

## ORIGINAL ARTICLE

# Compassion satisfaction and compassion fatigue in frontline nurses during the COVID-19 pandemic in Wuhan, China

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## Abstract

**Aim:** The aim of this study is to investigate the compassion satisfaction and compassion fatigue among Chinese frontline nurses during the COVID-19 pandemic in Wuhan, China and to explore the related factors.

**Background:** Frontline nurses undertake a huge nursing workload with a risk of infection, causing great pressure on them and making them face a risk of compassion fatigue during the pandemic.

**Methods:** A cross-sectional online survey was conducted from 9 March to 15 March 2020. A total of 1582 nurses caring for critical patients with COVID-19 participated. Compassion satisfaction and compassion fatigue (comprising burnout and secondary traumatic stress) were assessed with the Professional Quality of Life Scale, and resilience was measured with the Chinese 10-item Connor-Davidson Resilience Scale.

**Results:** Moderate levels of compassion satisfaction ( $36.99 \pm 6.71$ ), burnout ( $24.14 \pm 5.33$ ) and secondary traumatic stress ( $24.53 \pm 5.24$ ) were experienced by frontline nurses. Resilience and perceived work pressure were the main predictors.

**Conclusions:** Frontline nurses demonstrated a moderate level of compassion satisfaction and compassion fatigue.

**Implications for nursing management:** The compassion fatigue of frontline nurses should be considered. Strategies aiming to reduce stress and enhance resilience, such as training about psychological adjustment, developing professional skills and creating a supportive workplace environment, are several options.

The trial is not registered. This study is a cross-sectional study, and according to China's clinical trial registration standards, such studies are not required to be registered. So the trial is not registered. However, oral consent was obtained from the ethics committee of the hospital before this study was conducted.

## KEYWORDS

compassion fatigue, compassion satisfaction, COVID-19, nurses, resilience

## 1 | BACKGROUND

Coronavirus disease 2019 (COVID-19) is a newly emerged infectious disease. It is caused by a new coronavirus named SARS-CoV-2 (Gorbalenya et al., 2020). COVID-19 is spread by respiratory droplets or close contact. Despite rigorous global containment and quarantine efforts and the vaccine, the incidence of COVID-19 continues to rise. Globally, as of 6:49 PM Central European Time, 26 August 2022, there have been 596,873,121 confirmed cases of COVID-19, including 6,459,684 deaths received by World Health Organization (2022) from national authorities. As a highly infectious disease, it has caused huge threats to global health safety, people's lives, health care systems and economic development.

Compassion fatigue is the physical and mental exhaustion and emotional withdrawal experienced by those who take care of patients or traumatized persons for a long time (Stamm, 2010) in the case of not maintaining professional boundaries and taking effective self-care measures (Peters, 2018). Compassion fatigue is associated with witnessing traumatic events such as the death and daily care of critical patients, as well as lack of awareness about compassion fatigue. At the time of the spread of COVID-19, many patients were intensely infected, which posed a great threat to the entire medical system of Wuhan. Nurses have to provide complex care for patients suffering from COVID-19. They are under great pressure because of the huge nursing workload, the highest risk of infection due to close contact with patients for long hours and being unable to meet family responsibilities. Moreover, the wearing of personal protective equipment in isolation wards increases the difficulty and intensity of work. Nurses also need to offer more psychological support for patients in these special circumstances. Furthermore, the hospitals in which our respondents work are designated hospitals for patients with severe and critical diseases. Frontline nurses may witness more misfortune and deaths. All of these factors are harmful to the mental health of frontline nurses and may lead to their mental and physical exhaustion (MacKusick & Minick, 2010). Lai et al. (2020) reported the mental health situation of 1257 frontline health care workers exposed to COVID-19. Overall, 50.4% of the participants had depressive symptoms, 44.6% of the participants had anxiety symptoms, 71.5% of the participants reported distress and 34.0% of the participants experienced insomnia. Among all the health care workers, nurses reported more severe degrees of mental health symptoms than others. Poor mental states are bound to consume their mental energy faster and have adverse effects on their work. A meta-analysis performed by Zhang et al. (2018) showed that stress and negative affect were moderately positively associated with compassion fatigue ( $r = .405$ ). If compassion fatigue is not recognized and adjusted in time, it can have several serious consequences on nurses, patients and organizations. Nurses experience insufficient performance and worse holistic health including emotional breakdowns and physical weight fluctuations. They may have poor judgement, experience more work errors and be prone to accidents, which may impact patient safety and quality care. For organizations, compassion fatigue increases nurses' desire to leave the

profession, leading to nurse shortages and high turnover rates, which may negatively impact patients' care and the work difficulty of organizations given the pandemic (Peters, 2018).

