

RESEARCH ARTICLE

A survey of coping strategies among clinical nurses in China during the early stage of coronavirus disease 2019 pandemic: A cross-sectional study

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Abstract

Aims: To investigate coping strategies and identify their associated factors among Chinese clinical nurses during the early stage of coronavirus disease 2019 pandemic.

Design: A cross-sectional study.

Methods: This study was conducted in seven designated hospitals involved in the diagnosis and treatment of the coronavirus disease 2019 in the southwest of China between 1 February and 31 March, 2020. Multiple linear regression was conducted to explore the association of different factors with the coping strategies of nurses.

Results: Nurses' positive coping was associated with higher psychological capital ($B = 0.185$, 95% CI 0.158–0.213), social support ($B = 0.292$, 95% CI 0.244–0.340) and lower frustration ($B = -0.065$, 95% CI -0.123 to -0.007). In contrast, higher frustration ($B = 0.091$, 95% CI 0.044–0.139), lower performance ($B = -0.054$, 95% CI -0.101 to -0.007) and psychological capital ($B = -0.035$, 95% CI -0.055 to -0.014) were associated with negative coping.

KEYWORDS

China, Coping strategies, coronavirus disease 2019, frustration, nurse, psychological capital, social support

1 | INTRODUCTION

The coronavirus disease 2019 (COVID-19), as a newly emerging infectious disease (EID) (Cowie & Dore, 2012), is the third known zoonotic coronavirus disease after severe acute respiratory syndrome (SARS) and the Middle East respiratory syndrome (MERS). Due to its characteristics of high transmissibility, strong infectivity and no specific drugs for treatment, the COVID-19 has become a pandemic. As of 10:00 on 17 November 2020, the World Health Organization

(WHO) (2020) reported that there were 55,319,791 confirmed cases of COVID-19 and 1,331,334 deaths. These numbers were reduced by a vaccination campaign during 2021, but the data made it evident that the COVID-19 pandemic has been seriously endangering human health and life.

To prevent and control the critical situation created by the COVID-19 pandemic, the Chinese government, being the first to report COVID-19, has implemented a series of measures, including setting up designated hospitals across the country, and

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building more than 15 module hospitals and two new hospitals in Wuhan (Hubei, China) to treat confirmed and suspected cases of COVID-19 (National Health Commission of the People's Republic of China, 2020a). Therefore, as of 24:00 on 18 August 2020, the National Health Commission of China had received 84,888 reports of confirmed cases and 4,634 deaths in 31 provincial-level regions on the Chinese mainland and the Xinjiang Production and Construction Corps, and in all 79,685 patients had been cured and discharged from hospital (National Health Commission of the People's Republic of China, 2020b). The latest evidence showed that China has achieved phased accomplishments in fighting the COVID-19 pandemic. Nurses constitute one of the largest groups of front-line medical workers. Ineffective coping strategies in their work against the COVID-19 pandemic may lead to burnout, psychological distress and poor performance at work, and may be detrimental to nurses' health and patient outcomes (Ding et al., 2015; Li et al., 2017; Zhou et al., 2017).

2 | BACKGROUND

In the face of an EID, evidence shows that medical workers, especially nurses situated in the forefront of the healthcare system, have extensive responsibilities including identifying suspected and confirmed patients with EID infections (Lam et al., 2019), controlling the spread of EID using high-quality infection control measures (Lam et al., 2016), and offering appropriate quarantine arrangements for suspected and confirmed patients (Lam & Hung, 2013). The COVID-19 pandemic is no exception. These commitments have imposed a high physical and mental workload on nurses (Carayon & Gürses, 2005; Mohammadi et al., 2016). Excessive workload has been verified as a significant stressor for nurses, decreasing their productivity (Greenglass et al., 2003), comfort and health (Mohammadi et al., 2016; Rubio et al., 2004). Studies have also indicated that high workload risks medical errors, patient safety and even patient death (Abbey et al., 2012; Tarnow-Mordi et al., 2000).

