff at a public hospital in Singapore showed psychiatric symptoms (Sin & Huak, 2004). These results indicate the extent of the psychological effects of corona compared with previous infectious diseases. The COVID-19 pandemic has led to fear, anxiety, emotional distress and post-traumatic stress disorder in some people. Interventional measures taken by various healthcare authorities and governmental organizations are helpful to combat infections. It is vital to consider nurses' mental health and take preventive measures to minimize the harmful effects of the COVID-19 epidemic (Shah et al., 2020).

Among the GHQ subscales, 68.1% of the participants had social impairment. The review of the literature did not show a report on the rate of social impairment in relation with the COVID-19 disease and similar infections. The sudden onset of a disease is always a threat to

TABLE 1 The association between demographic characteristics and psychological disorders ($N = 185$)

Variables	Frequency (Valid per cent)	Psychological disorders		Chi-square test	p value
		Yes (N/%)	No (N/%)		
Gender					
Male	42 (22.7)	18 (42.9)	24 (57.1)	5.79	.02
Female	143 (77.3)	91 (63.6)	52 (36.4)		
Age (years)					
≤30	61 (33.2)	34 (55.7)	27 (44.3)	0.33	.57
>30	123 (66.8)	74 (60.2)	49 (39.8)		
Marital status					
Unmarried	31 (19.9)	19 (61.3)	12 (38.7)	1.68	.43
Widowed+divorce	9 (1.9)	7 (77.8)	2 (22.2)		
Married	143 (78.2)	81 (56.6)	62 (43.4)		
Educational level					
Bachelor	162 (88.5)	94 (58.0)	68 (42.0)	0.57	.45
Masters	21 (11.5)	14 (66.7)	7 (33.3)		
Income (million riyal)					
<3	20 (10.8)	8 (40.0)	12 (60.0)	4.96	.08
3–4	59 (31.9)	40 (67.8)	19 (32.2)		
>4	106 (57.3)	61 (57.5)	45 (42.5)		
Type of employment					
Hired	121 (65.8)	73 (60.3)	48 (39.7)	0.18	.91
Contract recruiters[a]	47 (25.5)	27 (57.4)	20 (42.6)		
Committed[b]	16 (8.7)	9 (56.3)	7 (43.8)		
Job history (years)					
>5	56 (30.4)	29 (51.8)	27 (48.2)	9.53	.02
5–10	60 (32.6)	44 (73.3)	16 (26.7)		
11–15	34 (18.5)	15 (44.1)	19 (55.9)		
>15	34 (18.5)	21 (61.8)	13 (38.2)		
Ward					
Critical/intensive	62 (33.5)	36 (58.1)	26 (41.9)	1.62	.65
Emergency	52 (21.1)	33 (63.5)	19 (36.5)		
Medical	39 (21.1)	24 (61.5)	15 (38.5)		
Others	32 (17.3)	16 (50.0)	16 (50.0)		
Shift					
Fixed	22 (12.0)	12 (54.5)	10 (45.5)	0.23	.63
Not fixed	162 (88.0)	97 (59.9)	65 (40.1)		
Overtime (hr)					
0–30	19 (11.7)	11 (57.9)	8 (42.1)	6.15	.10
31–60	65 (40.1)	42 (64.6)	23 (35.4)		
61–90	56 (34.6)	36 (64.3)	20 (35.7)		
>90	22 (13.6)	8 (36.4)	14 (63.6)		
Satisfaction with the job					
Yes	132 (72.1)	73 (55.3)	59 (44.7)	2.70	.10
No	51 (27.9)	35 (68.6)	16 (31.4)		

TABLE 1 (Continued)

Variables	Frequency (Valid per cent)	Psychological disorders		Chi-square test	p value
		Yes (N/%)	No (N/%)		
Direct contact with the COVID-19 patients					
Yes	109 (60.2)	62 (56.9)	47 (43.1)	0.32	.57
No	72 (39.8)	44 (61.1)	28 (38.9)		
Relatives/friends infected with the coronavirus					
Yes	47 (26.3)	28 (59.6)	19 (40.4)	0.02	.88
No	132 (73.7)	77 (58.3)	55 (41.7)		
Being at risk of coronavirus infection					
Yes	136 (75.6)	75 (55.1)	61 (44.9)	4.26	.04
No	44 (24.4)	32 (72.7)	12 (27.3)		
The most important concern about the coronavirus					
My family getting sick	130 (71.0)	78 (60.0)	52 (40.0)	1.70	.64
Death	31 (16.9)	16 (51.6)	15 (48.4)		
Others	17 (9.3)	11 (64.7)	6 (35.3)		
No concern	5 (2.7)	2 (40.0)	3 (60.0)		

[a]Annually contracted with payment similar to hired nurses.