In the professional quality of life (ProQOL) model, compassion satisfaction and compassion fatigue are the two components. Compassion fatigue consists of burnout and secondary traumatic stress (STS). Burnout refers to a psychological syndrome caused by exposure to chronic stressors in work, which is manifested as emotional and physical exhaustion, feeling cynical and indifferent, a lack of a sense of achievement or incompetence (Maslach & Leiter, 2016). STS refers to work-related, secondary exposure to people who have experienced extreme or traumatic stress events (Stamm, 2010). STS is manifested as sleep disorders, intrusive images or avoiding thinking about a person's traumatic experiences.

Caring for traumatized patients, however, also has a positive impact on nurses. Nurses can get pleasure from helping patients get through traumatic situations, which is described as compassion satisfaction (Stamm, 2010). It has been found that the factors promoting compassion satisfaction include the following aspects: regarding care as a calling; building an empathetic caregiving relationship; acquiring collegial support; developing resilience, coping mechanisms and self-care; and achieving a work-life balance with sufficient social support (Sacco & Copel, 2018). As a positive aspect of ProQOL, compassion satisfaction may contribute to balancing the negative aspects of burnout or STS (Stamm, 2010) and protecting against compassion fatigue (Sacco & Copel, 2018).

The compassion fatigue of nurses has attracted attention from many nursing scholars (Delaney & Soundy, 2018; Jakimowicz et al., 2018; Sadeeka et al., 2018). Many factors, including socio-demographic factors, work-related factors and other factors, affect the development of compassion fatigue (Alharbi et al., 2020a; Ang et al., 2018; Chen et al., 2018; Wang et al., 2020; Yu et al., 2016).

In the process of developing compassion fatigue, all types of influencing factors need to be mediated by internal psychological resources, and resilience is the most important (Siu et al., 2009). Resilience is the term used to describe 'an individual's ability to bounce back from or cope successfully with adverse circumstances' (Rutter, 2008). It has been found that resilience is a resource for individuals to move forward in a productive way from a traumatic or stressful experience (Tugade & Fredrickson, 2004). It has been proven that resilience has significant relationships with compassion satisfaction (Burnett, 2017) and burnout (Rushton et al., 2015). In addition, improving nurses' resilience can reduce burnout and increase compassion satisfaction (Wei et al., 2019). The role of resilience in compassion fatigue has also been demonstrated in a study conducted during the COVID-19 crisis (Ruiz-Fernández et al., 2021).

Before the epidemic, Alharbi et al. (2020a) explored compassion fatigue in critical care nurses. The results showed that 92.5% of the participants had average burnout, and 80.4% of the participants had average STS, which indicate the serious situation of nurses' compassion fatigue. The respondents in our study cared for severe and critical patients suffering from COVID-19 with greater pressure. It is supposed that frontline nurses' compassion fatigue and

compassion satisfaction may change, so the purpose of this investigation is to examine the compassion satisfaction and compassion fatigue levels experienced by frontline nurses and their influencing factors according to demographic and work-related characteristic compassion satisfaction and resilience during the COVID-19 spread in Wuhan.

## 2 | THE STUDY

### 2.1 | Aim

The purpose of this investigation was to examine the compassion satisfaction and compassion fatigue levels experienced by frontline nurses and their influencing factors during the COVID-19 spread in Wuhan.

### 2.2 | Design

A descriptive cross-sectional design with convenience sampling was adopted. The study followed the STROBE guidelines (see Supporting information).

### 2.3 | Participants

In March 2020, clinical nurses were recruited from a tertiary hospital in Wuhan, China. The tertiary hospital is a branch of a general hospital and licenced for 1000 beds. It was temporarily converted into a hospital for infectious diseases to treat critical patients with COVID-19. A total of 3164 nurses were arranged to care for inpatients temporarily. Some of these nurses were originally from the tertiary hospital, and some were from other provinces of China. The inclusion criteria were the following: (1) registered nurses or licenced practical nurses and (2) working in an isolation ward for more than 1 month. In total, 1634 structured online questionnaires were returned, and 52 of these were deleted owing to unreasonable data. In total, 1582 participants qualified for the study. The sample size was calculated using the formula  $N \geq 50 + 8m$  ( $m$  is the number of independent variables) to test for multiple correlations (Tabachnick & Fidell, 2012). In this study, a total of 20 demographic and work-related factors and 5 scale-associated dimensions were considered independent variables, so at least 250 participants ( $50 + 8 * 25$ ) were needed. The sample size of our study was sufficient.

### 2.4 | Ethical considerations

Ethical approval was orally obtained from the medical ethics committee of the hospital where the study was implemented, and participants were given a comprehensive explanation of the study's purpose, procedures and informed consent in a WeChat group via

text. The investigation was voluntary and anonymous. All data were accessible only to the research team to protect confidentiality.

## 2.5 | Data collection

The electronic survey was distributed to the WeChat group of every isolation ward by the director of nursing management. The instructions and procedures for the questionnaire were issued at the same time to ensure that all of the participants understood the purpose and considerations of the investigation.

