Multi-method Approach to Examining Psychosocial Responses and Reactions to COVID-19 in the US and China

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Multi-method Approach to Examining Psychosocial Responses and Reactions to COVID-19 in the US and China

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PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

Abstract

Objective

The purpose is to examine health care providers’ psychosocial responses to COVID-19 in China and the US via exploring relationships among psychological responses and describing experiences of working at the epicenter during the pandemic.

Methods

In manuscript one, a cross-sectional study was conducted in nurse and physician volunteers who provided direct care to COVID-19 patients in Wuhan (volunteers) and those with no COVID-19 contact outside of Wuhan (non-volunteers). A path analysis theoretical model was developed to illustrate the relationships among psychosocial variables and was separately applied to volunteer and non-volunteer groups.

In manuscript two, a cross-sectional study was conducted to examine the psychological wellbeing of nurses in the US. Network analysis was used to model the data and analyze the centrality indices.

In manuscript three, a qualitative descriptive study using content analysis was completed to explore experiences of Chinese nurse and physician volunteers at the epicenter.

Results

In manuscript one, no significant difference was found in the structure of the models between volunteers and non-volunteers. In volunteers, potential key early indicators to prevent PTSD were compassion satisfaction, general health, attitude toward life, and perceived stress. In non-volunteers, indicators were general health and attitude toward life.
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In manuscript two, one out of five US nurses had probable PTSD. Life satisfaction was a potential inflection point for intervention to reduce perceived stress and mitigate PTSD symptomatology. Perceived stress was a potential inflection point for intervention to mitigate PTSD symptomatology. Attitude toward life was a potential inflection point for intervention to improve compassion satisfaction.

In manuscript three, emerging themes were: (a) the manifestation of a strong sense of national need and a call to serve, (b) family support in a national crisis, (c) an understanding that collaboration was needed, (d) a commitment to protect oneself properly to avoid infection, (e) a necessary and varying degree of self-dependency, (f) the importance of coping strategies amidst the tension of the pandemic, and (g) a recognition that challenges and opportunities were present side-by-side.

Conclusions

Findings point to the need for implementing scalable, system-level interventions to reduce the psychological burden during the pandemic.
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Chapter 1: Multi-method Approach to Examining Psychosocial Responses and Reactions to COVID-19 in the US and China

Introduction

In this chapter, relationships among three manuscripts and an overview of the three manuscripts are discussed. The overall aim is to extend the knowledge of relationships among psychological variables in a US sample and a Chinese sample of health care providers and experiences of frontline nurses and physicians during the pandemic.

Relationships Among Three Manuscripts

Psychological responses and experiences of global health care providers during the pandemic were examined from both quantitative and qualitative perspectives. The first two manuscripts quantified psychological responses and relationships among those responses utilizing samples of health care providers in China and the US. To obtain more in-depth details about experiences of the health care providers during the coronavirus disease (COVID-19) crisis, a qualitative approach was utilized in Chinese health care providers at the epicenter in the third manuscript. Results of the three manuscripts would show a general picture of health care providers’ psychological wellbeing when working under the pandemic situation.

Overview of the Three Manuscripts

Manuscript 1: Multi-sample Path Analysis of Psychological Well-being of Health Care Providers After the First Wave of COVID-19 in China: A Cross-sectional Study

Problem. In the first wave of COVID-19, 40,000 health care volunteers traveled across China to the epicenter, Wuhan, to provide direct care to COVID-19 patients (The
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

State Council The People’s Republic of China, 2020; Central Commission for Discipline Inspection, 2020). During this crisis at the epicenter, on-the-spot telephone counseling was provided to help health care volunteers cope with the crisis (Kang et al., 2020). This brief intervention might not have been sufficient to address more pathological sequelae such as posttraumatic stress disorder (PTSD) after health care volunteers returned to their home hospitals.

Problem Statement. Countries are becoming more aware of the severity of aftereffects and are calling for intensive, large-scale, and longer-term psychological interventions for health care providers to mitigate the COVID-19-related psychological burden and improve psychological wellbeing (Türközer & Öngür, 2020; Vostanis & Bell, 2020; National Health Commission of the People’s Republic of China, 2020a). Before interventions can be widely disseminated clinically, further studies that examine psychological relationships in health care providers are warranted. Additionally, to whom these interventions might be directed needs to be clarified. Frontline health care volunteers in Wuhan and health care providers outside of Wuhan working in non-COVID-19 units both made significant contributions to the care of Chinese people during the COVID-19 crisis. However, only one study compared these two groups in terms of psychological wellbeing (Liao et al., 2021).

Purpose. The purpose of this study was to explore whether the models of relationships among compassion satisfaction, general health, attitude toward life, satisfaction with life, perceived stress, and PTSD symptomatology differ between frontline health care volunteers in Hubei Province (VOL) and health care non-volunteers outside Hubei Province with no COVID-19 patient contact (NV).
Methods. In the cross-sectional study, data were collected through an online survey between October 22 and November 20, 2020 from Chinese nurses and physicians (VOL, n = 259; NV, n = 330). Path analysis was applied to monitor the influence of compassion satisfaction, general health, and attitude toward life on satisfaction with life, perceived stress, and PTSD symptomatology in VOL and NV. To investigate this influence, the hypothesized model was applied to both the VOL group and the NV group. The hypothesized model was used to examine the group differences between VOL and NV by using the total sample. In order to examine the model of VOL being different from the model of NV, unconstrained and constrained model analyses were obtained, and chi-square difference test was computed to examine if the constrained model was statistically different from the unconstrained model.

Manuscript 2: Determination of Key Inflection Points for Maladaptive Responses in US Nurses During the Pandemic: A Network Analysis

Problem. Overcapacity, staff shortages, and infection among healthcare providers challenged hospitals in the US (Centers for Disease Control and Prevention, 2020; Ripp et al., 2020). Because of these major challenges, the nursing workforce had overwhelming workloads that carry a heavy psychological burden. A meta-analysis reported lack of sufficient resources and being a nurse as risk factors for developing mental health problems during the COVID-19 pandemic (Luo et al., 2020). Preventing maladaptive responses to COVID-19 and reducing psychological sequelae in nurses remain a system-level challenge, given the chronic nature of the pandemic.

Problem Statement. Countries are calling for large-scale, intensive, and long-term interventions to mitigate the psychological burden of COVID-19 in health care
providers (National Health Commission of the People’s Republic of China, 2020a; Türközer & Öngür, 2020; Vostanis & Bell, 2020). Before disseminating psychological interventions to the nursing workforce, however, understanding the research base and theoretical underpinnings of psychological factors related to COVID-19 in nurses is essential. A wide variety of psychological responses to the COVID-19 pandemic have been studied in nurses globally, but many are not studied or understudied in US nurses.

**Purpose.** The purpose of this study was to explore the associations of psychological responses (life satisfaction, perceived stress, PTSD symptomatology, attitude toward life, and compassion satisfaction), years of experience, and general health in US nurses during the COVID-19 pandemic using network analysis.

**Methods.** In the cross-sectional study, data were collected through an online survey between October and November 2020 from US nurses (N = 128). A partial correlation network was computed to investigate the structure and magnitude of associations among life satisfaction, perceived stress, PTSD symptomatology, attitude toward life, compassion satisfaction, years of experience, and general health. Additionally, centrality indices (betweenness, closeness, and strength) of the variables were analyzed as well.

**Manuscript 3: Experiences of Chinese Volunteer Health Care Providers Early in the COVID-19 Pandemic**

**Problem.** At the end of December 2019, the first case of COVID-19 was reported in Wuhan, the capital of Hubei Province in Central China (World Health Organization [WHO], 2020a). To suppress the spread of COVID-19, Wuhan and 15 other cities in Hubei Province locked down (Wu & McGoogan, 2020). Due to workers traveling in
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anticipation of the Chinese New Year or due to quarantine, mass production of medical supplies was largely halted across China. As a result, health care providers who worked in Hubei Province faced severe shortages of critical personal protective equipment (Zhang et al., 2020). Confirmed COVID-19 cases in China exceeded 80,000, with Hubei Province reporting 83% of these cases (National Health Commission of the People’s Republic of China, 2020b; WHO, 2020b). Deaths were over 3,000, with Hubei Province reporting 96% of these deaths (National Health Commission of the People’s Republic of China, 2020b; WHO, 2020b). Because health care providers faced overwhelmingly heavy workloads in Hubei Province, nurses and physicians across China rushed to assist them.

Problem Statement. Three studies were found focusing on volunteer health care providers who went to Wuhan to fight COVID-19. One qualitative study examined experiences of 10 nurse volunteers but no physician volunteers (He et al., 2020). Two quantitative studies examined psychosocial responses in 74 (Du et al., 2020) or 180 (Mo et al., 2020) volunteers but included mixed groups of professional and support staff or did not include physician volunteers.

Purpose. The purpose of this study was to examine experiences of Chinese nurse and physician volunteers who rushed to Hubei Province to care for patients with COVID-19.

Methods. A qualitative descriptive approach (Sandelowski, 2000) and content analysis (Creswell, 2013) were used. Twenty health care providers (seventeen nurses and three physicians) participated in the study. In-depth video interviews were conducted by two nurses outside and one volunteer inside Hubei Province. Interviewers used a semi-structured interview guide and collected data between February 20 and March 19, 2020.
Interviews ranged from 20 to 90 minutes. They were deidentified, transcribed verbatim in Chinese (Mandarin), translated into English, and analyzed by two English speaking and one bilingual Chinese qualitative researcher. Analysts read each transcript and wrote independent narratives summarizing findings. After the first four transcripts were summarized and discussed, working themes were identified and a coding dictionary established. Subsequent transcripts were coded by individual analysts, discussed, and categorized by consensus.

The first manuscript was submitted for publication in BMC Nursing, June 2022. The journal required Vancouver formatting for references. The study found that models of relationships among psychological variables were not significantly different between frontline health care volunteers in Hubei Province (VOL) and health care non-volunteers outside Hubei Province with no COVID-19 patient contact (NV). The significance of the study is that it extends previous research that also compared VOL and NV groups by incorporating a wide variety of relevant psychological variables from the literature and by successfully utilizing a high-level statistical modeling technique, multi-sample path analysis. An advantage of the multi-sample path analysis technique used in the current study is that we can use those paths with a significant total effect on PTSD to identify potential key early indicators to prevent PTSD and inflection points for intervention to mitigate PTSD for VOL and NV groups. This approach has implications for psychiatric mental health nurses and psychologists.

A limitation of the study is that all outcomes were self-reported, which could result in overestimation or underestimation of psychological burden. The strengths of the study include: (a) this is the first study to use the Attitude Toward Life Scale during a pandemic and explore the relationship between attitude toward life and other psychological responses; and (b) the design incorporating a multi-sample approach with advanced modeling techniques was more rigorous than that found in related studies in the literature.
Multi-sample Path Analysis of Psychological Well-being of Health Care Providers
After the First Wave of COVID-19 in China: A Cross-sectional Study

Abstract

Background: Frontline health care volunteers travelled to the epicenter to care for patients with coronavirus disease 2019 (COVID-19) during the first wave then returned home. Only one study compared psychological and health factors in volunteer and non-volunteer health care providers in China. More studies are warranted to provide an evidence base for future interventional studies. The purpose is to explore whether the models of relationships among compassion satisfaction, general health, attitude toward life, satisfaction with life, perceived stress, and posttraumatic stress disorder (PTSD) symptomatology differ between frontline health care volunteers in Hubei Province (VOL) and health care non-volunteers outside Hubei Province with no COVID-19 patient contact (NV).

Methods: This cross-sectional study used an online survey of nurses and physicians (VOL, n = 259; NV, n = 330). Constrained versus unconstrained model comparison was applied using chi-square difference.

Results: Multi-sample path analysis showed no significant difference between the structure of the models. In the VOL model, paths significantly related to PTSD symptomatology included compassion satisfaction (total effect, $\beta = -0.12$); general health (total effect, $\beta = -0.09$); attitude toward life (direct effect, $\beta = -0.30$; total effect, $\beta = -0.30$), and perceived stress (direct effect, $\beta = 0.30$; total effect, $\beta = 0.30$), and in the NV model included general health (direct effect, $\beta = -0.11$; total effect, $\beta = -0.11$) and attitude toward life (direct effect, $\beta = -0.47$; total effect, $\beta = -0.47$).
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**Conclusions:** Based on no difference between models, both groups may benefit from psychological intervention. Potential key early indicators to prevent PTSD and inflection points for psychological intervention to mitigate PTSD were identified. For volunteers, counselors might focus on compassion satisfaction and perceived stress, and for both volunteers and non-volunteers on general health and attitude toward life. Delivering counseling based on these key indicators may reduce COVID-19’s aftereffects in health care providers.
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

Introduction

China experienced the first wave of coronavirus disease (COVID-19) between January and March 2020 [1], and 40,000 health care volunteers (70% nurses) [2] traveled across China to the epicenter, Wuhan, to provide direct care to COVID-19 patients [3]. Due to China’s unique volunteerism system, Chinese nurses and physicians responded immediately to a national call to service, even with the uncertainty surrounding COVID-19, due to a sense of duty and patriotism to remedy a major health care deficit, a lack of frontline health care personnel [4].

During this crisis at the epicenter, the National Health Commission of the People’s Republic of China [5] issued principles for emergency psychological intervention to help health care volunteers cope with the crisis and provided brief on-the-spot telephone counseling [6]. Although this intervention may have addressed satisfaction with life and perceived stress in crisis mode, this brief intervention might not have been sufficient to address more pathological sequelae such as posttraumatic stress disorder (PTSD) after they returned to their home hospitals.

Now that two years have passed since the outbreak, countries such as the United States (US) [7], the United Kingdom [8], and China [9] are becoming more aware of the severity of aftereffects and are calling for intensive, large-scale, and longer-term psychological interventions for health care providers internationally to mitigate the COVID-19-related psychological burden and improve psychological well-being. Before interventions can be widely disseminated clinically, further studies that examine psychological relationships in health care providers are warranted. Additionally, to whom these interventions might be directed needs to be clarified.
Two major groups of health care providers are of particular interest and are understudied in China. Frontline health care volunteers in Wuhan and health care providers outside of Wuhan working in non-COVID-19 units both made significant contributions to the care of Chinese people during the COVID-19 crisis. The only study comparing these groups was by Liao et al. who measured psychological variables in China including perceived stress and demonstrated that those working in non-COVID-19 units outside of Wuhan were negatively affected psychologically [10]. Therefore, this larger group working in non-COVID units outside of Wuhan cannot be ignored.

The current study, using the same groups of health care providers, extends the work of Liao et al. [10] to include a wider array of psychological and health variables as well as high-level statistical modeling in an effort to provide findings that are clinically relevant regarding future in-depth counseling for health care providers. The purpose of the current study is to explore whether the models of relationships among compassion satisfaction, general health, attitude toward life, satisfaction with life, perceived stress, and PTSD symptomatology differ between volunteers (VOL) and non-volunteers (NV), using multi-sample path analysis. Hypotheses included:

- **H1**: Higher compassion satisfaction, better general health, and better attitude toward life are associated with greater satisfaction with life.
- **H2**: Better general health and better attitude toward life are associated with less perceived stress.
- **H3**: Higher compassion satisfaction, better general health, better attitude toward life, and less perceived stress are associated with less PTSD symptomatology.
Due to the exploratory nature of the analyses, no priori hypothesis was made regarding whether relationships among psychological and health variables differ between VOL and NV groups. The hypothesized model is presented in Fig. 1.

**Fig. 1** The hypothesized model

Note: PTSD = posttraumatic stress disorder
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The use of the measure, attitude toward life [11], is new in COVID-19 research and is exploratory in the current study; its score reflects the evaluation of ordinary life and connectedness, the evaluation of individual efforts, and the futility of life. Also, a hypothesized model (Fig. 1) was built upon previous psychological research [12-17] and COVID-19-related research [18-22], illustrating a framework that depicts relationships among psychological and health variables. The interdisciplinary approach used in the current study allowed us to target variables that are highly associated with the maladaptive psychological outcome, PTSD symptomatology, in both nurses and physicians.