Coping, as an integral element, is vital to the reduction of an individual's stress levels (Lazarus & Folkman, 1984; Parker et al., 1993). According to the psychological stress and coping theory, when the internal and external demands of the person-environment transaction exceed individual resources, coping refers to the cognitive and behavioural efforts of the individual to deal with the problem and regulate emotion (Folkman & Lazarus, 1980; Lazarus & Folkman, 1984). Coping consists of diametrically opposed positive and negative categories (Xie, 1998). When faced with stress, individuals with positive coping have positive thoughts and solutions (e.g., taking constructive actions) (Ding et al., 2015; Garrosa & Moreno-Jiménez, 2013). In contrast, negative coping consists of palliative coping strategies and negative appraisals under stressful conditions (e.g., avoidance) (Ding et al., 2015). Nurses may adopt negative attitudes or actions once EID-related deaths begin to be reported, especially when they are directly involved in the affected patients' care (Oh et al., 2017). Research based in Saudi Arabia found that nearly

half of a sample of nurses had a negative attitude towards treating patients with suspected or confirmed Middle East respiratory syndrome (Alkot et al., 2015). Moreover, evidence suggests that nurses adopting a positive coping had significantly better job performance and satisfaction, which can promote patient safety (Ding et al., 2015; Li et al., 2017; Zhou et al., 2017).

Additionally, according to the psychological stress and coping theory, the individual's attempts to utilize the personal (e.g., psychological capital) and social (e.g., social support) resources are important in the process of coping (Folkman & Lazarus, 1980; Lazarus & Folkman, 1984). Psychological capital, proposed by Luthans and his colleagues (Luthans et al., 2004), refers to a "positive appraisal of circumstances and probability for success during the growth and development of an individual based on motivated effort and perseverance" (Luthans et al., 2007), and is corroborated as a useful personal resource affecting nurses' coping styles in stressful situations (Ding et al., 2015; Zhou et al., 2017). Nurses with higher levels of psychological capital were more likely to develop positive coping styles, but lower psychological capital was significantly correlated with negative coping (Ding et al., 2015; Zhou et al., 2017). Evidence also indicates that social support, as an important social resource, improves nurses' coping skills (Ben-Zur & Michael, 2007; Gifkins et al., 2017; Pisanti, 2012) and shields them from stress (Lin et al., 2010). Moreover, previous studies found that age, gender and marital status were associated with nurses' coping strategies (Pisanti, 2012; Zhou et al., 2017). In summary, psychological capital, social support and other characteristics (e.g., age, gender and marital status) of nurses played important roles in their coping strategies.

Therefore, the present study aimed to investigate coping strategies and identify their associated factors among Chinese clinical nurses during the early stage of the COVID-19 pandemic.

3 | THE STUDY

3.1 | Design

This cross-sectional study was conducted in Chongqing, a municipality directly administered under the central government of China, and near Hubei province which was central to the COVID-19 pandemic. Chongqing, with 34.04 million people, had a reported 579 confirmed cases of COVID-19 and six deaths since the outbreak of COVID-19 (National Bureau of Statistics, 2018; National Health Commission of the People's Republic of China, 2020b). The number of confirmed cases ranked 10th in 31 provincial-level regions on the Chinese mainland and the Xinjiang Production and Construction Corps.

3.2 | Method

The participants were recruited from seven designated hospitals involved in the diagnosis and treatment of COVID-19 in Chongqing. Participants were invited to take part in this study if they were:

(a) registered nurses in China; (b) fighting against the COVID-19 pandemic at designated hospitals.