[b]It is obligatory to work for government for 2 years at a lower rate of pay.

Variable	Minimum	Maximum	Mean	SD	People with disorder (N/%)
General health	1	70	24.11	12.52	93 (50.3)
Somatic symptoms	0	21	6.79	4.09	91 (49.2)
Anxiety and insomnia	0	21	7.10	4.61	92 (49.7)
Social impairment	0	18	7.39	3.17	126 (68.1)
Symptoms of depression	0	14	2.84	3.64	34 (18.4)
Generalized anxiety disorder	0	21	7.58	5.0	53 (28.6)
Post-traumatic syndrome disorder	0	60	29.68	11.0	64 (34.6)
Avoidance	0	28	12.33	5.21	–
Intrusion	0	21	7.82	5.55	–
Hyperarousal	0	20	9.53	4.19	–

TABLE 2 The participants' general health condition, generalized anxiety and post-traumatic stress disorder (N = 185)

the mental health of people in close contact with patients, including nurses. Nurses involving in the treatment of people with COVID-19 may concern about the risk of infection in their families, friends or relatives, and they will lose face-to-face communication and other regular social interactions because of the disease spread (Zhang, Wu, et al., 2020). The sudden outbreak of COVID-19 has had a profound effect on nurses and created specific complexities in their lives and work. Restrictions on participation in collective groups and social and public programs are among these changes (Usher et al., 2020). On the other hand, to control and prevent the transmission of COVID-19 infection, nurses must have special communication, which reduces their social interactions and causes psychological trauma.

Among the GHQ subscales, 49.2% had somatic symptoms, 18.4% had depression, 49.7% had anxiety and insomnia, and 28.28% had generalized anxiety based on the Generalized Anxiety Disorder scale. Other studies have shown depression, anxiety and sleep disorders in healthcare staff. Lai et al. studied 34 hospitals selected for taking care of the COVID-19 patients in China and found that 50.4% of the healthcare workers experienced depression, 44.6% experienced anxiety and 34% experienced insomnia (Lai et al., 2020). Liu et al. in China reported that 50.7% of the healthcare workers had symptoms of depression, 44.7% had anxiety and 36.1% had sleep disorders (Liu et al., 2020).

A review study about the psychological effects of the COVID-19 disease on healthcare workers found that the prevalence of

TABLE 3 The comparison of satisfaction with life and resilience between nurses with and without psychological disorders

Variables	Nurses with psychological disorders		Nurses without psychological disorders		statistical test	p value
	Mean	Standard deviation	Mean	Standard deviation		
Satisfaction with life	22.24	6.16	25.55	5.60	t = 3.74	<.001
Resilience	59.87	17.0	70.09	11.39	Z = −4.35	<.001

Abbreviations: t, Independent t test; Z, Mann–Whitney U test.

insomnia in four studies was 38.9% and a significant proportion of the healthcare workers experienced mood and sleep disorders during the corona prevalence (Pappa et al., 2020). Measures should be taken to reduce the risks of mental health and to modify interventions in epidemics. Although the dimensions of somatic symptoms, anxiety and insomnia in this study are consistent with other studies (Lai et al., 2020; Li et al., 2020), the rate of depression in the present study was lower than that of similar studies because the present study has specifically addressed the frontline nurses, who have experienced more stress and anxiety in patient care. A review study of the psychological effects of the coronavirus disease on the healthcare workers showed the depression rate of 22.8% in 10 studies (Pappa et al., 2020), which are similar to the results of the present study. Anxiety disturbs sleep and poor quality of sleep increases anxiety (Poznanski et al., 2018). An increase in the COVID-19 epidemic increases stress and anxiety and interferes with nurses' sleep. The results show that nurses in direct contact with infected people and patients are at risk for physical fatigue, fear, emotional turmoil and sleep disorders. These factors have led to higher levels of stress and anxiety.