### 2.5.1 | Resilience

Resilience was measured by the Chinese 10-item Connor-Davidson Resilience Scale (CD-RISC-10) (Ye et al., 2016). The English version of the CD-RISC-10 is widely used in various populations in Western countries (Connor & Davidson, 2003). The Chinese version was translated and culturally adjusted by Ye et al. (2016) and possesses good psychometric properties. The scale is a self-administered questionnaire and has one single dimension. It consists of 10 items that assess the ability to change and cope with adversity. A 5-point Likert scale was used (0 = *never* to 4 = *almost always*). The total score of the scale is the sum of the responses of each item (range 0–40), with higher scores indicating higher resilience. The Cronbach's alpha coefficients were .85 in the original study (Laura, Campbell-Sills, & Murray, 2003), .851 in the Chinese version (Ye et al., 2016) and .929 in this study.

### 2.5.2 | Work pressure

We assessed the perceived work pressure of frontline nurses with a numerical scoring method of 0–10 points. A score of zero means no pressure, and a score of 10 means unbearable pressure. The higher the score is, the greater the pressure is. One to three points indicate low levels of pressure, 4–6 points indicate medium levels of pressure and 7–10 points indicate high levels of pressure.

### 2.5.3 | ProQOL

The ProQOL Scale is the most commonly used measure of the positive and negative effects of helpers caring for people experiencing extremely stressful events. The positive aspects refer to compassion satisfaction, and the negative aspects refer to compassion fatigue. The original scale was made by Stamm (2010). The Chinese ProQOL-5 was translated and culturally adjusted by Zheng et al. (2013) and was used in this study. It comprises 30 items with three subscales: compassion satisfaction, burnout and STS. Each subscale includes 10 items scored on a 5-point Likert scale and cannot be combined to create a total score. There are 5 reverse items including 1, 4, 15, 17 and 29, which need to be reversed before scoring. Scores of 22 or less

were designated as low, 23–41 were designated as moderate and 42 or above were designated as high. The reliability of the scales measured using Cronbach's alpha coefficients were .75 (burnout), .81 (STS) and .88 (compassion fatigue) in Stamm's (2010) study; .82, .73 and .76, respectively, in the study by Zheng et al. (2013); and .787, .785 and .929, respectively, in this study.

### 2.5.4 | Other demographic and work-related characteristics

The demographic characteristics included age, gender, education level, marital status, religion, children, family income per month and province. The work-related characteristics included original working department, current working department, professional rank, position in isolation ward, employment type, years working, average weekly working hours, number of night shifts in the last month, disaster nursing experience, training on disaster nursing and nurses' psychological adjustment.

## 2.6 | Statistical analysis

SPSS version 18.0 was used to analyse the data. Before the data analysis, two researchers checked the data together and deleted the unqualified data. The reliability of the measurement tools was calculated using Cronbach's alpha. The scores for resilience, ProQOL and pressure level followed normal distributions (analysed by skewness and kurtosis tests). Participants' demographic and clinical characteristics were analysed using frequencies and percentages. Levels of compassion satisfaction, burnout, STS, resilience and pressure were analysed using means and standard deviations. Correlations between the three dimensions of ProQOL and resilience, as well as work pressure, were tested using Pearson correlation. Independent *t* tests and one-way analysis of variance (ANOVA) were used to analyse the differences in compassion satisfaction, burnout and STS among participants with different demographic and work-related characteristics. The independent variables with a *p* value less than .05 in the univariate analysis were chosen for the multivariate analyses. Multiple linear stepwise regression was used to identify the influence of general variables, resilience and pressure on compassion satisfaction, burnout and STS. The values for 'the alpha to enter' and 'the alpha to remove' were .05 and .10, respectively. All statistical tests were two-sided ( $\alpha = .05$ ).

## 3 | RESULTS

### 3.1 | Characteristics of participants

A total of 1582 nurses participated in the survey. The mean age of the nurses was  $30.83 \pm 5.09$  years, and 95.1% of the participants were women. Other characteristics of the subjects are presented in Table 1.

**TABLE 1** Demographic characteristics of nurses (*N* = 1582)

Socio-demographic characteristics	N	%
Gender		
Male	78	4.9
Female	1504	95.1
Age group		
≤30	855	54.0
31–40	652	41.2
>40	75	4.7
Education level		
Associate's degree or below	73	4.6
Bachelor's degree	1457	92.1
Master's degree or above	52	3.3
Religion		
Yes	54	3.4
No	1528	96.6
Marital status		
Single	626	39.6
Married	932	58.9
Divorced or widowed	24	1.5
Have any children		
No	794	50.2
Yes	788	49.8
Family income per month (CNY)		
<10,000	462	29.2
10,000–15,000	616	38.9
15,000–20,000	300	19.0
>20,000	204	12.9
Province		
Hubei	1145	72.4
Others	437	27.6
Original department		
Infectious disease department	20	1.3
Respiratory medicine department	95	6.0
Intensive care unit	220	13.9
Emergency department	80	5.1
Others	1167	73.8
Current department		
General isolation ward	25	71.4
Intensive care unit	10	28.6
Others		
Professional rank		
Junior RN	192	12.1
Senior RN	992	62.7
Nurse in charge	363	22.9
Associate professor nurses or above	35	22.2
Position in isolation ward		
Staff nurse	1293	81.7
Charge nurse	134	8.5
Head nurse	69	4.4
Others	86	5.4