The sample size was determined using a power analysis and calculated using the G*Power program (Erdfeiler et al., 1996; Faul et al., 2007). Linear multiple regression in G*Power program was conducted using a random model. When using two-tailed test and considering an effect size of 0.05, 16 related factors were based on the psychological stress and coping theory (Folkman & Lazarus, 1980; Lazarus & Folkman, 1984) and relevant published work (Brudek et al., 2019; Ding et al., 2015; Gifkins et al., 2017; Li et al., 2017; Zhou et al., 2017), significance level (p) of 0.05, and 95% power, yielding a minimum sample size of 627 (Graph 1).

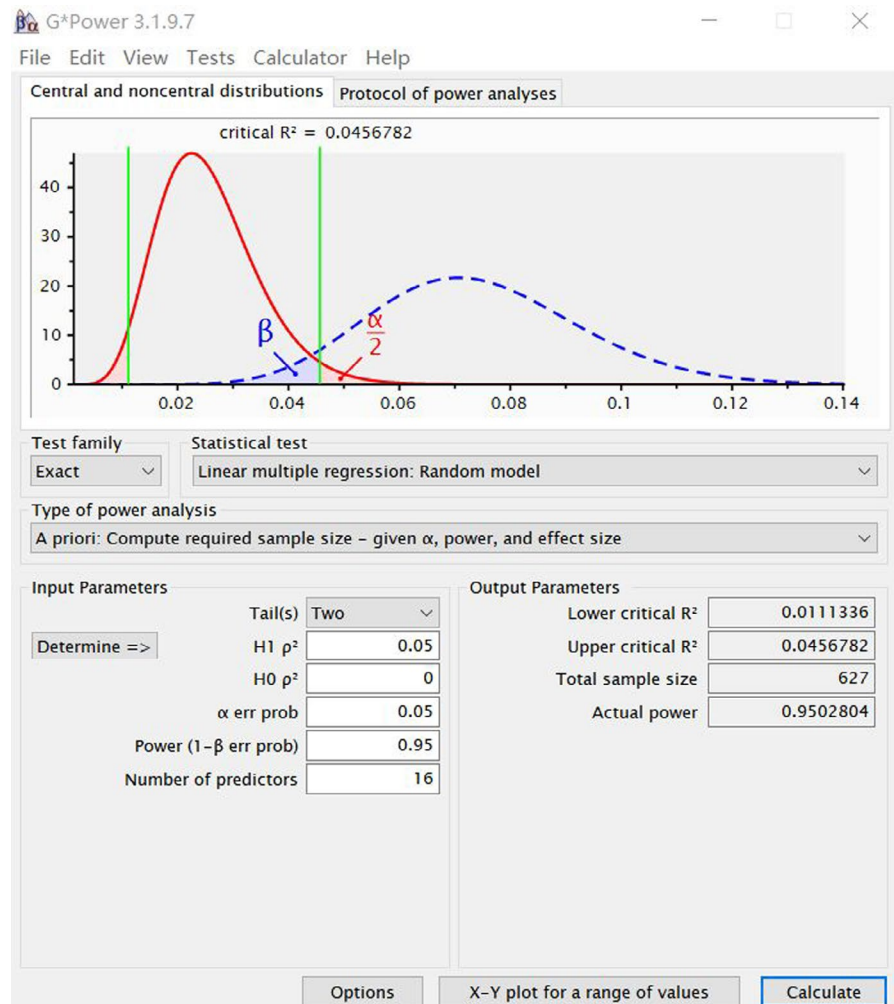
The data were collected by convenience sampling between 1 February and 31 March, 2020. An electronic questionnaire was created using Questionnaire Star, a professional online survey platform with 33.75 million users in China. The questionnaire link was sent by nursing managers at the seven designated hospitals to registered nurses using the social media platforms WeChat or QQ inviting them to anonymously join the study by clicking the link and following the prompts to complete the questionnaire. The questionnaire stated the purpose, methods and any risk of participating in the study on the first page to acquire informed consent. Furthermore, two items

were included ("Are you a registered nurse working in one of designated hospitals for the diagnosis and treatment of COVID-19 in Chongqing?" and "Are you currently engaged in the fight against COVID-19 pandemic now?") to ensure the participant met the inclusion criteria for the study. If the participants' responses to the two items were both "Yes," he or she would then be allowed to access the questionnaire content, otherwise the questionnaire would be terminated and submitted.