A review study of the psychological effects of coronavirus disease on healthcare workers found the anxiety rate of 23.2% in 12 studies (Pappa et al., 2020), which are consistent with the results of the present study regarding the generalized anxiety (28.6%). However, previous studies on the epidemic of MERS reported anxiety in 7.6% and aggression in 16.6% of the individuals, who were isolated due to contact with the MERS patients (Jeong et al., 2016). These rates are very low in comparison with nurses in the current study, who have restricted their communications. This issue highlights the greater involvement of nurses and their greater anxiety. These results can be due to the wider coverage of corona news, and the greater importance and sensitivity of the disease to the community and nurses. Nurses experience high levels of anxiety through direct contact with the pain and suffering of the COVID-19 patients. Some nurses working at the COVID-19 hospital reported that everyone even their families and friends avoided them after hearing that they were taking care of the COVID-19 patients. These attitudes have greatly increased nurses' anxiety. In previous epidemics, including the outbreak of SARS, many healthcare workers and nurses were emotionally affected and injured. Therefore, psychosocial support and intervention is necessary to prevent anxiety and the consequences of infectious diseases (Chan & Huak, 2004). The World Health Organization and the scientific community are working on many unanswered aspects of the COVID-19 disease. Due to limited information about nurses' status, they currently have an unknown status. This suspicious situation can also cause nurses' confusion and anxiety, which requires further research on the anxiety and mental health outcomes of the COVID-19 in nurses.

Another important result in the present study was that 34.6% of the nurses had PTSD. Nurses are involved with patients and their problems in the prevalence of corona disease and have painful experiences with the disease. A study of similar epidemics such as the prevalence of SARS showed that the prevalence of PTSD among healthcare workers was approximately 20% (Chan & Huak, 2004), indicating more severe PTSD in the outbreak of COVID-19. However, attention to the severity of previous traumatic experiences has been a factor determining the prevalence of PTSD in nurses. Secondary traumatic stress (STS) is an occupational hazard for healthcare workers, who may experience symptoms of post-traumatic stress disorder (PTSD). Beck et al. in the United States found that 36% of the nurses showed trauma symptoms (Beck et al., 2015). Since nurses are at higher risk for the COVID-19, they are more likely to have PTSD, and people with PTSD are more at risk of suicidal ideation, attempts and deaths, so that PTSD related to the COVID-19 disease has been compared to the second tsunami (Dutheil et al., 2020).

These results suggest that a significant percentage of the nurses suffer from PTSD because of painful experiences with the sudden onset of coronavirus. Since the present study was performed at the beginning of corona prevalence in Iran, the prevalence of PTSD is expected to increase in the long term. Lee found that healthcare workers showed symptoms of depression, anxiety and post-traumatic stress (PTSSs) 1 year after the outbreak of SARS (Lee et al., 2007). One study also showed that healthcare workers experienced symptoms of fatigue and psychological consequences, including depression, post-traumatic stress disorder (PTSD), somatoform disorder and panic disorder 3 years after the epidemic of SARS (Wing & Leung, 2012). These studies suggest that the long-term effects of corona disease on the development and prevalence of PTSD need to be examined in further studies, and a cross-sectional study will not show all aspects of this problem.

In the present study, the risk of mental disorders was 2.56 times higher in nurses at risk for the coronavirus. Furthermore, Lu et al. found that frontline healthcare workers, including nurses in close contact with infected patients experienced a sense of fear 1.4 times more and anxiety and depression twice more than non-clinical staff (Lu et al., 2020). Lai et al. also showed that healthcare

workers in Wuhan reported more severe symptoms of depression, anxiety, insomnia and distress compared with those outside Wuhan Province (Lai et al., 2020). Direct exposure and the workplace have affected the mental health of healthcare workers during the SRAS epidemic. Exposure to the epidemic diseases is psychologically traumatic (Wu et al., 2009). Therefore, it is necessary to provide effective strategies for improving the mental health of the frontline healthcare workers, who are in close contact with infected patients.

The results of the present study showed that the risk of psychological disorders in non-resilient nurses was 6 times higher than that of the resilient nurses. In line with the results of the present study, Santarone et al. showed that frontline nurses were vulnerable to depression, anxiety, insomnia and distress, and difficult working conditions during the coronavirus epidemic. Therefore, it is necessary to support resilient frontline nurses for controlling the COVID-19 epidemic disease and its complications (Santarone et al., 2020). Zou et al. showed a negative relationship between resilience, mental distress and burnout in Chinese female nurses and resilience affected the anxiety of female nurses (Zou et al., 2016). Mealer et al. also showed a correlation between high resilience, a low prevalence of post-traumatic stress disorder, anxiety, depression and job burnout syndrome in nurses working in the intensive care units (Mealer et al., 2012). Nurses must be highly resilient due to the stressful nature of the nursing profession.