**Methods**

**Participants**

The current study used a cross-sectional study design. Inclusion criteria for VOL were nurses or physicians ≥18 years of age; signed up as volunteers, traveled, had direct contact with patients with COVID-19 in Hubei Province, and returned to their home hospitals outside of Hubei Province; did not have a second volunteer experience in Hubei Province; and volunteered to participate in the study. Inclusion criteria for NV were nurses or physicians ≥18 years of age; worked at home hospitals outside of Hubei Province during COVID-19; had no contact with COVID-19 patients; and volunteered to participate in the study. An exclusion criterion was lack of internet access. A nurse researcher recruited participants by inviting nurse directors, chief physicians, and team leaders, from eight provinces in Central, Southern, Eastern, and Western China, to send a clickable online survey invitation to eligible health care providers on their lists.
Sample size was determined through a rule of thumb recommending 10 respondents for each item for multivariate analysis (10 x 49 = 490) [23].

**Ethical consideration**

Ethical approvals were obtained from Institutional Review Boards at a US university (approval number: 275305) and a Chinese hospital (approval number: 2020LWKY022). A digital informed consent form provided each participant the purpose of the study, the name of the principal investigator, and length of time for survey completion (20 minutes). Each participant clicked --I am willing to participate in the study and allow researchers to collect my data--at the end of the digital informed consent before joining the study. Permission was obtained for the use of research instruments.

**Instruments**

**Compassion satisfaction**

Compassion satisfaction was measured using a subscale of the Professional Quality of Life Scale Version 5 [24]. This is a 10-item subscale that measures the pleasure derived from being able to do work well. It uses a 5-point Likert-type scale (never to very often). A total score ≤22 indicates low, between 23 and 41 indicates moderate, and ≥42 indicates high compassion satisfaction. Cronbach’s alpha was 0.82 [25]. In the current study, Cronbach’s alpha was 0.94 in VOL and 0.95 in NV.

**General health**

General health was measured using the General Health item from the standard 4-item set of Healthy Days core questions [26]. The answer choices are poor to excellent.
**Attitude toward life**

Attitude toward life was measured using the total score of a Japanese Attitude Toward Life Scale [27]; this 10-item scale assesses how individuals’ attitude toward life is changed after a disaster. One item, conceptually non-translatable to Chinese culture, was eliminated. The first item measured the degree of change in attitude toward life after the experience of COVID-19 using a 5-point Likert-type scale (not changed at all to changed a lot). Only participants who chose changed somewhat or changed a lot were automatically directed to the rest of the scale, which uses a 7-point Likert-type scale (strongly disagree to strongly agree). Cronbach’s alpha ranged from 0.89-0.97 [11]. In the current study, Cronbach’s alpha was 0.66 in VOL and 0.69 in NV.

**Satisfaction with life**

Satisfaction with life was measured using the total score of the Satisfaction with Life Scale, a 5-item scale assessing global cognitive judgements of satisfaction with one’s life [28]. It uses a 7-point Likert-type scale (strongly disagree to strongly agree) [29]. Cronbach’s alpha was 0.88 [30]. In the current study, Cronbach’s alpha was 0.87 in both VOL and NV.

**Perceived stress**

Perceived stress was measured using the total score of the Perceived Stress Scale [31]; this 4-item scale examines experiencing stress in various life situations [31]. It uses a 5-point Likert-type scale (scored 0-4, never to very often). Cronbach’s alpha was 0.67 [32]. In the current study, Cronbach’s alpha was 0.62 in VOL and 0.56 in NV.
Posttraumatic stress disorder symptomatology

PTSD symptomatology was measured using the total score of the PTSD Checklist for Diagnostic and Statistical Manual of Mental Disorders (DSM-5) [33], a 20-item scale designed to assess the severity of 20 DSM-5 symptoms of PTSD. It uses a 5-point Likert-type scale (scored 0-4, not at all to extremely). Consistent with clinical guidance, the current study used a cut-off score ≥31 for probable PTSD [34]. Cronbach’s alpha was 0.95 [35]. In the current study, Cronbach’s alpha was 0.96 in VOL and 0.97 in NV.

Data collection

We administered an invitation only survey using a Chinese online web-based survey platform (www.wjx.cn). The survey included 66 questions about demographic and clinical information and psychological and health outcomes. Questions were distributed on 11 pages with 6 questions per page. Usability and technical functionality of the online survey was thoroughly pilot tested. By clicking on the online survey invitation, participants were granted access to the survey between October 22 and November 20, 2020. No incentive was offered. Data entry was web-based and data were captured automatically. The Chinese WJX platform required participants to fill in all items. The surveys were completed anonymously to reduce response bias and minimize risk. Data were exported from www.wjx.cn and stored in a password-protected computer that was only accessible by researchers.

Statistical analysis

Data were examined to identify duplicate IP addresses and further inspection of demographic data were conducted to determine if these participants were true duplicates. Path analysis was applied to monitor the influence and total effect of compassion
satisfaction, general health, and attitude toward life on satisfaction with life, perceived stress, and PTSD symptomatology in VOL and NV. To investigate this influence, the hypothesized model was applied to both the VOL group and the NV group. The hypothesized model was used to examine the group differences between VOL and NV by using the total sample. In order to examine the model of VOL being different from the model of NV, unconstrained and constrained model analyses were obtained, and chi-square difference test was computed to examine if the constrained model was statistically different from the unconstrained model. The constrained model was the model with all parameters constrained to be equal between VOL and NV. The unconstrained model was the model with all parameters freely estimated.

After checking for VOL and NV model differences, each model’s goodness of fit and modification indices were used to obtain the reported VOL and NV models. To check the model’s goodness of fit for both groups, chi-square and goodness of fit indices, including comparative fit index (CFI) and Root Mean Square Error of Approximation (RMSEA), were used. A CFI value, ranging from 0 to 1 with recommending values >0.90, indicates a good fit. Typically, there is a good fit when RMSEA is <0.05 [36]. All descriptive statistics and analyses were stratified into the VOL group and NV group. Descriptive analyses were conducted using IBM SPSS Statistics 26 and the path analysis was conducted using SPSS AMOS 26. All completed surveys were analyzed.

Results

Characteristics of the participants and psychological and health variables

One duplicate IP address was identified; one person had taken the survey twice. The first completed survey was retained. Data from 589 participants were analyzed,
including 259 participants (229 nurses, 30 physicians; male = 65, female = 194) in VOL and 330 (313 nurses, 17 physicians; male = 18, female = 312) in NV. There were more males (p < 0.001) and more physicians (p = 0.004) in VOL than NV. Age in VOL (33.86±5.52 years, range 23–51) was higher than in NV (30.58±6.67 years, range 20–50; p < 0.001). The duration of work experience was longer in VOL (11.68±5.93 years) than NV (8.88±7.26 years; p < 0.001). In VOL, the duration of caring for COVID-19 patients was 48.70±14.81 days. Additionally, the VOL group had significantly higher compassion satisfaction and satisfaction with life as well as significantly lower perceived stress compared to the NV group (Table 1).
Table 1 Psychological and health variables in volunteers (VOL) and non-volunteers (NV)

<table>
<thead>
<tr>
<th>Variables</th>
<th>VOL (n = 259)</th>
<th>NV (n = 330)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compassion satisfaction (Mean ± SD)</td>
<td>35.78±6.43</td>
<td>32.20±6.92</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Low compassion satisfaction (%)</td>
<td>0.77</td>
<td>6.67</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Moderate compassion satisfaction (%)</td>
<td>85.33</td>
<td>85.76</td>
<td></td>
</tr>
<tr>
<td>High compassion satisfaction (%)</td>
<td>13.90</td>
<td>7.58</td>
<td></td>
</tr>
<tr>
<td>General health</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Poor general health (%)</td>
<td>1.54</td>
<td>1.82</td>
<td>0.925</td>
</tr>
<tr>
<td>Fair general health (%)</td>
<td>39.00</td>
<td>37.58</td>
<td></td>
</tr>
<tr>
<td>Good general health (%)</td>
<td>38.61</td>
<td>41.82</td>
<td></td>
</tr>
<tr>
<td>Very good general health (%)</td>
<td>18.15</td>
<td>16.67</td>
<td></td>
</tr>
<tr>
<td>Excellent general health (%)</td>
<td>2.70</td>
<td>2.12</td>
<td></td>
</tr>
<tr>
<td>Attitude toward life&lt;sup&gt;a&lt;/sup&gt; (Mean ± SD)</td>
<td>10.31±10.26</td>
<td>10.79±11.75</td>
<td>0.656</td>
</tr>
<tr>
<td>Satisfaction with life (Mean ± SD)</td>
<td>20.61±6.06</td>
<td>19.34±5.81</td>
<td>0.010</td>
</tr>
<tr>
<td>Perceived stress (Mean ± SD)</td>
<td>7.27±1.66</td>
<td>7.62±1.53</td>
<td>0.008</td>
</tr>
<tr>
<td>PTSD symptomatology (Mean ± SD)</td>
<td>10.79±11.06</td>
<td>10.69±11.78</td>
<td>0.912</td>
</tr>
<tr>
<td>Have probable PTSD (%)</td>
<td>7.72</td>
<td>10.00</td>
<td>0.338</td>
</tr>
</tbody>
</table>

Note: PTSD = posttraumatic stress disorder. Have probable PTSD = PTSD Checklist for Diagnostic and Statistical Manual of Mental Disorders score ≥31

<sup>a</sup> Because of the scoring requirements of the Attitude Toward Life Scale, for this variable, 209 participants were in the VOL group and 201 participants were in the NV group.
Multi-sample path analysis

The constrained model, with all parameters set to be equal between VOL and NV, had the goodness of fit values of $X^2 (15) = 62.16$, $p < 0.05$, $CFI = 0.94$, $RMSEA = 0.07$. The unconstrained model with all parameters freely estimated had the goodness of fit values of $X^2 (6) = 52.13$, $p < 0.05$, $CFI = 0.95$, $RMSEA = 0.11$. Chi-square difference test indicated that the constrained and the unconstrained models were not significantly different, $X^2_{\text{diff}} = 10.03$, $df = 9$, $p = 0.348$. Therefore, the VOL model was not significantly different from the NV model.

After checking the goodness of fit of the hypothesized model (Fig. 1) for both groups and applying necessary modifications to ensure model fit, the models for VOL and NV groups (Fig. 2a, b) were obtained. VOL data had a $X^2 (5) = 4.84$, $p = 0.44$, $CFI > 0.95$, $RMSEA < 0.05$. NV data had a $X^2 (4) = 6.15$, $p = 0.19$, $CFI > 0.95$, $RMSEA < 0.05$. 
Fig. 2  

a Path analysis model for volunteers.  
b Path analysis model for non-volunteers

Note: PTSD = posttraumatic stress disorder. *$P < 0.05$
In the VOL group (Fig. 2a), compassion satisfaction and general health \((r = 0.29)\), compassion satisfaction and attitude toward life \((r = 0.55)\), and general health and attitude toward life \((r = 0.30)\) were significantly correlated. In the NV group (Fig. 2b), compassion satisfaction and general health \((r = 0.36)\), compassion satisfaction and attitude toward life \((r = 0.53)\), and general health and attitude toward life \((r = 0.22)\) were significantly correlated.

Table 2 shows standardized path coefficients for direct and total effects in the VOL and NV models. In the VOL model, significant paths related to PTSD symptomatology included: (a) compassion satisfaction and PTSD symptomatology (total effect, \(\beta = -0.12\)); (b) general health and PTSD symptomatology (total effect, \(\beta = -0.09\)); (c) attitude toward life and PTSD symptomatology (direct effect, \(\beta = -0.30\); total effect, \(\beta = -0.30\)); and (d) perceived stress and PTSD symptomatology (direct effect, \(\beta = 0.30\); total effect, \(\beta = 0.30\)). In the NV model, significant paths related to PTSD symptomatology included: (a) general health and PTSD symptomatology (direct effect, \(\beta = -0.11\); total effect, \(\beta = -0.11\)) and (b) attitude toward life and PTSD symptomatology (direct effect, \(\beta = -0.47\); total effect, \(\beta = -0.47\)).
### Table 2: Standardized path coefficients in models for volunteers (VOL) and non-volunteers (NV)

<table>
<thead>
<tr>
<th>Paths</th>
<th>VOL (n = 259)</th>
<th>NV (n = 330)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Direct effect</td>
<td>Total effect</td>
</tr>
<tr>
<td>Satisfaction with life</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compassion satisfaction → satisfaction with life</td>
<td>0.28*</td>
<td>0.39</td>
</tr>
<tr>
<td>General health → satisfaction with life</td>
<td>0.32*</td>
<td>0.40</td>
</tr>
<tr>
<td>Attitude toward life → satisfaction with life</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>Perceived stress → satisfaction with life</td>
<td>-0.28*</td>
<td>-0.28</td>
</tr>
<tr>
<td>Perceived stress</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compassion satisfaction → perceived stress</td>
<td>-0.39*</td>
<td>-0.39</td>
</tr>
<tr>
<td>General health → perceived stress</td>
<td>-0.31*</td>
<td>-0.31</td>
</tr>
<tr>
<td>Attitude toward life → perceived stress</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>PTSD symptomatology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Compassion satisfaction → PTSD symptomatology</td>
<td>--</td>
<td>-0.12</td>
</tr>
<tr>
<td>General health → PTSD symptomatology</td>
<td>--</td>
<td>-0.09</td>
</tr>
<tr>
<td>Attitude toward life → PTSD symptomatology</td>
<td>-0.30*</td>
<td>-0.30</td>
</tr>
<tr>
<td>Perceived stress → PTSD symptomatology</td>
<td>0.30*</td>
<td>0.30</td>
</tr>
</tbody>
</table>

Note: PTSD = posttraumatic stress disorder. *P < 0.05.
Discussion

This study extends previous research [10] that also compared VOL and NV groups by incorporating a wide variety of relevant psychological variables from the literature and by successfully utilizing a high-level statistical modeling technique, multi-sample path analysis. No significant difference between VOL and NV models indicates that both groups should be directed to undergo psychological counseling, which is consistent with one other study [10]. Cognitive processing therapy is a specific type of cognitive behavioral therapy developed to reduce symptoms of PTSD occurring after a variety of traumatic events, including natural disasters [37] and it has been recommended by international practice guidelines as a frontline intervention to target PTSD [38]. Future studies are needed, especially large-scale randomized controlled trials with diverse samples, to determine the effectiveness of cognitive processing therapy on PTSD in nurses during the COVID-19 crisis in China.

An advantage of the multi-sample path analysis technique used in the current study is that we can use those paths with a significant total effect on PTSD to identify potential key early indicators to prevent PTSD and inflection points for intervention to mitigate PTSD for VOL and NV groups. This approach has implications for psychiatric mental health nurses and psychologists. Specifically suggesting adding therapies separately tailored to the VOL group and NV group can be accomplished. In the VOL group, potential key early indicators to prevent PTSD and inflection points for intervention to mitigate PTSD are compassion satisfaction, general health, attitude toward life, and perceived stress. Furthermore, improving compassion satisfaction or improving general health would be associated with reducing perceived stress and consequently
associated with reducing the severity of PTSD symptomatology. Improving attitude toward life or reducing perceived stress would be associated with reducing the severity of PTSD symptomatology. In the current study, compassion satisfaction was most frequently at a moderate level, general health only good or fair, and mean attitude toward life low in the VOL group; tailoring counseling to focus on these variables in the VOL group may have beneficial effects.

In the NV group, indicators and inflection points are general health and attitude toward life. Therefore, it follows that enhancing general health or improving attitude toward life would be associated with reducing the severity of PTSD symptomatology. In the current study, general health was only good or fair and mean attitude toward life was low in the NV group; tailoring counseling to emphasize these variables in the NV group may also have beneficial effects. Overall, future studies need to be done to determine (a) if VOL would benefit from cognitive processing therapy with emphasis on compassion satisfaction, general health, attitude toward life, and perceived stress and (b) if NV would benefit from cognitive processing therapy with emphasis on general health and attitude toward life.