The electronic questionnaires included a demographic data sheet, Simplified Coping Style Questionnaire (SCSQ), National Aeronautics and Space Administration Task Load Index (NASA-TLX), Psychological Capital Questionnaire (PCQ) and Social Support Rating Scale (SSRS).

3.2.1 | SCSQ

Coping strategies were measured using the SCSQ (Xie, 1998). Based on the Ways of Coping Questionnaire (Folkman & Lazarus, 1988), the SCSQ is a 20-item instrument consisting of two subscales: positive coping (12 items) and negative coping (eight items). Each item of the SCSQ is ranked on a four-point Likert scale ranging from zero



GRAPH 1 Sample size calculation using G*Power

to three points. The SCSQ has adequate content validity, internal consistency and test-retest reliability in Chinese (Li et al., 2017). In the present study, the Cronbach's alpha of the positive coping and negative coping was 0.904 and 0.877, respectively.

3.2.2 | NASA-TLX

The NASA-TLX was used to measure the workload. The NASA-TLX is a self-report instrument, developed by Hart and Staveland (1988). It includes six items on mental demand, physical demand, temporal demand, performance, effort and frustration. Participants rate the level of their workload for each item on a 10-cm visual-analog scale which was then converted to a 0–20 scale, higher scores indicating higher workload. The NASA-TLX has been validated in Chinese nurses as having good reliability and validity (Liang et al., 2019). In the present study, the Cronbach's alpha of the scale was 0.638.

3.2.3 | PCQ

Psychological capital was measured using PCQ (Luthans et al., 2004), a 24-item questionnaire including four subscales: self-efficacy, hope, optimism and resilience, each with six items. All items were rated using a six-point Likert scale, ranging from strongly disagree (one point) to strongly agree (six points), with higher scores indicating better psychological capital. The original PCQ has been translated into Chinese and found to have adequate validity and reliability (Zhang et al., 2010). In the present study, the Cronbach's alpha of the four subscales ranged from 0.769–0.880.

3.2.4 | SSRS

Social support was measured using the SSRS, which was developed by Xiao (1994) and found to have acceptable validity and reliability. This 10-item instrument consists of three subscales: objective social support (three items), subjective social support (four items) and support utilization (three items). Items six and seven are rated on a nine-point Likert scale ranging from zero to eight points, while the other items are recorded on a four-point Likert scale ranging from one to four points. Higher scores indicate higher levels of social support. In the present study, the Cronbach's alpha of the three subscales ranged from 0.678–0.756.

Demographic characteristics, such as age, gender, educational attainment and working seniority, were collected using a demographic data sheet.

3.3 | Analysis

Data were analysed using SPSS version 25.0 (IBM Corporation). Descriptive statistics were used to present the sample characteristics

TABLE 1 Characteristics of participants (N = 957)

Characteristic	N	%
Age (years) Mean (SD) = 29.56 (5.96)		
<30.00	529	55.30
≥30.00	428	44.70
Gender		
Male	12	1.30
Female	945	98.70
Educational attainment		
Technical secondary school	13	1.30
Junior College	396	41.40
Undergraduate university or above	548	57.30
Marital status		
Married	616	64.40
Unmarried	341	35.60
Hospital grade of work		
Level 2 hospitals	485	50.70
Level 3 hospitals	472	49.30
Professional titles		
Primary	331	34.60
Intermediate	601	62.80
Senior	25	2.60
Working seniority (years) Mean (SD) = 8.04 (6.25)		
<5.00	303	31.70
5.00–9.90	364	38.00
≥10.00	290	30.30