Nurses should strengthen their resilience and develop resilience skills to deal with difficulties, adapt to new conditions, have realistic and positive expectations, and protect work and life. Studies have shown that nurses with high resilience are less prone to stress disorders and more likely to remain healthy (Ebadzadeh et al., 2019; Mahdavifar et al., 2020; Turner, 2014). This concept is very important for nurse managers because resilience may play an important role in nurses' longevity and protection against crises, including the COVID-19. Although most studies have focused on the psychological traumas caused by the COVID-19, future research must focus on better understanding of nurses' coping mechanisms such as resilience and related factors in the face of crises. These studies can also help nurse leaders understand how to improve nurses' resistance against problems and reinforce this concept.

The results of the present study showed that the risk of psychological disorders in nurses, who were not satisfied with their lives, was 2.42 times higher than nurses, who were satisfied with their lives. Trzebiński et al. studied the COVID-19 patients in Poland and showed that an increase in satisfaction with life reduced anxiety and stress caused by the COVID-19 disease (Trzebiński et al., 2020). People may consider this factor as an unpredictable threat and problem for their lives, which affects their life satisfaction and predisposes them to psychological problems. Zhang et al. showed that the severity of COVID-19 in the city where people were living predicted their life satisfaction (Zhang, Wang, et al., 2020). Although various factors can affect the nurses' life satisfaction, closure, quarantine, travel reduction, and many other restrictions imposed on society and nurses due to the COVID-19 disease can reduce nurses' life

satisfaction and develop psychological disorders in them. Therefore, paying attention to this factor can prevent the occurrence of psychological problems in nurses. In addition, taking preventive measures to prevent the spread of COVID-19 can have protective psychological effects (Wang, Horby, et al., 2020; Wang, Pan, et al., 2020) and increase nurses' life satisfaction.

Although extensive efforts have been made to control the spread of the disease internationally, more attention has been paid to the recognition of epidemiology, clinical features, transmission patterns and management of the COVID-19, and less attention has been paid to psychological aspects and health problems (Shah et al., 2020). The psychological responses to the COVID-19 epidemic are complex and multidimensional. Understanding the negative effects of the corona disease on mental health, planning and providing psychological support for nurses can prevent further consequences. Culture and beliefs can also play a role in the intensity of the effects of various factors on the mental health of nurses, so more studies on other factors affecting the mental health of nurses are recommended.

6 | LIMITATIONS

This study had several limitations. Participants working in a public hospital were from one of the southeastern provinces of Iran that makes it difficult to generalize our results to other regions. This study lacks longitudinal follow-up and does not address long-term outcomes of the coronavirus in nurses. The psychological outcomes and risk factors associated with the COVID-19 infection for nurses should be considered in future long-term studies. Mental response using self-report questionnaires is another limitation of this study that should be supported by objective measurement of the psychological outcomes. Another limitation of the present study was the critical condition of nurses during the corona epidemic, which made it difficult for nurses to participate in the study and reduced the response rate of study participants. Although we tried to examine all 300 samples by census sampling, it should be noted that some nurses were not interested in the study; therefore, the possibility of selection bias should be mentioned. For selection bias to be prevented, the samples of nurses should be representative of the nurse population and from all medical wards. In addition, more comprehensive and complete explanations about the research objectives were provided to nurses in each ward to attract more participants. Although we tried to identify and control potential confounders, there might be some other variables that affected the studied variables due to the different effects of COVID-19 disease.

6.1 | Consequences of nursing policy

The results of this study showed life dissatisfaction, significantly less resilience and higher psychological disorders in nurses during the prevalence of COVID-19. Therefore, more attention should be paid to the psychological and working conditions of nurses in crises such

as the COVID-19 epidemic. Nurse managers' attention to the special conditions of nurses in crises, provision of facilities and psychological support for nurses along with proper management of human resources can help nurses face the situation better. However, these results need to be considered in future studies and effective methods are needed to increase nurses' life satisfaction and resilience and to prevent the long-term consequences of COVID-19.