The research base underlying the significant paths we discovered through path analysis is minimal. In the current study, in the VOL model, compassion satisfaction was negatively correlated with perceived stress and perceived stress was positively correlated with PTSD symptomatology. These two relationships were consistent with findings in frontline nurses in Spain [39] and frontline nurse volunteers in China [21] during the pandemic.
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There is some evidence base regarding the outcomes used in the current study. Mean compassion satisfaction in the current study for frontline volunteers was slightly lower (35.78) compared with a one group study of frontline nurse volunteers in Hubei Province (39.58) [40]. In contrast to general health item used in the current study, several investigators examined specific disease symptoms and found that headache, fever, and respiratory symptoms were reported in frontline nurse volunteers in Hubei Province during the first wave of COVID-19 [41, 42]. In the current study, perceived stress was significantly lower in the VOL group than the NV group. This result was consistent with the finding of one study [10] where perceived stress was examined in 962 nurses in the same groups as were used in the current study. Research indicates possible reasons for lower stress in volunteers than non-volunteers may be related to enhanced training and social support [10]. Several other studies [21, 43-46] measured perceived stress in frontline volunteers in China, but these studies used only one group and used various stress scales, cut-off scores, and scoring algorithms, making it challenging to compare their results to those of the current study. Main reasons for stress in frontline nurse volunteers were homesickness, uncertainty about how long the current working status will last, concerns about being infected, and skin damage and discomfort caused by prolonged wearing of protective equipment [47]. The percentage of having probable PTSD in the current study in frontline volunteers was slightly higher (7.72%) compared to a one group study of frontline nurse volunteers in Hubei Province (5.6%) [21].

The limitations of the current study are that all outcomes were self-reported, which could result in overestimation or underestimation of psychological burden. In addition, due to the cross-sectional design, causality cannot be inferred from the results;
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the path analytical approach provides probabilistic causality [36]. Furthermore, sex analysis was not conducted due to the difference between male and female sample sizes (male = 83, female = 506). Finally, generalization of these findings outside of China should be done with caution. Despite its limitations, the study has major strengths. This is the first study to use the Attitude Toward Life Scale [11] during a pandemic and explore the relationship between attitude toward life and other psychological responses. Additionally, the design incorporating a multi-sample approach with advanced modeling techniques was more rigorous than that found in related studies in the literature.

Implications for Nursing Practice

Researchers should consider studying indicators that directly impact patient outcomes, as well as procedures that support healthcare providers’ well-being, indirectly improving patient care. The holistic approach of the HOPE model, an international disaster nursing model, takes both aspects into consideration. This model depicts important core elements of disaster nursing: holistic health assessment and promotion, organization and management of immediate response, professional adaptation, and endurance and recovery [48]. Although the HOPE model was developed before the COVID-19 crisis, its core elements are highly applicable today. According to the HOPE model, disaster nurses go through a phase of recovery to move beyond the disaster mode or scene after leaving the professional disaster nurse context. However, a difference now is, due to the long-term nature and uncertainties of the pandemic, the recovery process and emphasizing concern and support must continue to be extended in the future because nurses remain in the disaster mode. Nurse managers should support disaster nurses by
developing initiatives to mitigate stress in working environments to facilitate recovery and prevent triggering negative psychological issues, such as PTSD.

According to the pandemic disaster nursing guideline developed by the Tri-Council for Nursing in 2021, mental health and wellbeing of nurses during the pandemic is an important area that provides critical lessons and future opportunities for transforming nursing and health care [49]. The Tri-Council guideline recommends providing free and easy access to mental health resources. Additionally, similar to physical well-being, nurses’ psychological well-being should be regarded as an outcome measure of success [49].

Another major concern of the Tri-Council of Nursing is nursing students and facilitating their educational process in uncertain times. Nursing students tend not to recognize or prioritize mental health. Furthermore, nursing textbooks and curricula are deficient related to nursing students’ resilience and wellbeing particularly during crisis situations [49]. The guideline recommends redesigning nursing curricula to better incorporate mental health content and skills about stress self-assessment and coping strategies during disasters to improve nursing practice and enhance students’ ability to promote mental health in the workplace [49].

According to Sustain and Retain in 2022 and Beyond the Global Nursing Workforce and the COVID-19 Pandemic, a document issued by the International Council of Nurses [50], the pandemic has greatly disrupted nurse retention and staffing and consequently has reduced patient care quality and increased hospital costs. Our finding about the associations between general health and PTSD in health care providers regardless of degree of COVID-19 patient contact confirmed the vital role of ensuring

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physical health in the nursing workforce. Ensuring that nurses globally have priority access to full vaccinations is an essential and universal approach to improve general health and nurse retention [50].

The current findings support the importance of measuring attitude toward life. Can nurses in practice and nurse managers be taught to identify early signs of a coworker’s attitude toward life deteriorating? In this way, could awareness of a coworker’s evaluation of ordinary life and connectedness, the evaluation of individual efforts, and the futility of life during the pandemic help avert psychological sequelae? Future research on the relationship between attitude toward life and PTSD symptomatology is warranted.

Globally, countries are recognizing that they need to prepare to administer long-term psychological interventions for health care providers [7-9]. Findings of the current study have national applications in China, specifically pointing out groups to target for therapy and factors to tailor during psychological therapy. Future studies are required to determine whether the findings of the current study are applicable outside of China.

Conclusions

Our pioneering work using advanced modeling techniques identified specific groups in China to be targeted for longer-term counseling and specified potential key indicators to be tailored for each group. Psychological therapy to prevent or mitigate PTSD symptomatology should be delivered to both volunteer and non-volunteer health care providers with no COVID-19 patient contact. Delivering counseling in the form of PTSD prevention and education strategies may reduce COVID-19 psychological aftereffects, prevent dysfunctional thinking, and ultimately improve the psychological
wellbeing of health care providers. Findings point to the need for future research, more generally, on implementing prevention efforts, educating about psychological and physical well-being, and providing access to treatment for all healthcare providers to mitigate the development of PTSD symptomatology in the wake of a pandemic, regardless of degree of contact with patients. Attention to international practice and nursing education guidelines, encouraging health care providers to work toward sustainability and resilience during continued uncertainty in the pandemic, is critical.

**Abbreviations**


**Declarations**

**Ethics approval and consent to participate**

This study was approved by Institutional Review Boards at University of Missouri-St. Louis (approval number: 275305) and Affiliated Hospital of Integrated Traditional Chinese and Western Medicine (approval number: 2020LWKY022). We conducted the study in compliance with the principles of the Declaration of Helsinki. A digital informed consent was obtained from each participant before joining the study. Participants completed surveys anonymously and data were stored in a password-protected computer that was only accessible by researchers. A statement of ethical consideration is in the manuscript.
Consen for publication

Not applicable.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

Funding

Not applicable.

Authors’ contributions

FL, AFF, and QL designed the study. HG and QL collected data. FL, UT, and KW analyzed and interpreted data. FL, UT, KW, and AFF drafted the manuscript. All authors revised the manuscript and read and approved the final manuscript.
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50. Buchan J, Catton H, Shaffer FA. Sustain and retain in 2022 and beyond: The
global nursing workforce and the COVID-19 pandemic. International Council of
Chapter 3: Determination of Key Inflection Points for Maladaptive Responses in US Nurses During the Pandemic: A Network Analysis

The second manuscript was submitted for publication in Sage Open Nursing, May 2022. The journal required American Psychological Association (7th edition) formatting for references. The study found strong correlations between (a) life satisfaction and perceived stress, (b) perceived stress and PTSD symptomatology, and (c) attitude toward life and compassion satisfaction through network analysis. The significance of the study is that it identified that life satisfaction, perceived stress, and attitude toward life were key inflection points for maladaptive responses in US nurses during the pandemic.

A limitation of the study is that it utilized a relatively small sample of nurses; larger, more diverse studies are warranted. The major strength of this study is the use of network analysis, which has the advantage of providing a model of the data as well as centrality indices, illustrating the structure and magnitude of associations.
Determination of Key Inflection Points for Maladaptive Responses in US Nurses During the Pandemic: A Network Analysis

Abstract

Introduction: During the pandemic, the nursing workforce is experiencing overwhelming workloads that carry a heavy psychological burden. A wide variety of psychological responses to the COVID-19 pandemic have been studied in nurses globally, but many are not studied or understudied in US nurses. Theoretical underpinnings of the current study are based on the disaster component of the Middle-Range Theory of Nurses’ Psychological Trauma.

Objective: To explore the associations of psychological responses (life satisfaction, perceived stress, PTSD symptomatology, attitude toward life, and compassion satisfaction), years of experience, and general health in US nurses during the COVID-19 pandemic using network analysis.

Methods: A cross-sectional study was conducted using an online survey from October to November 2020 in US nurses. Network analysis was used to model the data and analyze the centrality indices of betweenness, closeness, and strength. Data were reported according to the Strengthening the Reporting of Observational studies in Epidemiology (STROBE) checklist.

Results: Data from 128 nurses were analyzed. About one in five nurses had probable PTSD. Network analysis showed a strong negative correlation between life satisfaction and perceived stress, and a strong positive correlation between perceived stress and PTSD symptomatology. Also, a strong positive correlation was found between attitude toward life and compassion satisfaction.
Conclusion: Low life satisfaction, high perceived stress, and low attitude toward life are key inflection points that signal the need for psychological intervention in the US nursing workforce during the continued pandemic. Based on 2021 Tri-Council of Nursing COVID-19 Report and the 2022 International Council of Nurses guideline, healthcare should implement scalable, system-level interventions to reduce psychological burden during the pandemic. The current study suggests targets for such intervention, which may promote a healthier, more effective US nursing workforce.
More than 79 million cases of COVID-19 have been detected and over 970,000 deaths have occurred in the US alone (Centers for Diseases Control and Prevention [CDC], 2022). Hospitals face unprecedented challenges including overcapacity, staff shortages, and infection among healthcare providers (CDC, 2020; Ripp et al., 2020). Because of these major challenges, the nursing workforce is experiencing overwhelming workloads that carry a heavy psychological burden. A meta-analysis reported lack of sufficient resources and being a nurse as risk factors for developing mental health problems during the COVID-19 pandemic (Luo et al., 2020). Preventing maladaptive responses to COVID-19 and reducing psychological sequelae in nurses remain a system-level challenge, given the chronic nature of the pandemic.

The US, the United Kingdom, and China are calling for large-scale, intensive, and long-term interventions to mitigate the psychological burden of COVID-19 in health care providers (National Health Commission of the People’s Republic of China, 2020; Türközer & Öngür, 2020; Vostanis & Bell, 2020). Before disseminating psychological interventions to the nursing workforce, however, understanding the research base and theoretical underpinnings of psychological factors related to COVID-19 in nurses is essential. A wide variety of psychological responses to the COVID-19 pandemic have been studied in nurses globally, but many are not studied or understudied in US nurses.

The purpose of this study was to explore the associations of psychological responses (life satisfaction, perceived stress, PTSD symptomatology, attitude toward life, and compassion satisfaction), years of experience, and general health in US nurses during the COVID-19 pandemic using network analysis. In the current study, attitude toward life is examined for the first time in COVID-19 research. Attitude toward life, encompassing
the elements of ordinary life and connectedness, individual efforts, and the futility of life, already has established importance in a previous disaster situation (Uchida et al., 2014).

Compared to correlation and regression analysis, network analysis shows interactions among variables through a network and centrality indices (Epskamp et al., 2018). Network analysis is used in the current study to facilitate the identification of potential psychological inflection points through which to target interventions, which in the future with further study, ultimately, may help to reduce COVID-19-related psychological sequelae in the nursing workforce.

**Background**

In the US, no previous research examined life satisfaction of nurses during the pandemic, but studies found inconsistent levels of life satisfaction (moderate or low) in Turkish nurses (Karabağ Aydın & Fidan, 2022; Teke et al., 2021). In the US, both a national survey and a survey across 30 states showed that one third of nurses had high perceived stress during the pandemic (Prasad et al., 2021; Sinsky et al., 2021). According to the Middle-Range Theory of Nurses’ Psychological Trauma, perceptions of stressful experiences are unique to each individual, and nurses cannot avoid such experiences given the nature of their work (Foli, 2021). COVID-19-related experiences of nurses are traumatic, including overwhelming grief and loss when facing patients’ deaths, being torn between personal and family safety and professional duties, and job dissatisfaction and intention to leave the profession (Foli et al., 2021). With these traumatic COVID-19 experiences persisting, allostatic overload can occur leading to increased risk for mental and physical health issues, poor patient care, and burnout (Foli, 2021).
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In the US, the severity of PTSD symptomatology varies widely in health care providers including nurses during COVID-19. A study found high severity of PTSD symptomatology in nurses and nursing assistants (Sagherian et al., 2020). However, a national survey reported low severity of PTSD symptomatology in health care providers including nurses (Warren et al., 2021).

Compassion satisfaction of nurses during the pandemic was not studied in the US. In Spain and Portugal, the majority of nurses had moderate compassion satisfaction (Ruiz-Fernández et al., 2020; Serrão et al., 2022). Finally in US nurses during COVID-19, no studies about general health were found.

Methods

Research Design and Research Question

This study used a cross-sectional survey design following the STROBE checklist (Equator Network, 2021). A Middle-Range Theory of Psychological Trauma (Foli, 2021), the Tri-Council of Nursing COVID-19 Report (2021), and the International Council of Nurses guideline (2022) were used to interpret the findings. The research question is: Using network analysis, what are associations of psychological responses (life satisfaction, perceived stress, PTSD symptomatology, attitude toward life, and compassion satisfaction), years of experience, and general health in US nurses during the pandemic?

Sample and Setting

Participants were recruited from an alumni database of a large midwestern university. Inclusion criteria were nurses at least 18 years old. An exclusion criterion was lack of Internet access.
Data Collection

Pilot testing was conducted to ensure the usability and technical functionality of the online survey before the start of the study. The survey was conducted from October to November, 2020 using Qualtrics. In a recruitment email, the researchers invited participation through a phone or a computer survey link. The survey included 63 questions: 13 about demographic and clinical information and 50 about psychological responses, years of experience and general health. Volunteers were asked to provide digital informed consent. Participants completed the survey anonymously to reduce response bias. To increase response rate, researchers sent four email reminders.

Life satisfaction was measured using the Satisfaction with Life Scale, a 5-item scale designed to assess global cognitive judgments of satisfaction with one’s life (Diener et al., 1985). It uses a 7-point Likert-type scale (strongly disagree to strongly agree). Higher total scores indicate greater life satisfaction (Measurement Instrument Database for Social Sciences, 2021). Reliability was previously established (Cronbach’s α = 0.87; Diener et al., 1985). In the current study, Cronbach’s α was 0.79.

Perceived stress was measured using the Perceived Stress Scale, a 4-item scale designed to examine the degree to which individuals experience stress in their various life situations (Carnegie Mellon University, 2015). It uses a 5-point Likert-type scale (never to very often). Higher total scores indicate greater perceived stress. Reliability was previously established (Cronbach’s α = 0.60; Cohen & Williamson, 1988). In the current study, Cronbach’s α was 0.84.

PTSD symptomatology was measured using the PTSD Checklist for Diagnostic and Statistical Manual of Mental Disorders (DSM-5; PCL-5), a 20-item scale designed to
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

assess symptomatology of PTSD (US Department of Veterans Affairs, 2021). It uses a 5-point Likert-type scale (not at all to extremely). Higher total scores indicate more severe PTSD symptomatology. The cutoff score for probable PTSD is between 31 and 33 (National Center for PTSD, 2021). In the current study, a cutoff score ≥31 was used. Reliability was previously established (Blevins et al., 2015). In the current study, Cronbach’s α was 0.94.

Attitude toward life was measured using the Attitude Toward Life Scale, a 10-item scale designed to assess how individuals’ attitudes toward life are changed after a disaster (Uchida et al., 2011). Attitude toward life encompasses ordinary life and connectedness, individual efforts, and the futility of life. Nine items of the original scale were used; one item was conceptually non-translatable to US culture. The first item measures the degree of change in attitude toward life after the experience of COVID-19 using a 5-point Likert-type scale (not changed at all to changed a lot). Only in the case where the response is changed somewhat or changed a lot, is the second part of the instrument completed. It uses a 7-point Likert-type scale (strongly disagree to strongly agree). Higher total scores indicate better attitude toward life. Cronbach’s α was previously established and ranged from 0.89 - 0.98 (Uchida et al., 2014). In the current study, Cronbach’s α was 0.60.