and study variables. Categorical variables were described using frequencies and percentages. Continuous variables were expressed as mean [standard deviation (SD)] or median [inter-quartile range (IQR)]. Mean (SD) was used to express normally distributed data; otherwise, median (IQR) was used. The following assumptions were testing prior to multiple linear regression analysis: (a) Linearity of the model, tested by drawing scatter plots; (b) Normally distributed standardized residuals, tested using a histogram; (c) No autocorrelation in the residuals, verified by a Durbin-Watson value of about two; (d) No multicollinearity between independent variables, verified by variance inflation factor (VIF) < 10. If all assumptions were satisfied, linear regression analysis was used to find the factors independently associated with coping strategies. Bilateral $p < 0.05$ indicated statistical significance.

3.4 | Ethical considerations

Ethical approval was obtained from Chongqing Medical University Ethical Committee. Informed consent was obtained from participants. The research conforms to the provisions of the Declaration of Helsinki in 1995 (as revised in Brazil 2013).

4 | RESULTS

4.1 | Sample characteristics

A total of 991 electronic questionnaires were received during the recruitment period. Fifteen participants (1.50%) did not meet the inclusion criteria, while 19 participants (1.90%) provided incorrect information. No missing data were found in this study because Questionnaire Star provided an automated and simple way for participants to read and complete the questionnaire. The questionnaire could not be submitted until all responses were provided. Thus, 957 participants completed this study. Table 1 shows the characteristics of participants, which were consistent with other studies involving nurses in China (Deng & Liu, 2018; Xu et al., 2016).

4.2 | Coping strategies

The total scores for positive and negative coping were 24.46 ($SD = 6.22$) and 8.96 ($SD = 4.10$), respectively. Table 2 shows the item score of coping strategies. The result of a paired-samples *t*-test showed that the mean score of positive coping was significantly higher than that of negative coping ($t = 42.36, p < .01$).

4.3 | Workload

The score of the NASA-TLX was 84.76 ($SD = 13.92$). The item with the highest score was physical demand (mean = 17.70, $SD = 3.56$), and the item with the lowest score was frustration (mean = 8.92, $SD = 5.60$) (Table 3).

4.4 | Psychological capital

As shown in Table 3, the total score on the PCQ was 108.55 ($SD = 13.31$). The highest score was on the self-efficacy subscale (mean = 4.58, $SD = 0.63$), and the lowest was on the resilience subscale (mean = 4.43, $SD = 0.59$).

4.5 | Social support

Table 3 also shows the score of the SSRS was 41.20 ($SD = 7.97$), objective social support subscale having the highest score (mean = 3.06, $SD = 0.98$), and support utilization subscale having the lowest score (mean = 2.73, $SD = 0.64$).

4.6 | Associated factors of coping strategies

According to the results of the multiple linear regression models predicting coping strategies in the present study, positive coping

TABLE 2 Coping strategies of the participants ($N = 957$)

Coping strategies	Range	Mean (SD)
Positive coping	0.42–3.00	2.04 (0.52)
I tried to look on the bright side of things	0.00–3.00	2.36 (0.75)
I made a plan of action and followed it	0.00–3.00	2.18 (0.72)
I tried to keep my feelings (e.g., sadness and anger) to myself	0.00–3.00	2.11 (0.77)
I found new faiths to solve the problem	0.00–3.00	2.07 (0.72)
I drew on others experiences in the similar situation	0.00–3.00	2.06 (0.71)
I asked advice from a relative, friend or classmate	0.00–3.00	2.03 (0.80)
I confided my troubles to my family, friends or colleagues	0.00–3.00	2.02 (0.82)
I didn't take it too seriously	0.00–3.00	1.99 (0.81)
I changed or grew as a person in a good way	0.00–3.00	1.99 (0.70)
I changed something about myself	0.00–3.00	1.95 (0.70)
I tried to make myself feel better by working, studying, etc.	0.00–3.00	1.85 (0.78)
I tried to make myself feel better by engaging in hobbies, leisure activities and recreation	0.00–3.00	1.84 (0.82)
Negative coping	0.00–3.00	1.12 (0.51)
I went along with fate, sometimes I just have bad luck	0.00–3.00	2.04 (0.85)
I tried to get away from it for a while by resting or taking vacation	0.00–3.00	1.80 (0.89)
I accepted this situation because there is nothing I can do to change it	0.00–3.00	1.16 (0.87)
I refuse to think too much about it	0.00–3.00	1.05 (0.85)
I was waiting for time to change the situation	0.00–3.00	0.93 (0.86)
I relied on others to solve the problem	0.00–3.00	0.79 (0.76)
I had fantasies or wishes about how things might turn out	0.00–3.00	0.76 (0.83)
I tried to get away from it by eating, drinking, smoking, using drugs or medicine, etc.	0.00–3.00	0.43 (0.79)