7 | CONCLUSION

Nearly half of the nurses experienced psychological disorders in the early stages of the COVID-19 prevalence in Iran. For reducing the psychological effects of this disease on nurses, it is necessary to reduce the complications and pay attention to the mental health of nurses. Moreover, it is essential to consider effective strategies and psychological interventions in improving the mental health of nurses. We do not know whether the psychological effects of the COVID-19 are permanent or improve after a long time. Therefore, it is important to treat the psychological problems of nurses in charge of patient care and evaluate them in future and long-term studies. Our research can provide support and reference for other countries to identify and address the psychological effects of the COVID-19 in nurses.

AUTHOR CONTRIBUTIONS
MAZ, MD, SMHR: designed the study. MD: analysed data collection. MAZ: drafted the manuscript. MAZ, MD, MZ: revised the manuscript for intellectual content. All authors read and approved the final version.

DATA AVAILABILITY STATEMENT
The datasets used for the current study are available from the corresponding author upon request.

ORCID
Mohammad Ali Zakeri [ID] https://orcid.org/0000-0003-1500-391X
Mahlagha Dehghan [ID] https://orcid.org/0000-0002-4205-829X

REFERENCES
Ahangarzadeh Rezaei, S., & Rsoli, M. (2015). Psychometrics properties of the persian version of "connor-davidson resilience scale" in adolescents with cancer. *Quarterly Journal of Urmia Nursing and Midwifery Faculty*, *13*(9), 739–747.

Asadi, N., Memarian, R., & Vanaki, Z. (2019). Motivation to care: A qualitative study on Iranian nurses. *The Journal of Nursing Research*, *27*(4), e34. https://doi.org/10.1097/jnr.0000000000000294

Beck, C. T., LoGiudice, J., & Gable, R. K. (2015). A mixed-methods study of secondary traumatic stress in certified nurse-midwives: Shaken belief in the birth process. *Journal of Midwifery & Women's Health*, *60*(1), 16–23. https://doi.org/10.1111/jmwh.12221

Chan, A. O., & Huak, C. Y. (2004). Psychological impact of the 2003 severe acute respiratory syndrome outbreak on health care workers in a medium size regional general hospital in Singapore. *Occupational Medicine*, *54*(3), 190–196. https://doi.org/10.1093/occmed/kqh027

China National Health Commission (2020). *Update on the novel coronavirus pneumonia outbreak (Jan 24, 2020)*. China National Health Commission. http://www.nhc.gov.cn/xcs/yqfkdt/202001/c5da49c4c5bf4bcfb320ec2036480627.shtml

National Health Commission of the People's Republic of China (2020). Retrieved from http://www.nhc.gov.cn

Connor, K., & Davidson, J. (2003). Development of a new resilience scale: The Connor-Davidson Resilience Scale (CD-RISC). *Depression and Anxiety*, *18*(2), 76–82. https://doi.org/10.1002/da.10113

Creamer, M., Bell, R., & Failla, S. (2003). Shorter communication psychometric properties of the impact of event scale- revised. *Behaviour Research and Therapy*, *41*, 1489–1496. https://doi.org/10.1016/j.brat.2003.1407.1010

Dai, Y., Hu, G., Xiong, H., Qiu, H., & Yuan, X. (2020). Psychological impact of the coronavirus disease 2019 (COVID-19) outbreak on healthcare workers in China. *medRxiv*. https://doi.org/10.1101/2020.03.03.20030874

Damari, B., Almadani, S. H., Hajebi, A., & Salehi Shahrabi, N. (2019). Promoting mental health in workplaces of Iran; reviewing present status and future approaches. *Iranian Journal of Psychiatry and Clinical Psychology*, *25*(2), 122–135 [persian]. https://doi.org/10.32598/ijpcp.25.2.122

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, *49*(1), 71–75. https://doi.org/10.1207/s15327752jpa4901_13

Dutheil, F., Mondillon, L., & Navel, V. (2020). PTSD as the second tsunami of the SARS-Cov2 pandemic. *Psychological Medicine*, *24*, 1–2. https://doi.org/10.1017/S0033291720001336

Ebadzadeh, M. R., Nouhi, E., Farokhzadian, J., & Mangolian Shahrbabaki, P. (2019). What is the supporting role of health care providers from the perspective of patients with renal allograft rejection? A qualitative study. *The International Journal of Health Planning and Management*, *34*(1), 338–345. https://doi.org/10.1002/hpm.2639

Gao, J., Zheng, P., Jia, Y., Chen, H., Mao, Y., Chen, S., Wang, Y. I., Fu, H., & Dai, J. (2020). Mental health problems and social media exposure during COVID-19 outbreak. *SSRN Electronic Journal*, *15*(4), e0231924. https://doi.org/10.2139/ssrn.3541120

Goldberg, D. (1972). *The detection of psychiatric illness by questionnaire: A technique for the identification and assessment of non-psychotic psychiatric illness*. Oxford U. Press.