Compassion satisfaction was measured using the compassion satisfaction subscale of the Professional Quality of Life Scale Version 5. This is a 10-item subscale designed to measure the pleasure individuals derive from being able to do their work well (Professional Quality of Life [ProQOL], 2021a). It uses a 5-point Likert-type scale (never to very often). Higher total scores indicate greater compassion satisfaction. Reliability
was previously established (Cronbach’s $\alpha = 0.88$; ProQOL, 2021b). In the current study, Cronbach’s $\alpha$ was 0.95.

Years of experience was measured by a single question: How long have you been a nurse? General health was measured using the General Health Item from the standard 4-item set of Healthy Days core questions (CDC, 2018). A single item used to measure individuals’ general health condition is: Would you say that in general your health is poor, fair, good, very good, or excellent? A higher score indicates better general health (CDC, 2018).

**Statistical Analysis**

A partial correlation network was computed using graphical LASSO to investigate the structure and magnitude of associations among life satisfaction, perceived stress, PTSD symptomatology, attitude toward life, compassion satisfaction, years of experience, and general health. Networks are typically displayed (a) using gradations of color and thickness of lines in a graphic and (b) a plot of z-scored centrality indices. In the network graphic, darker and thicker lines show stronger correlations. Additionally, z-scores >0 show a higher centrality in the network.

The graphical LASSO technique is an extension of regression analysis and has the advantage of handling study data with relatively small samples (Finch & Finch, 2016). To run the graphical LASSO algorithm, R packages glasso (Friedman et al., 2008) and qgraph (Epskamp et al., 2012) were used. Undirected edges represent the relationships among the variables in the network, not cause and effect.

To evaluate the centrality indices (betweenness, closeness, strength) of the variables (Epskamp et al., 2018), a bootnet R package was used. The index of
betweenness shows the “importance” of each variable in the network (the number of connections each variable has). The index of closeness shows each variable’s location in the network. A variable with a higher betweenness and closeness is considered to possess a higher connection in the network. Finally, strength in a network of variables represents the magnitude of the connections between the variables (McNally et al., 2017).

**Results**

*Sample Characteristics*

A total of 212 surveys were received. After eliminating participants who answered <90% of the questions, 128 participants were included in data analysis. Participants were predominantly female (90.55%) and White (83.33%), and had a Bachelor’s degree (46.03%). Some nurses had contracted COVID-19 themselves (17.32%). Seventy nurses (55.12%) had direct contract, caring for COVID-19 patients. For these nurses, the average days of care was 53.44 with a range of 1 to 245 days. Overall, about 1 in 5 nurses had probable PTSD (Table 1).
### Table 1. Demographic and Clinical Variables.*

<table>
<thead>
<tr>
<th>Variables</th>
<th>M (SD)</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (n = 127)</td>
<td>43.13 (13.57)</td>
<td></td>
</tr>
<tr>
<td>Sex (n = 127)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percent female</td>
<td>115</td>
<td>(90.55%)</td>
</tr>
<tr>
<td>Race (n = 126)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>105</td>
<td>(83.33%)</td>
</tr>
<tr>
<td>Black or African-American</td>
<td>12 (9.52%)</td>
<td></td>
</tr>
<tr>
<td>All other races</td>
<td>6 (4.76%)</td>
<td></td>
</tr>
<tr>
<td>Prefer not to answer</td>
<td>3 (2.38%)</td>
<td></td>
</tr>
<tr>
<td>Educational level (n = 126)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associate’s degree</td>
<td>2 (1.59%)</td>
<td></td>
</tr>
<tr>
<td>Bachelor’s degree</td>
<td>58 (46.03%)</td>
<td></td>
</tr>
<tr>
<td>Master’s degree</td>
<td>49 (38.89%)</td>
<td></td>
</tr>
<tr>
<td>Advanced practice degree or PhD</td>
<td>17 (13.49%)</td>
<td></td>
</tr>
<tr>
<td>Contracted COVID-19 (n = 127)</td>
<td>22 (17.32%)</td>
<td></td>
</tr>
<tr>
<td>COVID-19 patient contact (n = 127)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct contact</td>
<td>70 (55.12%)</td>
<td></td>
</tr>
<tr>
<td>Indirect contact</td>
<td>33 (25.98%)</td>
<td></td>
</tr>
<tr>
<td>No contact</td>
<td>24 (18.90%)</td>
<td></td>
</tr>
<tr>
<td><strong>PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Days caring for COVID-19 patients (n = 70)</td>
<td>53.44 (58.12)</td>
<td></td>
</tr>
<tr>
<td>Life satisfaction (n = 127)</td>
<td>22.64 (6.41)</td>
<td></td>
</tr>
<tr>
<td>Perceived stress (n = 128)</td>
<td>6.32 (3.31)</td>
<td></td>
</tr>
<tr>
<td>PTSD symptomatology (n = 124)</td>
<td>16.27 (15.31)</td>
<td></td>
</tr>
<tr>
<td>Probable PTSD (≥31)</td>
<td>24 (19.35%)</td>
<td></td>
</tr>
<tr>
<td>Attitude toward life (n = 128)</td>
<td>38.95 (6.07)</td>
<td></td>
</tr>
<tr>
<td>Not at all changed</td>
<td>13 (10.16%)</td>
<td></td>
</tr>
<tr>
<td>Changed very little</td>
<td>36 (28.13%)</td>
<td></td>
</tr>
<tr>
<td>Do not know</td>
<td>6 (4.69%)</td>
<td></td>
</tr>
<tr>
<td>Changed somewhat</td>
<td>47 (36.72%)</td>
<td></td>
</tr>
<tr>
<td>Changed a lot</td>
<td>26 (20.31%)</td>
<td></td>
</tr>
<tr>
<td>Compassion satisfaction (n = 126)</td>
<td>36.81 (8.81)</td>
<td></td>
</tr>
<tr>
<td>Years of experience (n = 127)</td>
<td>16.78 (13.33)</td>
<td></td>
</tr>
<tr>
<td>General health (n = 127)</td>
<td>3.72 (0.97)</td>
<td></td>
</tr>
</tbody>
</table>

*Note: Some values may not total 100% due to rounding. PhD, Doctor of Philosophy; COVID-19, coronavirus disease 2019; PTSD, posttraumatic stress disorder.*
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Partial Correlation Network

A LASSO graphic illustrates the significant partial correlations among variables [insert Figure 1.]. Analyses indicate strong correlations between life satisfaction and perceived stress (negative), between perceived stress and PTSD symptomatology (positive), and between attitude toward life and compassion satisfaction (positive). In addition, moderate correlations were identified between attitude toward life and life satisfaction (positive) as well as between compassion satisfaction and perceived stress (negative). Other moderate correlations were between general health and life satisfaction (positive) and between general health and perceived stress (negative). Smaller correlations were found between years of experience and perceived stress (negative), between years of experience and PTSD symptomatology (negative), between years of experience and compassion satisfaction (positive), and between general health and PTSD symptomatology (negative). Overall, findings with strong correlations stood out as clinically relevant.

Z-scored centrality indices (betweenness, closeness, strength) are presented in Figure 2 [insert Figure 2.]. Life satisfaction, perceived stress, and PTSD symptomatology had a z-score >0 for each index, demonstrating higher centrality than other variables. Specifically, life satisfaction had the highest betweenness connection with other variables; perceived stress had the closest and strongest connection with other variables in the network. PTSD symptomatology had considerable betweenness (importance; z-score = 0.4) and closeness (z-score = 0.3), and a strength >0 (z-score = 0.2). In contrast, years of experience and general health, with a z-score <0, showed the lowest centrality. Overall, based on betweenness, life satisfaction, perceived stress, and PTSD symptomatology
stood out as “important” variables. The betweenness of attitude toward life was only slightly below the zero.

**Discussion**

In the current study, 19.35% nurses had probable PTSD. Whether this percentage is consistent with previous research in the US is difficult to tell. In one study across 15 states, 23% of nurses showed a high risk for developing PTSD (Rodriguez et al., 2021). In another study, 55.38% of nurses and nursing assistants had probable PTSD (Sagherian et al., 2020). Furthermore, in a national survey, 4.6% of health care providers including nurses showed probable PTSD (Warren et al., 2021). The difference in percentages might be explained by the use of various PTSD scales, cut-off scores, and scoring algorithms as well as combined groups of health care workers.

Under the influence of COVID-19, more than half of US nurses studied experienced somewhat or a lot of change in attitude toward life, signaling a major life shift. Given this is the first time that attitude toward life has been examined in COVID-19 research, the degree of attitude toward life change needs to be confirmed in future studies. Since part of attitude toward life is the futility of life, which means that nurses feel that their efforts are useless and they are ineffective, it seems therefore that nursing managers and counselors would want to be aware of and interested in monitoring increasing feelings of futility of life related to giving patient care.

Three key inflection points for maladaptive responses in US nurses during the pandemic were identified primarily based on the presence of strong relationships and also on the indices of centrality using network analysis. Regarding the first inflection point, a strong negative relationship between life satisfaction and perceived stress in nurses
during COVID-19 was found in the current study. This relationship was not directly examined in previous research. However, a study reported strong family functioning and high resilience (indicators of life satisfaction) as protective factors for perceived stress in US nurses during COVID-19 (Kim et al., 2021). Furthermore in the current study, life satisfaction also served as an “important” variable based on z-scored centrality indices. Therefore, life satisfaction is a potential inflection point for intervention to reduce perceived stress in nurses during the pandemic.

Regarding the second inflection point, the strongest positive association was found between perceived stress and PTSD symptomatology. The relationship was also found in frontline ICU nurses in China during the pandemic (Leng et al., 2021), a meta-analysis, and a literature review before the pandemic (Ozer et al., 2003; Rajkumar, 2020). Additionally, according to z-scored centrality indices, perceived stress was an “important” variable in the network. Therefore, perceived stress is a potential inflection point for intervention to mitigate PTSD symptomatology in nurses during the pandemic. Furthermore, in the network analysis, three psychological responses predominated. Strong correlations between life satisfaction and perceived stress, and between perceived stress and PTSD symptomatology highlighted that life satisfaction also serves as a potential inflection point for intervention to mitigate PTSD symptomatology in nurses during COVID-19.

Regarding the third inflection point, a strong positive relationship was found between attitude toward life and compassion satisfaction. Because of the strong relationship, attitude toward life is a potential inflection point for intervention to improve compassion satisfaction.
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Few studies in US nurses were found in the literature on the significant low and moderate relationships reported in the current study. Findings from Kim et al. (2021) were in agreement with the finding in the current study that years of experience was negatively related to perceived stress. In contrast to the finding of a negative relationship between years of experience and PTSD symptomatology in the current study, Schierberl Scherr et al. (2021) found no significant relationship. This might be due to the use of different PTSD instruments (Schierberl Scherr et al., 2021).

Limitations and Strengths

The current study has some limitations. First, the study utilized a relatively small sample of nurses; larger, more diverse studies are warranted. Second, this cross-sectional design could not capture changes in psychological responses over time. Future research, using a multi-wave or longitudinal approach would allow for the examination of how COVID-19 chronicity influences these relationships. Third, because health care systems vary widely across countries, generalizing findings to countries outside of the US should be done with caution. Finally, all psychological outcomes were self-reported, which could result in overestimation or underestimation of psychological burden. The major strength of this study was the use of network analysis, which has the advantage of providing a model of the data as well as centrality indices, illustrating the structure and magnitude of associations.

Implications for Practice

The latest national and international nursing guidelines suggest nurses’ transition to recovering from COVID-19 and are focused on sustaining the psychological well-being of nurses and retaining them in practice (International Council of Nurses, 2022; Tri-
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Council for Nursing, 2021). Given that the pandemic has persisted for over two years, countries have released their own policy guidelines, emphasizing the need to move to system-level, long-term COVID-19-related counseling interventions (National Health Commission of the People’s Republic of China, 2020; Tri-Council for Nursing, 2021). Although the type, cost, and feasibility of these future therapies have not been determined, the findings of the current study support a move to long-term therapy. We found that the majority of participants had experienced a major shift in their lives, a profound change in attitude toward life, and over 19% had probable PTSD. Long-term therapies must focus beyond coping with COVID-19-related events in the work setting and include, more generally, COVID-19-related challenges in life and struggles with everyday living as well.

We found that life satisfaction was prominent in our network analysis and was strongly related to perceived stress, suggesting that low life satisfaction should be targeted in counseling interventions. Our network model supports that if long-term counseling could break the chain between low life satisfaction and high perceived stress and then high PTSD symptomatology, then it would mitigate maladaptive responses in practicing nurses.

The Tri-Council of Nursing COVID-19 Report (2021) stresses the need to monitor psychological outcomes and determine benchmarks to show when psychological interventions are successful in the nursing workforce. This report emphasizes that, from a policy perspective, psychological health should be taken more seriously; it should be taken at least as seriously as physical health during the pandemic. In our network model, psychological variables were more important than general health.
In the qualitative study, nurses reported the intention to leave their job or profession due to the psychological trauma related to COVID-19 (Foli et al., 2021). The key goal of the International Council of Nurses guideline (2022) is to sustain and retain nursing workforce during the prolonged pandemic. To achieve this goal, nursing leadership should provide intervention programs that improve psychological well-being of nurses, such as those enhancing compassion satisfaction through improving nurses’ attitude toward life.

Conclusions

We successfully used network analysis to identify psychological variables that nurse administrators and nurse practitioners might target for long-term therapy, given that COVID-19 is persisting in the US. In other words, awareness of low life satisfaction, high perceived stress, and low attitude toward life may serve as primary prevention targets to reduce the mental health burden of nurses. Specifically, improving life satisfaction through therapy might reduce perceived stress and in turn reduce PTSD symptomatology. In addition, enhancing attitude toward life is associated with augmenting compassion satisfaction, an significant factor in quality patient care.

According to the recommendations from recent guidelines about recovering from COVID-19 (International Council of Nurses, 2022; Tri-Council for Nursing, 2021), implementing interventions for psychological health must be a high priority. Psychological well-being must be enhanced to the extent necessary to sustain and retain nurses during the pandemic.
References


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**Figure 1.** The LASSO Graphic for Regularized Partial Correlations Among Life Satisfaction, Perceived Stress, PTSD Symptomatology, Attitude Toward Life, Compassion Satisfaction, Years of Experience, and General Health.

Figure 2. The Z-Scored Centrality Indices in the Network. The Centrality Indices are Betweenness, Closeness, and Strength.

*Note.* The Variables of Interest are Listed on the Left. Z-Scores >0 Show a Higher Centrality in the Network.
Chapter 4: Experiences of Chinese Volunteer Health Care Providers Early in the COVID-19 Pandemic

The third manuscript was submitted for publication in Western Journal of Nursing Research, April 2021. The journal required American Psychological Association (7th edition) formatting for references. The study found seven themes from the experiences of Chinese health care volunteers who rushed to Hubei Province, the epicenter, to care for patients with coronavirus disease. The study has historical importance and reveals insights about disease impact, hospital infection control strategies, and the Chinese response during the early outbreak of the COVID-19 crisis. A major strength of the study is that it explored the experiences of both nurse and physician volunteers during the crisis.
Experiences of Chinese Volunteer Health Care Providers Early in the COVID-19 Pandemic

Abstract

Experiences of Chinese nurse and physician volunteers who rushed to Hubei Province to care for patients with coronavirus disease were examined in this study. Twenty nurse and physician volunteers were interviewed early in the outbreak. Resulting themes were: (a) the manifestation of a strong sense of national need and a call to serve, (b) family support in a national crisis, (c) an understanding that collaboration was needed, (d) a commitment to protect oneself properly to avoid infection, (e) a necessary and varying degree of self-dependency, (f) the importance of coping strategies amidst the tension of the pandemic, and (g) a recognition that challenges and opportunities were present side-by-side. Health care providers showed great resilience and created systems and strategies to manage contagion and accelerating morbidity and mortality in a changing environment. Findings may help hospitals and nurse leaders develop effective processes and create support and coping interventions for disaster management.