was associated with the level of psychological capital ($B = 0.185$, 95% *CI* 0.158–0.213), social support ($B = 0.292$, 95% *CI* 0.244–0.340), frustration subscale of workload ($B = -0.065$, 95% *CI* -0.123 to -0.007), gender ($B = 2.957$, 95% *CI* 0.199–5.714) and marital status ($B = -2.092$, 95% *CI* -2.825 to -1.359). The variables

	Range of total scores	Total scores [Mean (SD)]	Mean scores [Mean (SD)]
Workloads	20.00–120.00	84.76 (13.92)	14.13 (2.32)
Physical demand	0.00–20.00	17.70 (3.56)	–
Temporal demand	0.00–20.00	16.66 (4.24)	–
Effort	0.00–20.00	16.13 (3.89)	–
Mental demand	0.00–20.00	15.35 (4.15)	–
Performance	0.00–20.00	10.00 (5.65)	–
Frustration	0.00–20.00	8.92 (5.60)	–
Psychological capitals	61.00–144.00	108.55 (13.31)	4.52 (0.55)
Self-efficacy	13.00–36.00	27.50 (3.76)	4.58 (0.63)
Hope	8.00–36.00	27.29 (4.01)	4.55 (0.67)
Optimism	9.00–36.00	27.19 (4.01)	4.53 (0.67)
Resilience	15.00–36.00	26.57 (3.52)	4.43 (0.59)
Social supports	17.00–60.00	41.20 (7.97)	2.91 (0.58)
Objective social support	1.00–17.00	8.68 (3.17)	3.06 (0.98)
Subjective social support	9.00–32.00	23.82 (4.91)	2.98 (0.61)
Support utilization	3.00–12.00	8.20 (1.91)	2.73 (0.64)

TABLE 3 Workload, psychological capital and social supports of the participants ($N = 957$)

TABLE 4 Factors associated with of coping strategies of the participants^a ($N = 957$)

Coping strategies	Variable	B	SE-B	β	t	p	95% CI of B		VIF
							Low	Up	
Positive coping	Constant	-9.491	3.251	–	-2.919	.004	-15.871	-3.110	–
	Psychological capital	0.185	0.014	0.389	13.213	<.001	0.158	0.213	1.359
	Social support	0.292	0.024	0.379	11.924	<.001	0.244	0.340	1.379
	Frustration	-0.065	0.030	-0.059	-2.195	.028	-0.123	-0.007	1.125
	Gender ^b	2.957	1.405	0.054	2.104	.036	0.199	5.714	1.016
	Marital status ^c	-2.092	0.373	-0.161	-5.603	<.001	-2.825	-1.359	1.294
Negative coping	Constant	10.536	0.517	–	20.392	<.001	9.522	11.550	–
	Frustration	0.091	0.024	0.126	3.782	<.001	0.044	0.139	1.065
	Performance	-0.054	0.024	-0.075	-2.263	.024	-0.101	-0.007	1.055
	Psychological capital	-0.035	0.010	-0.110	-3.368	.001	-0.055	-0.014	1.020
	Hospital grade of work ^d	1.210	0.267	0.147	4.536	<.001	0.686	1.733	1.017

Abbreviations: 95% CI, 95% confidence interval; B, unstandardized coefficient beta; SE-B, standard error of B; VIF, variance inflation factor; β , standardized coefficient beta.