Guo, J., Liao, L., Wang, B., Li, X., Guo, L., Tong, Z., Guan, Q., Zhou, M., Wu, Y., Zhang, J., & Gu, Y. (2020). Psychological effects of COVID-19 on Hospital Staff: A National Cross-Sectional Survey of China Mainland. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.3550050

Haynes, B., Messonnier, N. E., & Cetron, M. S. (2020). *First travel-related case of 2019 novel coronavirus detected in United States: press release, Tuesday, January 21, 2020*.

Huang, C., Wang, Y., Li, X., Ren, L., Zhao, J., Hu, Y. I., Zhang, L. I., Fan, G., Xu, J., Gu, X., Cheng, Z., Yu, T., Xia, J., Wei, Y., Wu, W., Xie, X., Yin, W., Li, H., Liu, M., … Cao, B. (2020). Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *The Lancet*, *395*(10223), 497–506. https://doi.org/10.1016/S0140-6736(20)30183-5

Huang, L., Lei, W., Xu, F., Liu, H., & Yu, L. (2020). Emotional responses and coping strategies in nurses and nursing students during Covid-19

outbreak: A comparative study. *PLoS One*, *15*(8), e0237303. https://doi.org/10.1371/journal.pone.0237303

Iranmanesh, S., Shamsi, A., & Dehghan, M. (2015). Post-Traumatic stress symptoms among Iranian parents of children during cancer treatment. *Issues in Mental Health Nursing*, *36*(4), 279–285. https://doi.org/10.3109/01612840.2014.983622

Japan National Commission (2020). (ex-China) http://www.who.int/csr/don/17-january-2020-novel-coronavirus-japan-ex-china/en/ (Jan 17, 2020).

Jeong, H., Yim, H. W., Song, Y.-J., Ki, M., Min, J.-A., Cho, J., & Chae, J.-H. (2016). Mental health status of people isolated due to Middle East Respiratory Syndrome. *Epidemiology and Health*, *38*, e2016048. https://doi.org/10.4178/epih.e2016048

Kang, L., Ma, S., Chen, M., Yang, J., Wang, Y., Li, R., Yao, L., Bai, H., Cai, Z., Xiang Yang, B., Hu, S., Zhang, K., Wang, G., Ma, C. I., & Liu, Z. (2020). Impact on mental health and perceptions of psychological care among medical and nursing staff in Wuhan during the 2019 novel coronavirus disease outbreak: A cross-sectional study. *Brain, Behavior, and Immunity*, *87*, 11–17. https://doi.org/10.1016/j.bbi.2020.03.028

Kaveh, M. (2012). *Psychopathology of social diseases* (1st ed.). Jameshenasan. (Persian).

Novel Coronavirus – Republic of Korea (ex-China) (2020). (ex-China) http://www.who.int/csr/don/21-january-2020-novel-coronavirus-republic-of-korea-ex-china/en/ (Jan 21, 2020).

Kroenke, K., Spitzer, R. L., Williams, J. B. W., Monahan, P. O., & Lowe, B. (2007). Anxiety disorders in primary care: prevalence, impairment, comorbidity, and detection. *Annals of Internal Medicine*, *146*(5), 317–325. https://doi.org/10.7326/0003-4819-146-5-200703060-00004

Lai, J., Ma, S., Wang, Y., Cai, Z., Hu, J., Wei, N., Wu, J., Du, H., Chen, T., Li, R., Tan, H., Kang, L., Yao, L., Huang, M., Wang, H., Wang, G., Liu, Z., & Hu, S. (2020). Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Network Open*, *3*(3), e203976. https://doi.org/10.1001/jamanetworkopen.2020.3976

Lee, A. M., Wong, J. G. W. S., McAlonan, G. M., Cheung, V., Cheung, C., Sham, P. C., Chu, C.-M., Wong, P.-C., Tsang, K. W. T., & Chua, S. E. (2007). Stress and psychological distress among SARS survivors 1 year after the outbreak. *The Canadian Journal of Psychiatry*, *52*(4), 233–240. https://doi.org/10.1177/070674370705200405