Keywords: qualitative research, COVID-19, China, workforce
At the end of December 2019, the first case of COVID-19 was reported in Wuhan, the capital of Hubei Province in Central China (World Health Organization [WHO], 2020a). To suppress the spread of COVID-19, Wuhan and 15 other cities in Hubei Province locked down (Wu & McGoogan, 2020). Due to workers traveling in anticipation of the Chinese New Year or due to quarantine, mass production of medical supplies was largely halted across China. As a result, health care providers who worked in Hubei Province faced severe shortages of critical personal protective equipment (PPE; Zhang et al., 2020). Confirmed COVID-19 cases in China exceeded 80,000, with Hubei Province reporting 83% of these cases (National Health Commission of the People’s Republic of China, 2020; WHO, 2020b). Deaths were over 3,000, with Hubei Province reporting 96% of these deaths (National Health Commission of the People’s Republic of China, 2020; WHO, 2020b). As of February 2020, 2,055 health care providers in China already were documented as infected with COVID-19, with Hubei Province reporting 88% of these cases (WHO, 2020c). Because health care providers faced overwhelmingly heavy workloads in Hubei Province, nurses and physicians across China rushed to assist them.

**Volunteer Health Care Providers**

Three studies were found focusing on volunteer health care providers who went to Wuhan to fight COVID-19. One qualitative study examined experiences of 10 nurse volunteers but no physician volunteers (He et al., 2020). Two quantitative studies examined psychosocial responses in 74 (Du et al., 2020) or 180 (Mo et al., 2020) volunteers but included mixed groups of professional and support staff or did not include physician volunteers.
Purpose

Our study, using a qualitative descriptive approach, relates the unique circumstances and experiences of Chinese nurse and physician volunteers travelling from outside Hubei Province to the epicenter to care for patients, and health care providers already hospitalized for COVID-19. The interviews took place between February 20 and March 19, 2020. The research question was: What are the experiences of nurse and physician volunteers fighting against COVID-19 in Hubei Province early in the outbreak?

Methods

A qualitative descriptive approach (Sandelowski, 2000) and content analysis (Creswell, 2013) were used. The study was approved by the Institutional Review Board of University of Missouri (1593757-1) and of Affiliated Hospital of Integrated Traditional Chinese and Western Medicine, Nanjing University of Chinese Medicine (2020LWKYZ025). Twenty health care providers responded to an invitation and gave verbal informed consent. Participants were given pseudonyms to maintain confidentiality. The sequence of the interviews is captured in Table 1.

In-depth video interviews were conducted by two nurses outside and one volunteer inside Hubei Province. Interviewers used a semi-structured interview guide and collected data over a one-month period. Interviews ranged from 20 to 90 minutes. They were deidentified, transcribed verbatim in Chinese (Mandarin), translated into English, and analyzed by two English speaking and one bilingual Chinese qualitative researcher. Analysts read each transcript and wrote independent narratives summarizing findings. After the first four transcripts were summarized and discussed, working themes were
identified and a coding dictionary established. Subsequent transcripts were coded by individual analysts, discussed, and categorized by consensus.

**Results**

Seventeen nurses and three physicians participated in the study. Most were female (70%). Participants ranged in age from 20 to 40 years, with 50% of participants under age 30. Volunteers worked in Hubei Province in intensive care units (25%), on floors for the seriously ill (25%), or on medical floors (50%). The participants’ accounts provided a clear description of experiences of volunteers in Hubei Province in the months after the onset of the pandemic. Following is a summary of the situation in Hubei Province, hospital processes, and a rendering of emergent themes. Participant quotations are identified using pseudonyms.

**The Situation in Hubei Province**

The economy of Hubei Province was hit hard by the lock down. A volunteer recalled: “When I came here … lots of areas, not to mention small businesses, are suffering. … residents’ lives must be impacted. This shocked me. Just like what was reported on TV, there was no one on the street, only some stray dogs were running.” (Shin)

**Hospital Processes**

Hospitals responded in the way of process/procedure and equipment as best they could, given the immediacy of the need and as required by the incoming health care volunteers, who were newly trained or already highly trained in infection prevention and control. It should be noted that, early in the pandemic, there was little information about the characteristics and management of COVID-19 and, as this information became
available, hospitals adjusted procedures. Cooperation between volunteers and local health care providers was “a little bit unorganized.” (Ban) The communication was not sufficient, volunteers were not familiar with Hubei Province hospital practices, and the environment of the hospitals was changing. Although a volunteer commented: “… we did not ask the real situation …” (Pong), volunteer health care providers knew from the media that local health care providers had already gotten infected and were being cared for as patients because of lack of personal protective equipment (PPE), infection control procedures, or knowledge about the characteristics and treatment of the virus. Lenn reflected: “Because at the beginning, probably the protective measures were not very sufficient; some health care providers were infected. I felt so sorry. They were young.” Volunteers evaluated the reality of the situation with their own eyes: “… went into the intensive care unit to take a look.” (Pan) “… They have very few intensive care unit nurses.” (Yuan)

Pan reported that on one unit, 14 out of 14 patients died over several days. Nan described a threat of contagion close to home at her living quarters. She said: “Their health care providers were infected. You see, those who might be infected live with us [at the hotel].” Given the reality of the situation, several nurses wondered when they would be able to return to their home hospital. Pan said: “Right now, the time is uncertain. Our team leader said that we need to control the pandemic as soon as possible; then we can go home.”

“Pressure” on nurses was related to the fact that they had to significantly alter hospital spaces to accommodate large numbers of COVID-19 patients. Describing a hospital unprepared for the crisis, Min said: “Before we came, there was nothing.” Clean,
semi-contaminated, and contaminated areas were not separate. Zheng reflected: “On the first day, we disassembled beds and re-arranged all rooms. Just like movers. We do everything.” Ban recalled: “…equipment- it is not very sufficient. Yes, this condition here cannot be improved all of a sudden.” The stock of supplies was uncertain or just not on shelves for use. Volunteers were told to keep a stock of their own supplies from the home hospital with them so they would not run out. Regarding direct care situations, there were reports of the central oxygen supply suddenly shutting off. Yuan recalled: “For example, we may need to search for an oxygen tank and other equipment.”

“Pressure” on nurses also came from working on units in Hubei Province other than the one they worked on at home. For example, a urology nurse at her home hospital was assigned in Hubei Province to the Emergency Department. Ban said: “A lot of basic practices I am relatively unfamiliar with” and “I really haven’t experienced life-or-death situations for a long time …”

Pan mentioned that “They kept moving and kept moving [patients]. … did not transfer patients to the so-called intensive care unit until the third move. … In terms of critical illness, it develops very fast …” Health care providers had difficulty communicating across clean, semi-contaminated, and contaminated areas. For example, medicines prescribed “did not fit the real clinic situation at all.” (Xiao) and ordering blood tests and throat swabs was unorganized. For patients with severe conditions, Xiao reported they only had enough personnel to “measure blood pressure and oxygen saturation every 4 hours.” This monitoring is far from optimal.

Many improvements were achieved and safeguards incorporated. Regarding treatment choice, a physician recalled: “… because we are not from the respiratory or
emergency department, we can’t give them suggestions. … When Chinese medicine is needed, we come up.” (Pong) Regarding training in infection control, a nurse responded: “We practiced again according to the process. A person cannot go to work until he/she passed the exam …” (Min) Zheng reflected: “Now we are gradually merging into their team.” Shifts for nurses and physicians were developed to fit the situation. “We have nursing shifts and disinfection shifts.” (Zheng) Jia explained that he did four hours of patients rounds (caring for 30 patients) one day, worked 24 hours in the clean area the second day, and had the third day off, rotating through this cycle. Cameras were installed. Supervisors strictly monitored infection control procedures. “The number of people who inspect the environment and sanitation all increased.” (Den) Chung responded: We “really established a set of systems for working processes in a short time …” Xiao summarized the changes best:

After we arrived, patients received IV infusions and oral medications. Those who needed ventilators were on ventilators … we added processes with more details that fit our real situation … included handoffs during shift change, transfers and admissions, and sending patients for tests. The processes were developed and posted in the chat group.

**Emergent Themes**

In all of the interviews, the experiences of these providers could be summarized in common areas of focus that were evident. These included: (a) the manifestation of a strong sense of national need and a call to serve, (b) family support in a national crisis, (c) an understanding that collaboration was needed, (d) a commitment to protect oneself properly to avoid infection, (e) a necessary and varying degree of self-dependency, (f) the
importance of coping strategies amidst the tension of the pandemic, and (g) a recognition that challenges and opportunities were present side-by-side. These themes will be explicated and exemplified below.

**National Service.** Chinese nurses and physicians expressed many heart-felt examples of their moral obligation to serve their country and a strong sense of responsibility for the greater good. They felt united with other Chinese, requiring self-sacrifice even to the point of the risk of death. Ban recalled that local young nurses worked without a break for the two weeks before volunteers arrived. Zheng reported that when facing the risk of death, health care volunteers “did not step back, but worked together.” They strongly believed they could win this battle; they had passion. Sheng said: “… We dare to go to the frontline. … We inherited the characteristics of the old generation, not afraid of difficulty …” Ban just “signed up,” and she thought “the country really needed us to go at that time.” She added: “I am a communist” and this is reason enough. Shin volunteered without hesitation even though her wedding was planned.

The idea of moral obligation stands out clearly. Zheng said: “… I did not consider the possibility of being infected or the amount of risk.” Ting commented that elder health care providers inspired younger ones, “Elder chief physicians … are still fighting on the frontline … how can we not be on the frontline, right?”

Shin said: “I feel that I am still young, I should take on responsibility. I wanted to challenge myself; I still lack life experience.” Ting does not question this duty, even though she is going into the unknown and is aware of the possibility of death. She says she has “no regrets”, though she has prepared for death. “I left several papers for my
husband: family’s bank card password, insurance information, and the child’s arrangements.”

The national pride is strong and the pandemic offers an opportunity to serve her country. Ting says:

There is no country as united as China… Very brave, strong, resilient … I think in our daily life, we are just very ordinary people, but when we encountered this, we are able to come here by overcoming fear. … I think it is educationally meaningful, not only to our family, but also to our child … Educated him how to correctly establish his sense of social responsibility.

People on social media from other countries recognized the Chinese health care providers’ call to service and communicated with them to support them, spurring them on. Nan reflected: “… The wailing wall in Israel … someone wrote ‘Pray for the Chinese people’. I am quite moved when I read this message on the frontline, quite moved.”

Shin recalled a story that reflects self-sacrifice on the frontline. A nurse shaved off all her beautiful hair to make it easier to prevent contamination. “I think hair is very important to a female, but she got her hair shaved. I feel that it really shocked me. I admire her very much.”

*Family Support.* Participants volunteered, mostly not telling their families before signing up. Some family members were supportive because they understood the call to service. Nan said: “… My dad was supportive. Actually, he volunteered to go to Xinjiang in the 1950s in response to the county’s call. I told her [mom] after arriving here. She was very happy. She said: “I knew you would definitely go.” Den said: “The issue my mother
brought up was that if this one refuses to go, and that one refuses to go, then who will go?”

Family members had to bear being away from each other. Sheng summed up this feeling: “They miss us given that we have been on the frontline for a long time. They worry that we will be infected. They want to have a video call every day.” Yuan’s family supported her and will care for her child if Yuan dies, “when I came here, my family was worried that I wouldn’t come back. If I die, just continue taking care of the child the same way as when I am at work …”

**Collaboration.** Participants demonstrated the action of working with someone to form an alliance for the greater good. Yuan recalled: “I have a chat group that includes four of us. Every day before work, we remind each other we need to work tomorrow … afraid we might work on the wrong shift, get up late, or whatever.”

Collaboration among health care providers was necessary. “Originally, each person took care of several patients. In order to finish all work on time, we help each other when there is a need” (Den) Nan reflected: “We have good relationships.” To improve collaboration and medical care, Pong reflected: “These patients [infected health care providers] and we [providers] are all in the chat group together. If they need anything, they will all speak out.”

Ban’s story emphasized collaboration, or care, on the part of leaders as well. The aspect of taking care of nurses was well described. The chief nurse told Ban that she is most important, and she must come out of the protective suit when she is too uncomfortable. Camaraderie was strong. Ban said: “… happiest time is meeting so many people from our home hospital …”
Shin was working with others, which inspired her. She felt part of a team that worked together and this was exciting. The group working together provided a foundation for learning and growth, which is a part of the draw for Shin to volunteer. This sense of unity may ground Shin’s character and shape or account for her strong character. This sense of belonging was a very strong aspect of the experience and reflected the communal nature of the pandemic phenomenon. Shin reflected: “… Each time I enter the ward, I always value the opportunity. I always want to learn something from colleagues or help them to improve. Going to work, we are very excited. I feel a sense of belonging.”

**Protection for Self.** Volunteers had pretraining and on the spot training about taking actions to guard against contamination. Participants were encouraged to do procedures “step by step” and not “in a hurry.” (Pan) Participants knew, “we must not lose our caution.” (Gion)

There was a shortage of PPE. Gion recalled: “In addition, because of supply shortage … each person had only one protective suit to wear per day.” When more were available, protective suits were only worn the prescribed 4 hours. Chin described real threats to contamination, “When we arrived … local health care providers all ripped off their protective suits violently …” The situation was remedied by volunteer nurses, “And now they are gradually like us. Then, in terms of dividing areas, we are extremely careful. And then local health care providers also gradually followed what we say … feel much safer now …” For Xiao, the chance of infection was real, “Yes, I actually feel the virus is pervasive. I take shallow breaths every time I breathe. Just take shallow, shallow breaths. (laugh) I do not dare to breathe too much air …” Nan said: “Some gloves were
large and some were small… You need to use tape [to secure the gloves to the suit].”

Then, sometimes because “the gloves were thin, … have to wear 3 layers …”

Participants explained where they feared contamination. Chin reflected: “We need to check continuously if the mask leaks air …” Another nurse said: “every time I put a protective suit on, I feel that my protection is not done properly. I feel there are some crevices on my protective suit. In fact, the protective suit is fine, it’s just that I felt it’s not right.” (Sheng) She found a solution: “… sometimes I tuck cotton balls under [protective glasses], because I felt there were crevices.”

Participants described training for self-protection and use of PPE as satisfactory. They understood that it took time for leaders to prepare a plan and for equipment to be delivered. However, the response had been strong and they were comfortable with that. They learned to wear a suit that takes an hour to don and one hour to remove, practicing to get it right. Ban expressed that the changes in equipment made things easier over time. “…Today I wore a big helmet at the hospital, and it was too heavy and too tight. I was suffocated. Now, it's much better to wear a disposable one.” Ting was satisfied that supplies were adequate. “It is enough for me.”

One nurse stated that there were no showers at the hospital. When getting off work, she felt unclean but, after following the process of washing and disinfection, she felt better. Yuan described the elaborate process she had to use at the end of each workday:

… sprayed with alcohol [at the hospital] … we took off our coats and left them outside the hotel … sprayed in front of the room door… disinfect and wash hands … took off our clothes and threw them directly into the wash basin that had
bleach…took a shower for half an hour. The hospital gave us eye drops. Then we disinfected the nose, eyes, and mouth.

**Self-Dependency.** Participants did not know if they would be infected. Den stated, “So the risk of being infected is low if we do proper protective measures. It depends on us ...” Ban spoke of self-reliance related to being a professional: “we are competent to do everything [related to caring for patients].” Ting added: “Yes, I adapt very well ... after I am familiar with the environment.” Shij reflected: “… I do not need help from others [to release the pressure]. I will solve my own problems.” Self-reliance included relying on one’s ability to overcome difficulties. Xiao concurred: “Regarding fog and sultriness [in the protective suit] -- They are not difficulties anymore. Just overcome them gradually.”