^aRepresented by the multiple linear regression model.

^bGender: 0 = male, 1 = female.

^cMarital status: 0 = unmarried, 1 = married.

^dHospital grade of work: 0 = level 2 hospitals, 1 = level 3 hospitals.

co-explained 40.8% variation of positive coping. The level of frustration ($B = 0.091$, 95% CI 0.044–0.139) and performance ($B = -0.054$, 95% CI -0.101 to -0.007) of workload, psychological capital ($B = -0.035$, 95% CI -0.055 to -0.014) and hospital grade of work ($B = 1.210$, 95% CI 0.686–1.733), were factors associated with negative coping. The variables co-explained 14.1% variation of negative coping (Table 4).

5 | DISCUSSION

Prolonged and constant stress and ineffective coping strategies compromise nurses' health and patient outcomes (Brudek et al., 2019; Li et al., 2017; Zhou et al., 2017). Recent research showed that Chinese clinical nurses fighting against COVID-19 pandemic suffered a high level of stress (Ge & Meng, 2020). Heavy workload is a major source

of stress for nurses, other sources including a lack of resources, financial responsibilities and facing patients' death (Abraham et al., 2018; Mohammadi et al., 2016). Findings of the present study indicated that the Chinese clinical nurses fighting against COVID-19 pandemic in general had adopted more positive coping strategies (such as taking an optimistic view, making and following a plan of action, and attempting to control disappointment, regret, sadness and anger) than negative ones (such as acceptance of fate, or a sense of bad luck) to cope with the challenges of their work. This finding provides indicators to improve nurses' mental health, thus providing better quality care and improving patient outcome in difficult situations.

In this study, we found that psychological capital was one of the main factors associated with nurses' positive coping. Nurses with higher psychological capital tended to adopt positive coping strategies, and lower psychological capital was significantly correlated with negative coping. The findings are in agreement with those of previous studies (Ding et al., 2015; Zhou et al., 2017). Psychological capital has been corroborated as a useful personal resource affecting nurses' coping strategies in stressful situations (Ding et al., 2015; Zhou et al., 2017). Previous research has identified that psychological capital can indeed be developed and enhanced by establishing hope, cultivating an optimistic attitude, self-efficacy and enhancement of self-resilience based on psychological capital intervention (Liang et al., 2018). Accordingly, a psychological intervention based on the psychological capital theory could be designed to evaluate the effect of the intervention programme on the psychological capital of nurses, and provide feedback with the aim of prompting them to use a more positive way to respond to challenges in those critical circumstances.

The present study also showed that nurses with better social support would adopt positive coping strategies. Previous studies showed that social support could improve nurses' coping skills and shield them from stress (Ben-Zur & Michael, 2007; Gifkins et al., 2017; Lin et al., 2010; Pisanti, 2012). An Australian study reported that social support at work from nursing manager, family and friends was key to both experienced and graduate nurses' coping (Gifkins et al., 2017). In addition, Tesfaye (2018) found that social support and carefully planned problem-solving were the most preferred strategies for nurses to cope with job stress. Therefore, social support was also a key factor to nurses' coping strategies. In our study, sufficient and effective social support was found in Chinese clinical nurses fighting against COVID-19 pandemic. This result should be partly ascribed to the Chinese government and health management system for its provision of sufficient objective support to increase nurses' confidence and motivation to complete the task, such as improved working and rest conditions, strengthened humanistic care, improvements for a safer practice environment, implementation of industrial injury recognition and satisfaction from promotion and progression at work (Health Commission of Henan Province, 2020; National Health Commission of the People's Republic of China, 2020c).