(Continues)

**TABLE 1** (Continued)

Socio-demographic characteristics	N	%
Employment type		
Formal employed nurse	200	12.6
Personal agent nurse	76	4.8
Contract employed nurse	1306	82.6
Years working		
≤5	538	34
5–9	533	33.7
10–14	301	19.0
≥15	210	13.3
Average weekly working hours		
≤15	148	9.4
16–24	834	52.7
25–34	317	20
≥35	283	17.9
Number of night shifts in the last month		
0	93	5.9
1–5	512	32.4
6–10	645	40.8
>10	332	21.0
Disaster nursing experience		
No	1483	93.7
Yes	99	6.3
Training on disaster nursing		
No	953	60.2
Yes	629	39.8
Training on nurses' psychological adjustment		
No	1220	77.1
Yes	362	22.9

### 3.2 | Descriptive results of compassion satisfaction, compassion fatigue, resilience and levels of pressure

As shown in Table 2, the mean scores of compassion satisfaction, burnout and STS were 36.99 ( $SD = 6.71$ ), 24.14 ( $SD = 5.33$ ) and 24.53 ( $SD = 5.24$ ), respectively; and the mean scores of resilience and work pressure were 25.97 ( $SD = 6.14$ ) and 5.86 ( $SD = 2.39$ ), respectively.

### 3.3 | Correlations between compassion satisfaction, compassion fatigue, resilience and levels of pressure

The correlations between compassion satisfaction, burnout, STS and resilience and levels of pressure are presented in Table 3. The results showed that the three variables of ProQOL had significant correlations with resilience and work pressure ( $p < .01$ ), and all of the correlations were medium or large (Cohen, 1988).

### 3.4 | Univariate analyses of the factors associated with compassion satisfaction and compassion fatigue

The univariate analysis of compassion satisfaction, burnout and STS is shown in Table 4. The differences in compassion satisfaction scores between different ages, education levels, marital status, status of children, family income per month, working provinces, original working department, current working department, professional rank, position in isolation ward, employment type, years working, average weekly working hours, number of night shifts in the last month, disaster nursing experience, training on disaster nursing and training on nurses' psychological adjustment were significant ( $p < .01$ ). The differences in burnout scores between different ages, numbers of children, family income per month, original working department, current working department, professional rank, position in isolation ward, employment type, years working, average weekly working hours, number of night shifts in the last month, disaster nursing experience, training on disaster nursing and training on nurses' psychological adjustment were significant ( $p < .05$ ). The differences in STS scores between different working provinces, original working department, current working department, professional rank, position in isolation ward, years working, average weekly working hours, number of night shifts in the last month and training on disaster nursing were significant ( $p < .05$ ).

### 3.5 | Step linear regression results among socio-demographic variables, work-related variables and compassion satisfaction and compassion fatigue

In the three models of compassion satisfaction, burnout and STS, resilience and work pressure were all the main influencing factors ( $R^2$  change = .524, .529 and .269, respectively). Other related factors are presented in Table 5.

## 4 | DISCUSSION

This survey investigated the compassion satisfaction and compassion fatigue of frontline nurses and the influencing factors during the COVID-19 spread in Wuhan. The results showed that frontline nurses had medium levels of compassion satisfaction, burnout and STS. Resilience and pressure were the main predictors of the three variables. The findings of our study enrich the current knowledge about compassion satisfaction and compassion fatigue.

### 4.1 | Levels of compassion satisfaction and compassion fatigue

Our study showed that most of the nurses had moderate to high levels of compassion satisfaction, low to moderate levels of burnout and low to moderate levels of STS, which were similar to another study on frontline nurses' compassion fatigue in Wuhan (Jiang et al., 2021).

**TABLE 2** Mean and standard deviations of the variables of nurse resilience, pressure level and professional quality of life ( $N = 1582$ )

Subscale	Mean (SD)	Possible range	Observed range	Low (n, %)	Moderate (n, %)	High (n, %)
Compassion satisfaction	36.99 (6.71)	10–50	10–50	22 (1.4)	1169 (73.9)	391 (24.7)
Burnout	24.14 (5.33)	10–50	10–46	610 (38.6)	968 (61.2)	4 (0.3)
Secondary traumatic stress	24.53 (5.24)	10–50	10–49	561 (35.5)	1018 (64.3)	3 (0.2)
Resilience	25.97 (6.14)	0–40	3–40			
Level of pressure	5.86 (2.39)	1–10	1–10	283 (17.9)	636 (40.2)	663 (41.9)

Note: Scores of 3 or less were designated low levels of pressure, 4–6 as average levels of pressure and 7 or above as high levels of pressure.