**Coping.** Multiple strategies helped participants cope, diminished the harshness of the environment on self, diminished suffering, and allowed time to focus on the self or others. Den said: “The team leader is great. She makes me feel safe and peaceful …” Jia said: “I think the team here is like a big family…” Chatting was a common strategy to communicate to their home hospital and volunteers who arrived earlier. Specific strategies were exercising before sleep, joking, reading books, watching TV, doing meditation, and contacting family members. Nurses also reflected that not thinking too much and not being too emotional were good ways to cope.

**Opportunity and Challenges.** The experiences on the frontline had both positive and negative aspects, providing opportunities and challenges. In terms of opportunities, health care volunteers were provided with sufficient living supplies and meals. Den said: … Here at the very beginning, we did not bring sufficient bed linen… Some people mentioned that it was cold, then quilts and heaters arrived here very fast. News online
kept reporting that life [in the epicenter] is so difficult. I was very touched that supplies were all provided very fast… Then our food was prepared to taste like food from our home city.

Health care providers knew that they were not fighting alone on the frontline. They were supported by Chinese people at home who did their part to contribute to the battle against COVID-19. Shin said:

… My parents told me that they cannot help [because they are not health care providers]. What they can do is take good care of my sister and take good care of themselves at home. Then, my boyfriend told me that he will take good care of the cat and do his job well at home. …We are the same. We contribute to our country by doing our own job well.

Health care providers faced challenges that had a great psychological impact on them. Gion said: “I felt a little powerless when facing conditions like this.” and “felt that people were very small compared to the pandemic.” Because the development of COVID-19 was rapid, patients passed away unexpectedly fast. Dying alone in the hospital is a worse-case scenario for Chinese. This was upsetting to nurses. Pan reflected:

… Because for patients, the development of the disease, from sick to severely ill is very fast…When seeing that the patient in Bed 11 died and was moved away, there was a pair of red high heels under her bed, which actually touched me quite a lot. I thought that she came in wearing those red high heels. And then she just passed away like this. And then I kept thinking about it.

Doing cardiac resuscitation in a protective suit was a traumatic psychological and physical stressor for health care providers. Ban recalled:
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I could not bear to see this situation, feeling that when I was resuscitating that person, my heart… my nose was sore at that time, I was about to cry. I ended my shift early, because I used a lot of energy during resuscitation, I felt my body couldn’t bear it [the protective suit].

Challenges and opportunities were present side-by-side. The recovery and death of patients offer a range of feelings from hopelessness (“I cannot help them much.” [Ting]) to happiness (“I felt we saved several families rather than a person.” [Ting]) Ting is aware that the loss of one person affects many, and saving one person affects many also. This sentiment echoes the collaborative and communal nature of the situation - one that affects a whole, a community. Xiao said: “The experience of volunteering gave health care providers lasting memories. Participating in the battle is unforgettable, because it was my first big rescue…It will definitely inspire my future life. ... I can help more people. It makes me more aware of how to respond in a crisis.” Jia said: “But through this battle, I re-recognize the value of a health care professional.”

Discussion

The experiences of Chinese nurse and physician volunteers, who provided care to patients afflicted early during the outbreak of the novel coronavirus at the epicenter, reveal important insights about the disease impact and the Chinese response. The constant threat of the virus coupled with the unknown characteristics of the disease required constant vigilance, creating a profound challenge for health care providers. As noted by one volunteer, very ordinary people were called to a new location with unknown risks to do extraordinary things.
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It is interesting to note that although three published studies about volunteers rushing to fight COVID-19 were being conducted in China concurrently with our study; each had a somewhat different perspective. He et al. (2020), who collected qualitative data on 10 nurse volunteers in Wuhan only, did not include physicians or information on interview length. Du et al. (2020), also focusing only on Wuhan, conducted a quantitative study on psychological symptoms in 74 volunteers that was published as a brief letter. Mo et al. (2020) obtained quantitative data about stress load in 180 volunteer nurses who went to Wuhan. The study did not provide rich descriptions of volunteer experiences. Compared to the published studies on health care volunteers in Hubei Province, the current study provides more detailed information, especially about changing hospital processes. In addition, the current study provides a description of the role of nurse managers in supporting nurses doing direct care as well as helping them, in general, to cope with the harsh environment. Like the other three studies, the nurses in the current study were predominately female and ranged in age from 20 to 40.

Accelerated morbidity and mortality necessitated a national response and call to service for providers across the country. This call was met with a resounding response by volunteers to go to Hubei Province to meet the need. Health care providers readily accepted the challenge. The commitment and strong passion for national service, displayed by the Chinese people and conveyed through the accounts of these volunteers, show the way through such a national crisis. In fact, the vast majority signed up without telling their family. One nurse signed up even though her wedding was planned. The common cause of working together to develop systems and defy death-related crises clarifies in these accounts and underscores the value of a national dedication to the good
of the whole, to the people of China, exerted by each individual. Families were
supportive. The strong sense of national need and a call to serve in the current study was
aligned with a subtheme, sense of mission and responsibility, reported in nurse volunteers
in Wuhan (He et al. 2020).

At the onset, whole systems of care management needed to be built. Volunteers
coming from various regions were unfamiliar with hospital procedures in Hubei
Province, and the procedures themselves were ever-changing, as knowledge regarding the
characteristics of the virus emerged. Supplies needed to be provided in mass and
organized. Although Western Medicine predominated in the fight against COVID-19,
Traditional Chinese Medicine physicians were on call to provide treatment as needed.
Urgently, an innovative hospital infection control monitoring system needed to be
developed (Chen et al., 2020) In the current study, hospitals used a surveillance system
with cameras and microphones to detect and correct infractions in the infection control
protocol then and there. Ultimately, nurse and physician managers established safe
hospital environments, improve hospital processes, and tried to make workloads more
bearable in the context of the unknown. Additionally, volunteer nurses caring for patients
with COVID-19 revised protocols about handoffs during shift change, transfers and
admissions, and sending patients for tests. Providers adjusted to new working conditions
as systems developed.

The resiliency of the providers was evident by their storied accounts, which
explicated the severe challenges they faced. Volunteers displayed varying strategies and
degrees of self-dependency to manage the tension, often without known endpoints to
their service. The volunteers worked with one another, learned to protect themselves from
contagion, and developed coping mechanisms to manage their personal responses. Nurses collaborated and expressed a sense of belonging. Similar to the current study, He et al. (2020) described a team spirit. Far from home, volunteers supported each other and made the volunteer team feel like a big family. Participation in social media (WeChat) bolstered their success in working together. A unique aspect regarding communication in our study was that health care providers who were infected and hospitalized as COVID-19 patients were part of the WeChat group and had a way to speak out about what they needed. All recognized the challenges and opportunities for themselves that existed side-by-side, allowing them to confront the immense threat.

Experiences reflect the devastation wrought by the novel coronavirus that descended swiftly on Hubei Province and the world. Volunteer health providers in the current study and in a study by He et al., (2020) expressed feelings of powerlessness when facing the pandemic. In the current study, a major challenge that overwhelmed nurse volunteers physically and psychologically was doing cardiac resuscitation in protective suits. In addition, nurse volunteers found it difficult to cope with the loss when their patients died unexpectedly fast.

We wondered how these volunteers were so willing to face the challenges of this unknown crisis. The volunteers may be viewed as speculative adventurers, those dealing creatively with the unknown (Whitehead, 1933). This theorist describes “adventure” as a circumstance that pushes society forward because individuals rely on their own agency and ingenuity, bringing a “wealth of feelings” (Whitehead, 1933, p. 273) and resiliency to the foreground to create a “harmony of enduring individualities, connected in the unity of a background” (Whitehead, 1933, p. 281). In the current study, volunteers advanced
creatively into novelty to develop and adapt new procedures they carried out with success. They took action to fight COVID-19 and beat the virus back. They returned to their home hospitals with new experiential knowledge and practical wisdom, sought especially by some of the young health care providers. This is important to understand because the call extended in a crisis such as this pandemic must touch the recipient in a meaningful way. Their success provides purpose, exerted during the crisis and upon returning home.

By April 7, 2020 all volunteers included in the current study had returned to their home hospitals. By April 15, 2020 (Xinhua Net, 2020), one week later, all volunteers who had gone to Hubei Province had returned to their home hospitals (about 42,600 volunteers). According to National Supervisory Commission (2020), few or no volunteers who rushed to fight COVID-19 had gotten infected. Hospitals and nursing leaders may use the study’s findings to develop effective processes for large-scale disaster management, including a mechanism for the call to service and intentional supportive activities for volunteers during and after the critical service is completed.

**Declaration of Conflicting Interests**

The Authors declare that there is no conflict of interest.
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PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19


No one was infected in the 42,600 health care volunteers in Hubei Province:
Scientific infection prevention made it happen.

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**Table 1**

*Sequence of Interviews (N = 20)*

<table>
<thead>
<tr>
<th>Volunteer group</th>
<th>Volunteer time in Hubei Province</th>
<th>Number of interviewees</th>
<th>Pseudonyms of interviewees</th>
</tr>
</thead>
<tbody>
<tr>
<td>First group</td>
<td>January 25, 2020 - March 17, 2020</td>
<td>4</td>
<td>Pan, Nan, Shin, Ting</td>
</tr>
<tr>
<td>Second group</td>
<td>February 9, 2020 - March 29, 2020</td>
<td>5</td>
<td>Chin, Yuan, Zheng, Min, Ban</td>
</tr>
<tr>
<td>Third group</td>
<td>February 13, 2020 - March 23, 2020</td>
<td>10</td>
<td>Chung, Pong, Jung, Gion, Lenn, Shij, Yang, Sheng, Xiao, Jia</td>
</tr>
<tr>
<td>Fourth group</td>
<td>February 21, 2020 - April 7, 2020</td>
<td>1</td>
<td>Den</td>
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</tbody>
</table>
Overall Summary of the Work

In the first manuscript, no significant difference was found between VOL and NV in models of relationships among compassion satisfaction, general health, attitude toward life, satisfaction with life, perceived stress, and PTSD symptomatology, which indicated that both groups should be directed to undergo psychological counseling. In the VOL group, potential key early indicators to prevent PTSD and inflection points for intervention to mitigate PTSD were compassion satisfaction, general health, attitude toward life, and perceived stress. In the NV group, indicators and inflection points were general health and attitude toward life.

In the second manuscript, one out of five nurses had probable PTSD. Strong relationships in network analysis showed that (a) life satisfaction was a potential inflection point for intervention to reduce perceived stress and mitigate PTSD symptomatology, (b) perceived stress was a potential inflection point for intervention to mitigate PTSD symptomatology, and (c) attitude toward life was a potential inflection point for intervention to improve compassion satisfaction.

In the third manuscript, themes emerging from experiences of Chinese nurse and physician volunteers who worked at the epicenter included: (a) the manifestation of a strong sense of national need and a call to serve, (b) family support in a national crisis, (c) an understanding that collaboration was needed, (d) a commitment to protect oneself properly to avoid infection, (e) a necessary and varying degree of self-dependency, (f) the importance of coping strategies amidst the tension of the pandemic, and (g) a recognition that challenges and opportunities were present side-by-side.
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

Three manuscripts depicted mental wellbeing and psychosocial responses of Chinese and the US health care providers working under the pandemic. Structures of psychosocial relationships were compared between VOL and NV for the first time. Inflection points to mitigate psychological sequelae in Chinese and the US health care providers were identified, which might contribute to the development of future interventional studies. Furthermore, the experiences of Chinese physician and nurse volunteers at the epicenter have historical importance and reveal insights about disease impact, hospital infection control strategies, and the Chinese response.

Contributions to the Nursing Discipline

In the two quantitative studies, attitude toward life was examined for the first time in COVID-19 research. Since part of attitude toward life is the futility of life, which means that nurses feel that their efforts are useless and they are ineffective, it seems therefore that nursing managers and counselors would want to be aware of and interested in monitoring increasing feelings of futility of life related to giving patient care. Additionally, the first manuscript also extends previous nursing research (Liao et al., 2021) that compared VOL and NV groups by incorporating a wide variety of relevant psychological variables from the literature and by successfully utilizing a high-level statistical modeling technique, multi-sample path analysis.

The qualitative study extends previous nursing research (He et al., 2020) by including experiences from both nurse volunteers and physician volunteers. In addition, the study provides a description of the role of nurse managers in supporting nurses doing direct care as well as helping them, in general, to cope with the harsh environment.
Implications for Future Research and Practice

Findings from manuscripts have implications for nursing practice. In a disaster nursing model (HOPE model), nurses go through a phase of recovery to move beyond the disaster mode after leaving the professional disaster nurse context (Hugelius & Adolfsson, 2019). However, due to the long-term nature and uncertainties of the pandemic, the recovery process and emphasizing concern and support must continue to be extended in the future because nurses remain in the disaster mode. Nurse managers should support disaster nurses by developing initiatives to mitigate stress in working environments to facilitate recovery and prevent triggering negative psychological issues.

According to the pandemic disaster nursing guideline developed by the Tri-Council for Nursing in 2021, mental health and wellbeing of nurses during the pandemic is an important area that provides critical lessons and future opportunities for transforming nursing and health care (Tri-council for Nursing, 2021). Additionally, similar to physical wellbeing, nurses’ psychological wellbeing should be regarded as an outcome measure of success (Tri-council for Nursing, 2021).

Findings from manuscripts have implications for nursing education. A major concern of the Tri-Council of Nursing is nursing students and facilitating their educational process in uncertain times. Nursing students tend not to recognize or prioritize mental health. Furthermore, nursing textbooks and curricula are deficient related to nursing students’ resilience and wellbeing particularly during crisis situations (Tri-council for Nursing, 2021). The guideline recommends redesigning nursing curricula to better incorporate mental health content and skills about stress self-assessment and
coping strategies during disasters to improve nursing practice and enhance students’ ability to promote mental health in the workplace.

Findings from this dissertation have implications for theory construction. In contrast to the HOPE model where phases of disaster nursing occur chronologically, findings of the manuscripts showed a different sequence (Hugelius & Adolfsson, 2019). The HOPE model has four phases: (a) being hit by reality; (b) adapting to conditions; (c) providing aid, relief, and caring; and (d) recovering, remembering, and growing. Findings of manuscripts showed that the second and third phases occurred side-by-side. Additionally, the last phase happened as early as health care providers decided to volunteer at the epicenter. Findings might be used to modify the current HOPE model so that it can be applied to the context of the pandemic.

Findings from the manuscripts also have implications for policy development. As guided by the Tri-Council of Nursing (2021), healthcare agencies must plan for the long-term mental health impact of trauma exposure and crisis experienced by nurses. Additionally, findings from the manuscripts might be used to develop systemic interventions to address root causes of negative outcomes to the nursing workforce. Finally, findings might also be used to create pandemic guidelines focusing on patient and resource prioritization.
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References


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Appendix A: Survey for Chapter 2

All of the following items ask about your response after the first wave of COVID-19.

First, we would like to ask you a few questions about your quality of life.

Please select the response that best describes your answer.

After the first wave of COVID-19, would you say that in general your health was

- Poor
- Fair
- Good
- Very good
- Excellent

The next set of questions will ask you things about your life.

Please select the response that best describes the extent to which you agree or disagree with the following statements. Please be open and honest in your responding.

After the first wave of COVID-19, in most ways my life was close to my ideal.

- Strongly disagree
- Disagree
- Slightly disagree
- Neither agree nor disagree
- Slightly agree
- Agree
- Strongly agree
After the first wave of COVID-19, the conditions of my life were excellent.

- Strongly disagree
- Disagree
- Slightly disagree
- Neither agree nor disagree
- Slightly agree
- Agree
- Strongly agree

After the first wave of COVID-19, I was satisfied with my life.

- Strongly disagree
- Disagree
- Slightly disagree
- Neither agree nor disagree
- Slightly agree
- Agree
- Strongly agree

So far I have gotten the important things I want in life.

- Strongly disagree
- Disagree
- Slightly disagree
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

- Neither agree nor disagree
- Slightly agree
- Agree
- Strongly agree

If I could live my life over, I would change almost nothing.

- Strongly disagree
- Disagree
- Slightly disagree
- Neither agree nor disagree
- Slightly agree
- Agree
- Strongly agree

The next set of questions explores your thoughts and feelings.

Please select the response that best describes your feelings and thoughts after the first wave of COVID-19. In each case, please indicate how often you felt or thought a certain way.