Conversely, the frustration item of NASA-TLX, used to measure workload, was negatively associated with the nurses' positive coping strategies, but other items, especially physical, temporal and

mental demand of workload had no significant influence on coping strategies. When tackling this large-scale infectious public health event, nurses are susceptible to various psychological and mental problems due to the death risk of virus infection (Wu et al., 2009; Xu & Zhang, 2020). Nurses working with critically infected patients reportedly experience a sense of frustration frequently, since neither effective antiviral treatment nor vaccine is available and some deaths are inevitable (Sohrabi et al., 2020). Research has also indicated that participating in systematic psychological training to increase their psychological knowledge and skills was the primary demand of medical staff in disaster relief situations (Brooks et al., 2019; Yan et al., 2015). This is consistent with our finding that frustration and not physical or time-related items had a significant influence on nurses' coping strategies, measured using the NASA-TLX. During the COVID-19 pandemic, many Chinese medical institutions and universities have taken measures such as opening online platforms to provide psychological counselling for medical personnel, or building a psychological intervention medical team providing online courses to guide medical staff to deal with common psychological problems (Chen et al., 2020; Xiang et al., 2020; Xiao, 2020). These measures may have had a positive effect on reducing nurses' frustration and helped them adopt positive coping in this stressful situation. However, the psychological interventions were not without problems, such as insufficient attention being paid to their practical implementation, or overall inadequate planning (Duan & Zhu, 2020).

5.1 | Limitations

Factors identified in our multiple linear regression models account for just 40.8% variation of positive coping and 14.1% variation of negative coping. This indicates that some significant associated factors remain unaccounted for by this analysis, and more variables need to be incorporated into the model in further study, with a particular focus on other demographic characteristics. In addition, although we had a relatively large sample size, our study used online convenience sampling, which would not be representative of all nurses in the study setting, thus limiting the generalizability of the findings. Finally, we employed a cross-sectional rather than longitudinal design, and we do not have evidence for the dynamic influence of psychological capital, social support and workload (frustration subscale) on the positive coping of Chinese clinical nurses who fight against COVID-19 pandemic. Further research aiming to track and verify the causality of variables identified in this study could provide additional insights into nurses' coping strategies.

6 | CONCLUSIONS

Chinese clinical nurses tended to adopt positive coping in fighting against the COVID-19 pandemic. Positive coping was associated with high levels of psychological capital, adequate social support and low sense of frustration. This group, which tended to respond

in a positive coping way, might benefit from a series of interventions in Chinese health system as follows: (a) paying attention to and monitoring the psychological problems of nurses, and helping them address frustration by corresponding systematic and powerful psychological intervention; (b) providing enough objective support to increase nurses' confidence and motivation to complete the task and cope with the challenges; (c) encouraging and stimulating the positive emotions in nurses so that they can gain respect, pride and satisfaction in their job.

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CONFLICT OF INTEREST

The authors declare that there were no conflicts of interest.

AUTHOR CONTRIBUTIONS

JT, YZ, FL, ZZ, XG and ZL have made substantial contributions to conception and design, or acquisition of data, or analysis and interpretation of data. JT, YZ, FX, FL and ZL have been involved in drafting the manuscript or revising it critically for important intellectual content. JT, YZ, FX, FL, ZZ, XG and ZL gave final approval of the version to be published and have participated sufficiently in the work to take public responsibility for appropriate portions of the content; and agreed to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

ETHICAL APPROVAL AND PATIENT CONSENT FOR PUBLICATION STATEMENT

Ethical approval has been obtained from Chongqing Medical University Ethical Committee. Informed consent has been obtained from participants. The research conforms to the provisions of the Declaration of Helsinki in 1995 (as revised in Brazil 2013).

DATA AVAILABILITY STATEMENT

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

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