**TABLE 3** Bivariate correlations (Pearson) between pressure level, resilience and ProQoL subscales ( $N = 1582$ )

	Pressure level	Resilience	Compassion satisfaction	Burnout	STS
Pressure level		-.429**	-.378**	.507**	.461**
Resilience			.716**	-.689**	-.415**
Compassion satisfaction				-.802**	-.398**
Burnout					.671**
STS					

Abbreviations: ProQoL, professional quality of life; STS, secondary traumatic stress.

\*\*Correlation is significant at .01 level (2-tailed).  $r = .10$ – $.29$  small correlation,  $r = .30$ – $.49$  medium correlation and  $r = .50$ – $1.00$  large correlation (Cohen, 1988).

**TABLE 4** Univariate analysis of three constructs with different demographic and work-related characteristics ( $N = 1582$ )

Variable	Category	Compassion satisfaction			Burnout			STS		
		Mean (SD)	t/F	p	Mean (SD)	t/F	p	Mean (SD)	t/F	p
Gender			1.277	.202	–	–1.371	0.170		–1.101	0.271
	Male	37.94 (6.36)			23.33 (5.36)			23.90 (5.88)		
	Female	36.94 (6.73)			24.18 (5.33)			24.57 (5.21)		
Age group			27.786	<.001		9.517	<.001		1.113	.329
	≤30	36.02 (6.44)			24.61 (5.129)			24.71 (5.23)		
	31–40	37.81 (6.80)			23.72 (5.54)			24.34 (5.32)		
	>40	40.93 (6.67)			22.39 (5.11)			24.21 (4.70)		
Education level			5.899	.003		1.900	.150		0.755	.470
	Associate degree or below	37.56 (7.73)			23.36 (5.40)			23.88 (5.79)		
	Bachelor degree	36.85 (6.66)			24.22 (5.33)			24.55 (5.22)		
	Master degree or above	40.02 (5.87)			23.12 (5.02)			24.96 (5.12)		
Religion			0.011	.991		–0.170	.865		1.403	.161
	Yes	37.00 (6.36)			24.02 (5.76)			25.52 (5.54)		
	No	36.99 (6.73)			24.14 (5.31)			24.50 (5.23)		
Marital status			12.659	<.001		1.647	.193		0.179	.836
	Single	35.99 (6.55)			24.40 (5.20)			24.45 (5.24)		
	Married	37.59 (6.74)			24.00 (5.39)			24.60 (5.24)		
	Divorced or widowed	39.58 (6.71)			22.96 (6.13)			24.33 (5.56)		

(Continues)

TABLE 4 (Continued)

Variable	Category	Compassion satisfaction			Burnout			STS		
		Mean (SD)	t/F	p	Mean (SD)	t/F	p	Mean (SD)	t/F	p
Have any children			-5.998	<.001		2.544	.011		-0.006	.995
	No	35.99 (6.66)			24.48 (5.34)			24.53 (5.25)		
	Yes	37.99 (6.62)			23.80 (5.30)			24.54 (5.24)		
Family income per month (CNY)			6.906	<.001		6.605	<.001		2.127	.095
	<10,000	37.57 (6.74)			23.40 (5.42)			24.04 (5.54)		
	10,000-15,000	36.13 (6.42)			24.71 (5.25)			24.78 (5.12)		
	15,000-20,000	38.00 (6.65)			23.75 (5.12)			24.57 (5.15)		
	>20,000	36.77 (7.28)			24.67 (5.42)			24.86 (5.03)		
Province			-9.501	<.001	10.779	6.202			6.202	<.001
	Hubei	36.03(6.69)			25.00(5.17)			25.03(5.15)		
	Others	39.51(6.11)			21.88(5.07)			23.23(5.28)		
Original department			7.360	<.001		8.306	<.001		4.455	.001
	Infectious disease department	42.05 (4.55)			19.20 (3.81)			21.20 (4.06)		
	Respiratory medicine department	39.11 (7.56)			22.51 (5.35)			23.99 (5.65)		
	Intensive care unit	37.43 (6.62)			23.90 (5.47)			24.30 (5.12)		
	Emergency department	35.15 (7.62)			25.45 (5.98)			26.20 (5.42)		
	Others	36.77 (6.55)			24.31 (5.21)			24.57 (5.21)		
Current department			13.146	<.001		22.060	<.001		14.877	<.001
	General isolation ward	37.65 (6.78)			23.49 (5.39)			24.04 (5.28)		
	Intensive care unit	35.81 (6.40)			25.51 (4.92)			25.71 (4.97)		
	Others	36.04 (6.62)			24.58 (5.29)			24.55 (5.29)		
Professional rank			10.501	<.001		3.756	.011		2.604	.050
	Junior RN	36.32 (7.71)			23.61 (5.80)			23.55 (5.81)		
	Senior RN	36.49 (6.48)			24.48 (5.24)			24.65 (5.17)		
	Nurse in charge	38.41 (6.57)			23.62 (5.29)			24.74 (5.04)		
	Associate professor nurses or above	40.06 (6.07)			22.89 (4.73)			24.49 (5.80)		
Position in isolation ward			11.739	<.001		3.749	.011		3.638	.012
	Staff nurse	36.67 (6.70)			24.33 (5.34)			24.63 (5.25)		
	Charge nurse	38.30 (6.71)			23.81 (5.32)			24.78 (5.46)		
	Head nurse	41.10 (6.50)			22.70 (5.10)			24.58 (4.32)		
	Others	36.40 (5.80)			22.99 (5.12)			22.73 (5.28)		