After the first wave of COVID-19, how often did you feel that you were unable to control the important things in your life?

- Never
- Almost never
- Sometimes
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

- Fairly often
- Very often

After the first wave of COVID-19, how often did you feel confident about your ability to handle your personal problems?

- Never
- Almost never
- Sometimes
- Fairly often
- Very often

After the first wave of COVID-19, how often did you feel that things were going your way?

- Never
- Almost never
- Sometimes
- Fairly often
- Very often

After the first wave of COVID-19, how often did you feel difficulties were piling up so high that you could not overcome them?

- Never
- Almost never
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

- Sometimes
- Fairly often
- Very often

The next set of questions explores your compassion.

When you help people, you have direct contact with their lives. As you may have found, your compassion for those you help can affect you in positive and negative ways. Below are some questions about your experiences, both positive and negative, as a helper. Consider each of the following questions about you and your work situation. Select the answer that honestly reflects how frequently you experience these things pertaining to COVID-19.

Pertaining to COVID-19, I get satisfaction from being able to help people.

- Never
- Rarely
- Sometimes
- Often
- Very often

Pertaining to COVID-19, I feel invigorated after working with those I help.

- Never
- Rarely
- Sometimes
- Often
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

• Very often

Pertaining to COVID-19, I like my work as a helper.

• Never
• Rarely
• Sometimes
• Often
• Very often

Pertaining to COVID-19, I am pleased with how I am able to keep up with helping techniques and protocols.

• Never
• Rarely
• Sometimes
• Often
• Very often

Pertaining to COVID-19, my work makes me feel satisfied.

• Never
• Rarely
• Sometimes
• Often
• Very often
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

Pertaining to COVID-19, I have happy thoughts and feelings about those I help and how I could help them.

- Never
- Rarely
- Sometimes
- Often
- Very often

Pertaining to COVID-19, I believe I can make a difference through my work.

- Never
- Rarely
- Sometimes
- Often
- Very often

Pertaining to COVID-19, I am proud of what I can do to help.

- Never
- Rarely
- Sometimes
- Often
- Very often

Pertaining to COVID-19, I have thoughts that I am a "success" as a helper.
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

- Never
- Rarely
- Sometimes
- Often
- Very often

Pertaining to COVID-19, I am happy that I chose to do this work.

- Never
- Rarely
- Sometimes
- Often
- Very often

The next set of questions explores your attitude toward life.

Please select the response that best describes your degree of change in attitude toward life after your experience with COVID-19.

Please select the degree to which your thoughts on life or happiness changed after your experience with COVID-19.

- Not changed at all
- Changed very little
- Do not know
- Changed somewhat
- Changed a lot
After my experience with COVID-19, I began to feel that normal everyday living is important and makes me happy.

- Strongly disagree
- Disagree
- Slightly disagree
- Neither agree nor disagree
- Slightly agree
- Agree
- Strongly agree

After my experience with COVID-19, I started to think that we all must work together in order to make society a better place.

- Strongly disagree
- Disagree
- Slightly disagree
- Neither agree nor disagree
- Slightly agree
- Agree
- Strongly agree

After my experience with COVID-19, I began to feel fearful and anxious that I might lose my normal day-to-day life at any moment.
After my experience with COVID-19, I started wanting to place a higher value on the connection with my local community.

After my experience with COVID-19, I started wanting to place a higher value on the sense of fulfillment I get from work or academics.
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

- Neither agree nor disagree
- Slightly agree
- Agree
- Strongly agree

After my experience with COVID-19, I began to feel that I wanted to improve myself more.

- Strongly disagree
- Disagree
- Slightly disagree
- Neither agree nor disagree
- Slightly agree
- Agree
- Strongly agree

After my experience with COVID-19, I began to feel that no matter how hard I try, it's all in vain.

- Strongly disagree
- Disagree
- Slightly disagree
- Neither agree nor disagree
- Slightly agree
- Agree
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

• Strongly agree

After my experience with COVID-19, I started wanting to enjoy today because I don't know what is going to happen in the future, regardless of how much I prepare for it.

• Strongly disagree
• Disagree
• Slightly disagree
• Neither agree nor disagree
• Slightly agree
• Agree
• Strongly agree

The next set of questions explores your response to COVID-19.

Below is a list of problems that people sometimes have in response to a very stressful experience. Please read each problem carefully and indicate how much you have been bothered by that problem after the first wave of COVID-19.

Repeated, disturbing, and unwanted memories of the stressful COVID-19 experience?

• Not at all
• A little bit
• Moderately
• Quite a bit
• Extremely

Repeated, disturbing dreams of the stressful COVID-19 experience?
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Suddenly feeling or acting as if the stressful COVID-19 experience was actually happening again (as if you were actually back there reliving it)?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Feeling very upset when something reminded you of the stressful COVID-19 experience?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Having strong physical reactions when something reminded you of the stressful COVID-19 experience (for example, heart pounding, trouble breathing, sweating)?
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Avoiding memories, thoughts, or feelings related to the stressful COVID-19 experience?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Avoiding external reminders of the stressful COVID-19 experience (for example, people, place, conversations, activities, objects, or situations)?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Trouble remembering important parts of the stressful COVID-19 experience?

- Not at all
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

- A little bit
- Moderately
- Quite a bit
- Extremely

Having strong negative beliefs about yourself, other people, or the world (for example, having thoughts such as: I am bad, there is something seriously wrong with me, no one can be trusted, the world is completely dangerous)?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Blaming yourself or someone else for the stressful COVID-19 experience or what happened after it?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Having strong negative feelings such as fear, horror, anger, guilt, or shame?
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Loss of interest in activities that you used to enjoy?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Feeling distant or cut off from other people?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Trouble experiencing positive feelings (for example, being unable to feel happiness or have loving feelings for people close to you)?

- Not at all
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

- A little bit
- Moderately
- Quite a bit
- Extremely

Irritable behavior, angry outbursts, or acting aggressively?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Taking too many risks or doing things that could cause you harm?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Being “super alert” or watchful or on guard?

- Not at all
- A little bit
- Moderately
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

- Quite a bit
- Extremely

Feeling jumpy or easily startled?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Having difficulty concentrating?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Trouble falling or staying asleep?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

Now we would like to ask you a few questions about yourself.

How many children do you have? ________

Are you a single child?

- Yes
- No

How long have you been a nurse/physician? Years ________

You home hospital is in ______ Province ______ city.

Your home hospital is public or private?

- Public
- Private

What is the classification of your home hospital?

- Tertiary
- Secondary
- Primary
- No classification

In which department did you work during COVID-19?

- Emergency department
- Outpatient clinic
- Fever clinic
- Ordinary ward for COVID-19 patients
- Intensive care unit
- Regular floor/ward for non-COVID-19
- Other
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

Did you have COVID-19 patient contact?

- Have direct contact with COVID-19 patients (directly engaged in clinical activities of diagnosing, treating, or providing nursing care to patients with confirmed or suspected COVID-19)
- Have indirect contact with COVID-19 patients (not engaged in clinical activities of diagnosing, treating, or providing nursing care to patients with confirmed or suspected COVID-19, but have confirmed or suspected patients with COVID-19 where you work)
- Have no contact with COVID-19 patients (not engaged in clinical activities of diagnosing, treating, or providing nursing care to patients with confirmed or suspected COVID-19, and have no confirmed or suspected patients with COVID-19 where you work)

How many days did you take care of patients with COVID-19? Days _____

Did you worry about bringing the corona virus home after the first wave of COVID-19?

- Yes
- No

Were you infected with COVID-19?

- Yes
- No
- I do not know

Have any of your colleagues, family members, or friends been infected with COVID-19?

- Yes
- No
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

What is your age?  _________

What is your sex?

• Male

• Female

What is your marital status?

• Single

• Married or living with a partner

• Divorced or separated

• Widowed

What is your education level?

• Technical secondary school degree

• Junior college degree

• Bachelor’s degree

• Master’s degree

• PhD

What is your current role?

• Nurse

• Physician
Appendix B: Survey for Chapter 3

All of the following items ask about your response to COVID-19.

First, we would like to ask you a few questions about your quality of life.

Please select the response that best describes your answer.

After the first wave of COVID-19, would you say that in general your health was

- Poor
- Fair
- Good
- Very good
- Excellent

The next set of questions will ask you things about your life.

Please select the response that best describes the extent to which you agree or disagree with the following statements. Please be open and honest in your responding.

During the time I responded to COVID-19, in most ways my life was close to my ideal.

- Strongly disagree
- Disagree
- Slightly disagree
- Neither agree nor disagree
- Slightly agree
- Agree
- Strongly agree
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

During the time I responded to COVID-19, the conditions of my life were excellent.

- Strongly disagree
- Disagree
- Slightly disagree
- Neither agree nor disagree
- Slightly agree
- Agree
- Strongly agree

During the time I responded to COVID-19, I was satisfied with my life.

- Strongly disagree
- Disagree
- Slightly disagree
- Neither agree nor disagree
- Slightly agree
- Agree
- Strongly agree

So far I have gotten the important things I want in life.

- Strongly disagree
- Disagree
- Slightly disagree
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

- Neither agree nor disagree
- Slightly agree
- Agree
- Strongly agree

If I could live my life over, I would change almost nothing.

- Strongly disagree
- Disagree
- Slightly disagree
- Neither agree nor disagree
- Slightly agree
- Agree
- Strongly agree

The next set of questions explores your thoughts and feelings. Please select the response that best describes your feelings and thoughts during the time you responded to COVID-19. In each case, please indicate how often you felt or thought a certain way.

During the time I responded to COVID-19, how often did you feel that you were unable to control the important things in your life?

- Never
- Almost never
- Sometimes
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

- Fairly often
- Very often

During the time I responded to COVID-19, how often did you feel confident about your ability to handle your personal problems?

- Never
- Almost never
- Sometimes
- Fairly often
- Very often

During the time I responded to COVID-19, how often did you feel that things were going your way?

- Never
- Almost never
- Sometimes
- Fairly often
- Very often

During the time I responded to COVID-19, how often did you feel difficulties were piling up so high that you could not overcome them?

- Never
- Almost never
The next set of questions explores your compassion.

When you help people, you have direct contact with their lives. As you may have found, your compassion for those you help can affect you in positive and negative ways. Below are some questions about your experiences, both positive and negative, as a helper.

Consider each of the following questions about you and your work situation. Select the answer that honestly reflects how frequently you experience these things pertaining to COVID-19.

Pertaining to COVID-19, I get satisfaction from being able to help people.

- Never
- Rarely
- Sometimes
- Often
- Very often

Pertaining to COVID-19, I feel invigorated after working with those I help.

- Never
- Rarely
- Sometimes
- Often
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

• Very often

Pertaining to COVID-19, I like my work as a helper.

• Never
• Rarely
• Sometimes
• Often
• Very often

Pertaining to COVID-19, I am pleased with how I am able to keep up with helping techniques and protocols.

• Never
• Rarely
• Sometimes
• Often
• Very often

Pertaining to COVID-19, my work makes me feel satisfied.

• Never
• Rarely
• Sometimes
• Often
• Very often
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

Pertaining to COVID-19, I have happy thoughts and feelings about those I help and how I could help them.

- Never
- Rarely
- Sometimes
- Often
- Very often

Pertaining to COVID-19, I believe I can make a difference through my work.

- Never
- Rarely
- Sometimes
- Often
- Very often

Pertaining to COVID-19, I am proud of what I can do to help.

- Never
- Rarely
- Sometimes
- Often
- Very often

Pertaining to COVID-19, I have thoughts that I am a "success" as a helper.
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

- Never
- Rarely
- Sometimes
- Often
- Very often

Pertaining to COVID-19, I am happy that I chose to do this work.

- Never
- Rarely
- Sometimes
- Often
- Very often

The next set of questions explores your attitude toward life.

Please select the response that best describes your degree of change in attitude toward life after your experience with COVID-19.

Please select the degree to which your thoughts on life or happiness changed after your experience with COVID-19.

- Not changed at all
- Changed very little
- Do not know
- Changed somewhat
- Changed a lot
After my experience with COVID-19, I began to feel that normal everyday living is important and makes me happy.

- Strongly disagree
- Disagree
- Slightly disagree
- Neither agree nor disagree
- Slightly agree
- Agree
- Strongly agree

After my experience with COVID-19, I started to think that we all must work together in order to make society a better place.

- Strongly disagree
- Disagree
- Slightly disagree
- Neither agree nor disagree
- Slightly agree
- Agree
- Strongly agree

After my experience with COVID-19, I began to feel fearful and anxious that I might lose my normal day-to-day life at any moment.
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

- Strongly disagree
- Disagree
- Slightly disagree
- Neither agree nor disagree
- Slightly agree
- Agree
- Strongly agree

After my experience with COVID-19, I started wanting to place a higher value on the connection with my local community.

- Strongly disagree
- Disagree
- Slightly disagree
- Neither agree nor disagree
- Slightly agree
- Agree
- Strongly agree

After my experience with COVID-19, I started wanting to place a higher value on the sense of fulfillment I get from work or academics.

- Strongly disagree
- Disagree
- Slightly disagree
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

- Neither agree nor disagree
- Slightly agree
- Agree
- Strongly agree

After my experience with COVID-19, I began to feel that I wanted to improve myself more.

- Strongly disagree
- Disagree
- Slightly disagree
- Neither agree nor disagree
- Slightly agree
- Agree
- Strongly agree

After my experience with COVID-19, I began to feel that no matter how hard I try, it's all in vain.

- Strongly disagree
- Disagree
- Slightly disagree
- Neither agree nor disagree
- Slightly agree
- Agree
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

- Strongly agree

After my experience with COVID-19, I started wanting to enjoy today because I don't know what is going to happen in the future, regardless of how much I prepare for it.

- Strongly disagree
- Disagree
- Slightly disagree
- Neither agree nor disagree
- Slightly agree
- Agree
- Strongly agree

The next set of questions explores your response to COVID-19.

Below is a list of problems that people sometimes have in response to a very stressful experience. Please read each problem carefully and indicate how much you have been bothered by that problem during the time you responded to COVID-19.

Repeated, disturbing, and unwanted memories of the stressful COVID-19 experience?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Repeated, disturbing dreams of the stressful COVID-19 experience?
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Suddenly feeling or acting as if the stressful COVID-19 experience was actually happening again (as if you were actually back there reliving it)?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Feeling very upset when something reminded you of the stressful COVID-19 experience?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Having strong physical reactions when something reminded you of the stressful COVID-19 experience (for example, heart pounding, trouble breathing, sweating)?
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Avoiding memories, thoughts, or feelings related to the stressful COVID-19 experience?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Avoiding external reminders of the stressful COVID-19 experience (for example, people, place, conversations, activities, objects, or situations)?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Trouble remembering important parts of the stressful COVID-19 experience?

- Not at all
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

- A little bit
- Moderately
- Quite a bit
- Extremely

Having strong negative beliefs about yourself, other people, or the world (for example, having thoughts such as: I am bad, there is something seriously wrong with me, no one can be trusted, the world is completely dangerous)?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Blaming yourself or someone else for the stressful COVID-19 experience or what happened after it?

- Not at all
- A little bit
- Moderately
- Quite a bit
- Extremely

Having strong negative feelings such as fear, horror, anger, guilt, or shame?
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

• Not at all
• A little bit
• Moderately
• Quite a bit
• Extremely

Loss of interest in activities that you used to enjoy?

• Not at all
• A little bit
• Moderately
• Quite a bit
• Extremely

Feeling distant or cut off from other people?

• Not at all
• A little bit
• Moderately
• Quite a bit
• Extremely

Trouble experiencing positive feelings (for example, being unable to feel happiness or have loving feelings for people close to you)?

• Not at all
• A little bit
• Moderately
• Quite a bit
• Extremely

Irritable behavior, angry outbursts, or acting aggressively?

• Not at all
• A little bit
• Moderately
• Quite a bit
• Extremely

Taking too many risks or doing things that could cause you harm?

• Not at all
• A little bit
• Moderately
• Quite a bit
• Extremely

Being “super alert” or watchful or on guard?