Li, W., Yang, Y., Liu, Z.-H., Zhao, Y.-J., Zhang, Q., Zhang, L., Cheung, T., & Xiang, Y.-T. (2020). Progression of mental health services during the COVID-19 outbreak in China. *International Journal of Biological Sciences*, *16*(10), 1732. https://doi.org/10.7150/ijbs.45120

Liu, S., Yang, L., Zhang, C., Xiang, Y., Liu, Z., & Hu, S. (2020). 2019 novel coronavirus: Online mental health services. *Lancet Psychiatry*, *7*(4), E17–E18. https://doi.org/10.1016/S2215-0366(20)30077-8

Löwe, B., Decker, O., Müller, S., Brähler, E., Schellberg, D., Herzog, W., & Herzberg, P. (2008). Validation and standardization of the Generalized Anxiety Disorder Screener (GAD-7) in the general population. *Medical Care*, *46*(3), 266–274. https://doi.org/10.1097/MLR.1090b1013e318160d318093

Lu, W., Wang, H., Lin, Y., & Li, L. (2020). Psychological status of medical workforce during the COVID-19 pandemic: A cross-sectional study. *Psychiatry Research*, *288*, 112936. https://doi.org/10.1016/j.psychres.2020.112936

Mahdavifar, M., Asadi, N., Shadi, F., Choobin, N., Azad, M., & Ziarati, F. (2020). Investigating nursing students' needs and data sources in the emergency wards. *International Journal of Pharmaceutical Research*, *12*(1), 1569–1574 [Persian].

Mealer, M., Jones, J., Newman, J., McFann, K. K., Rothbaum, B., & Moss, M. (2012). The presence of resilience is associated with a healthier psychological profile in intensive care unit (ICU) nurses: Results of a national survey. *International Journal of Nursing Studies*, *49*(3), 292–299. https://doi.org/10.1016/j.ijnurstu.2011.09.015

Naeinian, M., Shaeiri, M., Sharif, M., & Hadian, M. (2011). To study reliability and validity for a brief measure for assessing Generalized Anxiety Disorder (GAD-7). *Scientific Journal of Clinical Psychology & Personality*, *2*(4), 41–50.

Pappa, S., Ntella, V., Giannakas, T., Giannakoulis, V. G., Papoutsi, E., & Katsaounou, P. (2020). Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: A systematic review and meta-analysis. *Brain, Behavior, and Immunity*, *88*, 901–907. https://doi.org/10.1016/j.bbi.2020.05.026

Poursadeghiyan, M., Abbasi, M., Mehri, A., Hami, M., Raei, M., & Ebrahimi, M. H. (2016). Relationship between job stress and anxiety, depression and job satisfaction in nurses in Iran. *The Social Sciences*, *11*(9), 2349–2355.

Poznanski, B., Cornacchio, D., Coxe, S., Pincus, D. B., McMakin, D. L., & Comer, J. S. (2018). The link between anxiety severity and irritability among anxious youth: Evaluating the mediating role of sleep problems. *Child Psychiatry & Human Development*, *49*(3), 352–359. https://doi.org/10.1007/s10578-017-0769-1

Rahmani, F., Behshid, M., Zamanzadeh, V., & Rahmani, F. (2010). Relationship between general health, occupational stress and burnout in critical care nurses of Tabriz teaching hospitals. *Iran Journal of Nursing*, *23*(66), 54–63.

Santarone, K., McKenney, M., & Elkbuli, A. (2020). Preserving mental health and resilience in frontline healthcare workers during COVID-19. The. *American Journal of Emergency Medicine*, *38*(7), 1530–1531. https://doi.org/10.1016/j.ajem.2020.04.030

Shah, K., Kamrai, D., Mekala, H., Mann, B., Desai, K., & Patel, R. S. (2020). Focus on mental health during the coronavirus (COVID-19) pandemic: Applying learnings from the past outbreaks. *Cureus*, *12*(3), e7405. https://doi.org/10.7759/cureus.7405

Sin, S., & Huak, C. (2004). Psychological impact of the SARS outbreak on a Singaporean rehabilitation department. *International Journal of Therapy and Rehabilitation*, *11*(9), 417–424. https://doi.org/10.12968/ijtr.2004.11.9.19589

Spitzer, R., Kroenke, K., Williams, J., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: The GAD-7. *Archives of Internal Medicine*, *166*(10), 1092–1097. https://doi.org/10.1001/archinte.166.10.1092

Sun, L., Sun, Z., Wu, L., Zhu, Z., Zhang, F., Shang, Z., Jia, Y., Gu, J., Zhou, Y., Wang, Y. & Liu, N. (2021). Prevalence and risk factors for acute posttraumatic stress disorder during the COVID-19 outbreak. *Journal of Affective Disorders*, *283*, 123–129. https://doi.org/10.1016/j.jad.2021.01.050

Tagharrobi, Z., Sharifi, K., Sooky, Z., & Tagharrobi, L. (2012). Psychometric evaluation of the satisfaction with life scale (SWLS) in the students of Kashan Nursing & Midwifery Faculty, Kashan, Iran. *Qom University of Medical Sciences Journal*, *6*(1), 89–98. [persian].