(Continues)

TABLE 4 (Continued)

Variable	Category	Compassion satisfaction			Burnout			STS		
		Mean (SD)	t/F	p	Mean (SD)	t/F	p	Mean (SD)	t/F	p
Employment type			22.328	<.001		16.97	<.001		1.731	.177
	Formal employed nurse	39.71 (6.52)			22.29 (5.10)			24.17 (5.32)		
	Personal agent nurse	38.43 (6.72)			23.01 (5.10)			23.70 (4.59)		
	Contract employed nurse	36.49 (6.63)			24.49 (5.31)			24.64 (5.27)		
Years of working			18.528	<.001		7.087	<.001	3.156	.024	.02
	≤5	35.80 (6.33)			24.67 (5.17)			24.78 (5.24)		
	5–9	36.53 (6.76)			24.43 (5.31)			24.65 (5.27)		
	10–14	38.49 (6.56)			23.12 (5.50)			23.71 (5.07)		
	≥15	39.04 (6.95)			23.50 (5.30)			24.79 (5.38)		
Average weekly working hours			6.912	<.001		8.813	<.001		4.636	.003
	≤15	38.43 (6.74)			22.37 (5.47)			23.30 (5.20)		
	16–24	36.76 (6.59)			24.15 (5.33)			24.47 (5.31)		
	25–34	36.03 (6.46)			25.06 (4.82)			25.23 (4.82)		
	≥35	37.99 (7.11)			23.99 (5.58)			24.58 (5.44)		
Number of night shifts in the last month			4.156	.006		12.566	<.001		8.587	<.001
	0	36.43 (7.64)			24.39 (5.60)			24.60 (5.07)		
	1–5	37.47 (6.57)			23.63 (5.22)			23.96 (5.19)		
	6–10	37.23 (6.49)			23.71 (5.19)			24.34 (5.29)		
	>10	35.93 (6.98)			25.68 (5.41)			25.77 (5.11)		
Disaster nursing experience			−3.633	<.001	2.514	.012		1.325	.185	
	No	36.83 (6.68)			24.23 (5.31)			24.58 (5.26)		
	Yes	39.35 (6.72)			22.84 (5.39)			23.86 (4.99)		
Training on disaster nursing			7.203	<.001		−5.408	<.001		−2.378	.018
	No	36.02 (6.66)			24.72 (5.30)			24.79 (5.26)		
	Yes	38.46 (6.53)			23.26 (5.26)			24.15 (5.20)		
Training on nurses' psychological adjustment			5.486	<.001		−2.889	.004	−0.942	.346	
	No	36.49 (6.72)			24.35 (5.41)			24.60 (5.23)		
	Yes	38.67 (6.42)			23.43 (5.00)			24.31 (5.29)		

These data were also consistent with those obtained in other countries with a serious COVID-19 crisis situation, such as Spain (Dosil et al., 2020; Ruiz-Fernández et al., 2021), although the participants were health care professionals, some of whom may not be anti-pandemic staff. However, compared with another study in Italy (Rossi et al., 2021), our study showed higher burnout. A possible

explanation was that Rossi et al.'s (2021) study included students and had only 89 respondents who worked in the COVID-19 emergency. Most of the participants in our study worked in an isolation ward caring for critical patients with a heavier workload, perhaps leading to higher levels of burnout. Compared with other similar studies before the pandemic that used the same scale among Chinese nurses



**TABLE 5** Multiple linear regression model of the predictors of compassion satisfaction, compassion fatigue and burnout ( $N = 1582$ )

Model	Independent	B	SE <sub>B</sub>	Beta	t	Sig.	R <sup>2</sup> change	F	p	R <sup>2</sup>	Adjusted R <sup>2</sup>
Compassion satisfaction	Constant	12.585	1.156		10.884	<.001		364.545	<.001	.536	.535
	Resilience	0.722	0.021	.660	34.357	<.001	.512				
	Have any children	1.688	0.245	.126	6.891	<.001	.010				
	Pressure level	-0.273	0.054	-.097	-5.100	<.001	.012				
	Training on nurses' psychological adjustment	-0.939	0.277	-.059	-3.387	.001	.002				
	Family income per month (CNY)	-0.384	0.124	-.056	-3.095	.002	.003				
Burnout	Constant	39.251	0.794		49.422	<.001		268.968	<.001	.545	.543
	Resilience	-0.485	0.017	-.559	-28.655	<.001	.475				
	Pressure level	0.556	0.042	.250	13.098	<.001	.054				
	Province	-1.120	0.214	-.094	-5.228	<.001	.008				
	Average weekly working hours	0.351	0.107	.059	3.267	.001	.002				
	Have any children	-0.557	0.199	-.052	-2.799	.005	.002				
	Professional rank	0.372	0.157	.045	2.374	.018	.001				
	Position in isolation ward	-0.242	0.118	-.036	-2.054	.040	.001				
STS	Constant	27.926	0.952		29.334	<.001		151.302	<.001	.277	.276
	Pressure level	0.741	0.052	.338	14.198	<.001	.212				
	Resilience	-0.223	0.021	-.261	-10.688	<.001	.057				
	Professional rank	0.570	0.178	.070	3.199	.001	.003				
	Province	-0.741	0.262	-.063	-2.827	.005	.004				

Note: B: unstandardized coefficients; SE<sub>B</sub>: standard error for nonstandardized coefficient; and Beta: standardized coefficients. Abbreviation: STS, secondary traumatic stress.

(Wang et al., 2020; Zhang, 2016), frontline nurses reported higher compassion satisfaction and lower burnout and STS during COVID-19, which could be the result of regarding care as a call and a supportive environment (Sacco & Copel, 2018). Our results also differ from other similar studies under different cultural backgrounds before the pandemic. This study showed a lower level of compassion satisfaction, a higher level of STS and similar or higher levels of burnout than that of studies by Kelly et al. (2015) and Wu et al. (2016). There are several potential explanations. First, nurses under the COVID-19 pandemic are exposed to dangerous working conditions and numerous traumatized patients within the intensive care environment in a short time. They are under great physical-mental stress, which makes them more prone to burnout and STS. Second, the average age of Kelly et al.'s (2015) study was 39.3 ( $SD = 10.9$ ), far greater than the 30.83 ( $SD = 5.09$ ) in our study. Older age was associated with a high level of compassion satisfaction (Wang et al., 2020).

## 4.2 | Predictors of compassion satisfaction

This study found that resilience and work pressure were the main predictors of compassion satisfaction, burnout and STS according to the

regression model. This was consistent with other similar studies (Alharbi et al., 2020a; Ang et al., 2018; Guo et al., 2018; Ruiz-Fernández et al., 2021). Here, 41.9% of the participants reported high levels of pressure. A study on the concept analysis of compassion fatigue concluded that high-stress environments were one of the six antecedents contributing to compassion fatigue (Peters, 2018). Working in an isolation ward makes frontline nurses worry about contagion all the time. This plus the overwhelming workload places them under great pressure, which leads to faster consumption of mental energy, thus decreasing compassion satisfaction and promoting compassion fatigue (Kelly, 2020). Resilience is the most important resource of psychological energy (Siu et al., 2009). It has the following effects on individuals: facilitating individuals to use their own favourable conditions and resources to handle risks (Fergus & Zimmerman, 2005), coping with different situational pressures at different times and mobilizing other psychological resources to handle current and future pressures and threats (Henley, 2010). High levels of resilience have been proven to be associated with increased psychological health (Mealer et al., 2012) and job satisfaction (Matos et al., 2010), which reduce the negative impact of work-related stress, protect nurses from emotional exhaustion (Rushton et al., 2015) and inhibit or overcome the development of compassion fatigue.

Besides resilience and pressure, demographic and work-related characteristics including having children, receiving training on psychological adjustment and family income per month significantly influenced nurses' compassion satisfaction. In general, nurses with children experience more personal suffering, giving them more chances to adapt to changes and challenges. Furthermore, solicitude for children and from their families gives them motivation and support. Moreover, receiving training on psychological adjustment could help them cope with stress positively (Babanataj et al., 2019). The univariate analysis showed that nurses with family income per month from 15,000 to 20,000 (at an upper middle level) had the highest compassion satisfaction score. A potential explanation was that the upper middle-income group does not need to worry about life and can also obtain the pleasure brought by income, which enhances their happiness and reduces their stress. Because limited studies have explored the relationship between family income per month and compassion satisfaction, comparisons were difficult to make.