Novel Coronavirus – Thailand (ex-China) (2020). (ex-China) http://www.who.int/csr/don/14-january-2020-novel-coronavirus-thailand/en/ (Jan 14, 2020).

Tirgari, B., Forouzi, M. A., Razban, F., & Alimirzaei, R. (2016). Difficulties felt by intensive care unit nurses in providing end-of-life care in Southeast Iran. *Journal of Hospice & Palliative Nursing*, *18*(5), 443–449. https://doi.org/10.1097/NJH.0000000000000273

Trzebiński, J., Cabański, M., & Czarnecka, J. (2020). Reaction to the COVID-19 pandemic: The influence of meaning in life, life satisfaction, and assumptions on world orderliness and positivity. *Journal of Loss and Trauma*, *1*(4), 544–557. https://doi.org/10.1080/15325024.2020.1765098

Turner, S. B. (2014). The resilient nurse: An emerging concept. *Nurse Leader*, *12*(6), 71–90. https://doi.org/10.1016/j.mnl.2014.03.013

Usher, K., Bhullar, N., & Jackson, D. (2020). Life in the pandemic: Social isolation and mental health. *Journal of Clinical Nursing*, *29*(15–16), 2756–2757. https://doi.org/10.1111/jocn.15290

Vassar, M., Ridge, J. W., & Hill, A. D. (2008). Inducing score reliability from previous reports: An examination of life satisfaction studies. *Social Indicators Research*, *87*(1), 27–45. https://doi.org/10.1007/s11205-007-9157-8

Wang, C., Horby, P. W., Hayden, F. G., & Gao, G. F. (2020). A novel coronavirus outbreak of global health concern. *The Lancet*, *395*(10223), 470–473. https://doi.org/10.1016/S0140-6736(20)30185-9

Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C. S., & Ho, R. C. (2020). Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *International Journal of Environmental Research and Public Health*, *17*(5), 1729. https://doi.org/10.3390/ijerph17051729

Weiss, D. S., & Marmar, C. R. (1997). The impact of event scale-revised. In J. P. Wilson, & T. M. Keane (Eds.), *Assessing psychological trauma and PTSD* (pp. 399–411). Guilford.

Wing, Y., & Leung, C. (2012). Mental health impact of severe acute respiratory syndrome: a prospective study. *Hong Kong Medical Journal = Xianggang Yi Xue Za Zhi*, *18*, 24–27.

Wu, P., Fang, Y., Guan, Z., Fan, B., Kong, J., Yao, Z., Liu, X., Fuller, C. J., Susser, E., Lu, J., & Hoven, C. W. (2009). The psychological impact of the SARS epidemic on hospital employees in China: Exposure, risk perception, and altruistic acceptance of risk. *The Canadian Journal of Psychiatry*, *54*(5), 302–311. https://doi.org/10.1177/070674370905400504

Zhang, J., Wu, W., Zhao, X., & Zhang, W. (2020). Recommended psychological crisis intervention response to the 2019 novel coronavirus pneumonia outbreak in China: A model of West China Hospital. *Precision Clinical Medicine*, *3*(1), 3–8. https://doi.org/10.1093/pcmedi/pbaa006

Zhang, S. X., Wang, Y., Rauch, A., & Wei, F. (2020). Unprecedented disruption of lives and work: Health, distress and life satisfaction of working adults in China one month into the COVID-19 outbreak. *Psychiatry Research*, *288*, 112958. https://doi.org/10.1016/j.psychres.2020.112958

Zou, G., Shen, X., Tian, X., Liu, C., Li, G., Kong, L., & Li, P. (2016). Correlates of psychological distress, burnout, and resilience among Chinese female nurses. *Industrial Health*, *54*, 2015–2103. https://doi.org/10.2486/indhealth.2015-0103