### 4.3 | Predictors of compassion fatigue

#### 4.3.1 | Predictors of burnout

The results of this study showed that working in Wuhan, having more weekly working hours, having no children and being a senior staff nurse were also predictors of burnout besides resilience and levels of pressure. The results of the correlation analysis showed that compassion satisfaction had a large negative correlation with burnout ( $r = -.802$ ), consistent with other similar studies (Jakimowicz et al., 2018), indicating that the variables promoting compassion satisfaction may prevent burnout. Therefore, having children or not was entered in the regression equation of compassion satisfaction and burnout. As is widely known, Wuhan had more cases than other cities in China during the COVID-19 pandemic. Health care professionals from Wuhan experienced more stress, including witnessing more misfortune, more worrying about their families, greater responsibilities to fight the virus and longer working hours than medical workers outside Hubei. More pressure contributes to more serious psychological problems, putting them at a high risk of burnout and compassion fatigue (Alharbi et al., 2020b). In a study by Lai et al. (2020), health care professionals with intermediate technical titles (similar to the senior RN professional rank) reported more mental health symptoms, which may be the result of more responsibility and pressure due to the core role both at work and home but having no adequate work experience yet (Jakimowicz et al., 2018). This is consistent with the study by Guo et al. (2018) showing that low professional rank was a predictor of nurses' emotional exhaustion. Duty nurses provide direct bedside care for patients. They are exposed to more suffering from patients, and long-term exposure might result in heavy emotional burdens (Mason et al., 2014), leading to the development of burnout.

#### 4.3.2 | Predictors of STS

In the regression model of STS, professional rank (nurse in charge) and working in Wuhan were also entered into the regression equation. The potential explanations were similar to burnout. In the bivariate correlation analysis, burnout has a large positive relationship with STS, supporting previous similar results (Jakimowicz et al., 2018; Sodeke-Gregson et al., 2013) and indicating that these two syndromes may be aggravated by each other (Malkina-Pykh, 2017).

There were several limitations in this study. First, this was a cross-sectional and observational study, so causal relationships could not be determined. Second, the change in frontline nurses' compassion satisfaction and compassion fatigue over time could also not be known in this study. Third, the study sample was from a designated hospital for critical patients, the results of which could not be generalized to all of the frontline nurses during this pandemic. Comparative studies between frontline nurses and non-frontline nurses, as well as nurses caring for critically ill patients and nurses caring for general patients, are recommended. Longitudinal and intervention studies are also suggested.

## 5 | CONCLUSION

This study explored the status and influencing factors of compassion satisfaction and compassion fatigue (comprising burnout and STS) among frontline nurses fighting COVID-19. As the main force against SARS-CoV-2, the frontline nurses in this study were found to have moderate levels of compassion satisfaction, burnout and STS. Resilience and pressure level were the main predictors of compassion satisfaction and Compassion fatigue. Some demographic and work-related characteristics were also determined to be significant factors of compassion satisfaction and compassion fatigue. Having children, receiving training on psychological adjustment and family income per month were predictors of compassion satisfaction. Working in Wuhan, higher weekly working hours, having no children and being a senior staff nurse could promote the development of burnout. Professional rank (nurse in charge) and working in Wuhan were associated with a higher risk of STS.

## 6 | IMPLICATIONS FOR NURSING MANAGEMENT

Compassion fatigue could have many adverse consequences, including physical, psychological and social consequences, such as contributing to high turnover intention, patient dissatisfaction and poor-quality care. There is a desperate need for nursing management to take preventive measures. Protection for health care workers is a significant part of public health measures during the COVID-19 outbreak. To decrease nurses' stress, fewer hours per shift, adequate protection equipment, training on coping with stress and psychological adjustment, sufficient support and encouragement

both materially and spiritually not only for them but also for their families are recommended. Seven strategies were found to develop nurses' resilience in a previous study (Wei et al., 2019) and could be used in this special situation: facilitating social connections (conducting random acts of kindness for coworkers and patients), promoting positivity using the approach of positive psychology (three good things, practising gratitude and paying it forward), capitalizing on nurses' strengths (recognizing and applying nurses' strengths at work), nurturing nurses' growth (creating a loving and nonjudgemental environment), encouraging nurses' self-care, fostering mindfulness practice (deep breathing and drawing) and conveying altruism (meaningful recognition). To promote compassion satisfaction and relieve compassion fatigue, creating a magnetic culture (lower patient-to-nurse ratios, supportive work environments, an autonomous practice environment and strong nursing leadership) (Graystone, 2019) and implementing education/training programmes and peer support (Wahl et al., 2018) are strategies that can be used by nurse leaders.

### CONFLICT OF INTEREST

No conflict of interest has been declared by the authors.

### ETHICAL APPROVAL

The study was orally approved by medical ethics committee of Tongji Hospital Affiliated to Tongji Medical College of Huazhong University of Science and Technology before implementation. All participants gave oral informed consent.

### AUTHOR CONTRIBUTIONS

Hu Luhong, Wang Xia, Wu Defang, Guan Xiaoli, Wang Weidi and Cui Jinrui undertook the design of the study. Resource coordination was conducted by Hu Luhong, Liu Junya and Wang Hui. Data of this study were collected by Hu Luhong and Wang Hui. Data collation and analysis were made by Wang Xia and Wu Defang. Basic framework of the paper was designed by Wang Xia and Wu Defang. All of the authors made substantive contributions to the final paper.

### DATA AVAILABILITY STATEMENT

Authors do not wish to share the data.

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## SUPPORTING INFORMATION

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