• Not at all
• A little bit
• Moderately
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

• Quite a bit
• Extremely

Feeling jumpy or easily startled?

• Not at all
• A little bit
• Moderately
• Quite a bit
• Extremely

Having difficulty concentrating?

• Not at all
• A little bit
• Moderately
• Quite a bit
• Extremely

Trouble falling or staying asleep?

• Not at all
• A little bit
• Moderately
• Quite a bit
• Extremely
Now we would like to ask you a few questions about yourself.

How many children do you have? ________

How long have you been a nurse? Years ________

In which department did you work during COVID-19?

- Not working
- Emergency department
- COVID-19 isolation unit
- Intensive care unit
- Regular floor/ward
- Other inpatient area
- Community organization
- Other

Did you have COVID-19 patient contact?

- Have direct contact with COVID-19 patients (directly engaged in clinical activities of diagnosing, treating, or providing nursing care to patients with confirmed or suspected COVID-19)
- Have indirect contact with COVID-19 patients (not engaged in clinical activities of diagnosing, treating, or providing nursing care to patients with confirmed or suspected COVID-19, but have confirmed or suspected patients with COVID-19 where you work)
- Have no contact with COVID-19 patients (not engaged in clinical activities of diagnosing, treating, or providing nursing care to patients with confirmed or
suspected COVID-19, and have no confirmed or suspected patients with COVID-19 where you work)

How many days did you take care of patients with COVID-19? Days _____

Did you worry about bringing the corona virus home during the time you responded to COVID-19?

• Yes
• No

Were you infected with COVID-19?

• Yes
• No
• I do not know

Have any of your colleagues, family members, or friends been infected with COVID-19?

• Yes
• No

What is your age? _________

What is your sex?

• Male
• Female
• I prefer not to answer

What is your race or ethnicity?

• American Indian or Alaska Native
• Asian
• Black or African American
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

- Native Hawaiian or other Pacific Islander
- White
- Hispanic or Latino
- I prefer not to answer

What is your marital status?
- Single
- Married or living with a partner
- Divorced or separated
- Widowed

What is your education level?
- Associate nursing degree
- Currently pursuing a bachelor’s degree
- Bachelor’s degree
- Master’s degree
- Advanced practice degree such as DNP
- PhD

What is your current role?
- Nurse not practicing now
- Nurse in current practice
Appendix C: Strengthening the Reporting of Observational Studies in Epidemiology

(STROBE) Checklist for Chapter 3

<table>
<thead>
<tr>
<th>Item No</th>
<th>Recommendation</th>
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<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Explain the scientific background and rationale for the investigation being reported</td>
</tr>
<tr>
<td>3</td>
<td>State specific objectives, including any prespecified hypotheses</td>
</tr>
<tr>
<td>4</td>
<td>Present key elements of study design early in the paper</td>
</tr>
<tr>
<td>5</td>
<td>Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection</td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable</td>
</tr>
<tr>
<td>8*</td>
<td>For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group</td>
</tr>
</tbody>
</table>
Bias 9 Describe any efforts to address potential sources of bias

Study size 10 Explain how the study size was arrived at

Quantitative variables 11 Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why

Statistical methods 12
(a) Describe all statistical methods, including those used to control for confounding
(b) Describe any methods used to examine subgroups and interactions
(c) Explain how missing data were addressed
(d) Cohort study—If applicable, explain how loss to follow-up was addressed

Case-control study—If applicable, explain how matching of cases and controls was addressed

Cross-sectional study—If applicable, describe analytical methods taking account of sampling strategy
(e) Describe any sensitivity analyses

Results Participants 13*
(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed
(b) Give reasons for non-participation at each stage
(c) Consider use of a flow diagram

Descriptive data 14*
(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders
(b) Indicate number of participants with missing data for each variable of interest
(c) Cohort study—Summarise follow-up time (eg, average and total amount)

Outcome data 15* Cohort study—Report numbers of outcome events or summary measures over time

Case-control study—Report numbers in each exposure category, or summary measures of exposure

Cross-sectional study—Report numbers of outcome events or summary measures

Main results 16 (a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

(b) Report category boundaries when continuous variables were categorized
(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period

Other analyses
17 Report other analyses done—e.g., analyses of subgroups and interactions, and sensitivity analyses

Discussion
Key results
18 Summarise key results with reference to study objectives

Limitations
19 Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias

Interpretation
20 Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence

Generalisability
21 Discuss the generalisability (external validity) of the study results

Other information
Funding
22 Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based.

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Appendix D: Interview Questions for Chapter 4

1. What is your age, marital status, and do you have children (if yes, how many children do you have)? What is your job, job position, job title, length of employment? Which department did you work in before going to Hubei Province? In which department are you working now in Hubei Province? What is your job position in Hubei Province?

2. What drove you to risk your life and volunteer to go to Hubei Province when others are leaving Hubei Province?

3. Have you been informed how long you will work in Hubei Province (such as several months or until the epidemic is completely under control)?

4. Did your family members (parents, spouse, children) support you to go to Hubei Province and work on the frontline?

5. Did you consider the death risk of working on the frontline? Did you consider who will take care of your parents and children, if you die?

6. If you are infected by COVID-19 and you have sequelae due to treatment, how do you want the government to support you and your family?

7. Do you have relevant work experience (such as working in an infectious disease department or in an intensive care unit)?

8. Did you receive any training or orientation before starting to work in Hubei Province? If yes, what training or orientation did you receive? Do you think the training or orientation was enough? Did you receive the training or orientation at your original institution, or at the new institution in Hubei Province? What other requirements did you have in terms of the training or orientation? If you had no other requirements, did the training or orientation help your adaptation to the new working environment?
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

Why or why not?

9. In Hubei Province, are you directed to work with patients with mild symptoms or critically ill patients? How many beds are there at the department where you work in Hubei Province? Are all the beds full? How long have you worked in Hubei Province? Did you witness any patient’s death due to COVID-19 during your work in Hubei Province?

10. How many hours do you work every day? Within your daily working hours, how many hours do you work with patients (direct patient contact)? How many days do you work every week? Do you work morning shifts or night shifts? How many patients do you take care of every day? How do you spend your leisure time after work?

11. In Hubei Province, do you work with old colleagues from your original institution, or do you work with new colleges from other institutions? How do you and colleagues divide work? When working with people from other institutions, is the colleague rapport good and collaboration efficient? Is there anything that needs to be improved?

12. Are the protective measures sufficient in Hubei Province? Do you feel the environment is safe? How long does it take to put on and take off a protective suit? How long are you in a protective suit before taking it off?

13. Do you have sufficient medical supplies and necessities? Are there enough necessities and food? Is there anything that needs to be improved?

14. Do leaders in Hubei Province and leaders in the new hospital support your work? Do you work well with other departments (such as radiology department and pharmacy) in the hospital in Hubei Province?
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

15. What is the procedure for a patient being admitted to the hospital? With limited beds, how to determine which patients will be admitted to the hospital? Are there any criteria for patients being admitted to the hospital? If patients cannot be admitted to the hospital due to lack of beds, how is this issue resolved?

16. Facing the condition of the hospital where you work in Hubei Province, do you feel psychological pressure? How much is the pressure (score 1-10)? How much pressure did you feel in your original institution (score 1-10)? What are the differences between the two types of pressure? How does the pressure you experienced in Hubei Province influence your physical and mental health? Do you have any change in sleep, appetite, or physical feelings? To cope with the pressure, what support do you want to get? Now, do you have the support that you want?

17. How do you feel emotionally when you go to work every day? Are you full of confidence when you go to work?

18. How did you feel when you witness a patient with COVID-19 dying in front of you?

19. How did you feel when you see the fear and helplessness of the patients with COVID-19 when you were at the ward?

20. How did you feel when you see patients recovered from COVID-19 and were released from the hospital?

21. How did you feel when you see many healthcare professionals being infected and some of them even die?

22. During the time that you fight COVID-19 on the frontline, what is the happiest thing you experienced? What is the saddest thing you experienced? What do you long for? What is the most touching thing you experienced? What difficulties have you
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

23. After you arrived in Hubei Province, were the conditions in Hubei Province, the conditions in the hospital where you worked in Hubei Province fighting the war against the virus, and difficulties beyond your imagination? Please give an example or some examples.

24. What characteristics of Chinese people did you identify from the war against COVID-19?

25. How did the experience of joining the war against COVID-19 inspire and change your life?

26. Please talk about the contributions healthcare professionals who volunteer to go to Hubei Province made, such as improving procedures, enhancing infection control, boosting confidence, and so on.

27. What do you want to say regarding the phenomenon of violence against healthcare professions in our society?

28. Any idea or anything you want to share?
Appendix E: IRB Approval Letter From University of Missouri-St. Louis for

Chapter 2 and Chapter 3

October 08, 2020

Principal Investigator: Anne Fish
Department: College of Nursing

Your IRB Application to project entitled Cross-cultural comparison of Chinese and US health care professionals regarding psychosocial responses to COVID-19 was reviewed and approved by the UMSL Institutional Review Board according to the terms and conditions described below:

IRB Project Number: 2030543
IRB Review Number: 275305
Initial Application Approval Date: October 08, 2020
IRB Expiration Date: October 08, 2021
Level of Review: Exempt
Project Status: Active - Exempt
Exempt Categories (Revised Common Rule): 45 CFR 46.1044(d)(1)
Risk Level: Minimal Risk

Recruitment materials in China including recruiting process and participation invitation.
Informed consent in China.
Recruitment materials in the US including recruiting process and participation invitation.
Resources to relieve anxiety in American subjects.
Resource to relieve anxiety in Chinese subjects.
Survey content (Chinese survey was translated from the US survey).
Informed consent in the US.

The principal investigator (PI) is responsible for all aspects and conduct of this study. The PI must comply with the following conditions of the approval:

2. No subjects may be involved in any study procedure prior to the IRB approval date or after the expiration date.
3. All changes must be IRB approved prior to implementation utilizing the Exempt Amendment Form.
4. The Annual Exempt Form must be submitted to the IRB for review and approval at least 30 days prior to the project expiration date to keep the study active or to close it.
5. Maintain all research records for a period of seven years from the project completion date.

If you are offering subject payments and would like more information about research participant payments, please click here to view the UM Policy: https://www.umsystem.edu/ums/policies/finance/payments-to-research-study_participants

If you have any questions or concerns, please contact the UMSL IRB Office at 314-516-5972 or email to irb@umsl.edu.

Thank you,
UMSL Institutional Review Board
Appendix F: IRB Approval Letter From Jiangsu Province Hospital on Integration of Chinese and Western Medicine for Chapter 2 and Chapter 3

<table>
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<tr>
<th>Number</th>
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<td>Project name</td>
<td>Cross-cultural comparison of Chinese and US health care professionals regarding psychosocial responses to COVID-19</td>
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<td>Application center</td>
<td>Jiangsu Province Hospital on Integration of Chinese and Western Medicine</td>
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<tr>
<td>Researcher/ center</td>
<td>Haiping Gu/ Jiangsu Province Hospital on Integration of Chinese and Western Medicine</td>
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<td>September 25, 2020</td>
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<td>Jionghua Chen</td>
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<td>Review files</td>
<td>1. Application form for IRB second review</td>
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<td>2. English version of research documents</td>
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<td>3. Research proposal (V1.0/20200801)</td>
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Review comments

According to the principles of Ethical Review Methods for Biomedical Research Involving Human Subjects issued by Ministry of Health of China, Quality Control Regulations for Clinical Trials issued by CFDA, Medical Device Regulations for Clinical Trials, The Declaration of Helsinki issued by WMA and International Ethical Guidelines for Biomedical Research Involving Human Subjects issued by CIOMS, the Institutional Review Board (IRB) approves the research to be conducted. The research should follow its research proposal, and consent form. Please follow the principles for Good Clinical Practice (GCP) and the approved research proposal to conduct the research and protect the rights and interests of subjects. The IRB will review the research regularly. Requirements for the research are as follows:

1. During the research process, if any change occurs in researchers, research proposal, or recruitment plan etc, the applicant should submit the revised files accordingly to IRB for review.
2. If any severe adverse event occurs, the Report for Severe Adverse Event should be submitted in time.
3. Submit the Research Progress Report at least 1 month in advance according to the frequency of IRB tracking review.
4. If the research process does not follow the research proposal or violates any GCP principles, the Violation Report should be submitted in time.
5. If the applicant pauses or ceases the research in advance, Pause/ Cease Research Report should be submitted in time.
6. When the research is completed, the Research Completion Report should be submitted in time.
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

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<th>Frequency of IRB tracking review</th>
<th>12 months</th>
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<td>(See Chinese Version)</td>
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<td>Date</td>
<td>September 25, 2020</td>
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<td>IRB (stamp)</td>
<td>(See Chinese Version)</td>
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Address for IRB: Jiangsu Province Hospital on Integration of Chinese and Western Medicine, No. 100, Shizi Street, Hongshan Road, Nanjing, Jiangsu Province, 210028

Phone: 025-85630192
Appendix G: IRB Approval Letter From University of Missouri-St. Louis for Chapter 4

Office of Research Administration

DATE: May 26, 2020
TO: Anne Fish, PhD, MSN, BSN
FROM: University of Missouri-St. Louis IRB
PROJECT TITLE: [1593757-1] Experiences of health care professionals who volunteered to work in Hubei Province (Wuhan) to fight covid-19
REFERENCE #: New Project
SUBMISSION TYPE: New Project
ACTION: DETERMINATION OF EXEMPT STATUS
DECISION DATE: May 26, 2020
REVIEW CATEGORY: Exemption category #4

The chairperson of the University of Missouri-St. Louis IRB has APPROVED the above mentioned protocol for research involving human subjects and determined that the project qualifies for exemption from full committee review under Title 45 Code of Federal Regulations Part 46.101b. The time period for this approval expires one year from the date listed above. You must notify the University of Missouri-St. Louis IRB in advance of any proposed major changes in your approved protocol, e.g., addition of research sites or research instruments.

You must file an annual report with the committee. This report must indicate the starting date of the project and the number of subjects to date from start of project, or since last annual report, whichever is more recent.

Any consent or assent forms must be signed in duplicate and a copy provided to the subject. The principal investigator must retain the other copy of the signed consent form for at least three years following the completion of the research activity and they must be available for inspection if there is an official review of the UM-St. Louis human subjects research proceedings by the U.S. Department of Health and Human Services Office for Protection from Research Risks.

This action is officially recorded in the minutes of the committee.

If you have any questions, please contact Carl Bassi at 314-516-6029 or bassi@umsl.edu. Please include your project title and reference number in all correspondence with this committee.
Appendix H: IRB Approval Letter From Jiangsu Province Hospital on Integration of Chinese and Western Medicine for Chapter 4

<table>
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<td>Jiangsu Province Hospital on Integration of Chinese and Western Medicine</td>
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<td><strong>Researcher/ center</strong></td>
<td>Qingqing Lou/ Jiangsu Province Hospital on Integration of Chinese and Western Medicine</td>
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<td><strong>Main IRB members</strong></td>
<td>Jiege Huo</td>
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<td>2. Research proposal (V1.1/20210118)</td>
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<td>3. Consent form (V1.1/20210118)</td>
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<td>4. Explanation about revisions</td>
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**Review comments**

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3. Submit the Research Progress Report at least 1 month in advance according to the frequency of IRB tracking review.
4. If the research process does not follow the research proposal or violates any GCP principles, the Violation Report should be submitted in time.
5. If the applicant pauses or ceases the research in advance, Pause/ Cease Research Report should be submitted in time.
6. When the research is completed, the Research Completion Report should be submitted in time.
PSYCHOSOCIAL RESPONSES AND REACTIONS TO COVID-19

Frequency of IRB tracking review 12 months
Validity period for the approval letter February 4, 2021 – February 3, 2022
IRB chairman signature (See Chinese Version)
Date February 4, 2021
IRB (stamp) (See Chinese Version)

Address for IRB: Jiangsu Province Hospital on Integration of Chinese and Western Medicine, No. 100, Shizi Street, Hongshan Road, Nanjing, Jiangsu Province, 210028

Phone: 025-85630192

Note.

During the early outbreak of the pandemic, all hospital employees of Jiangsu Province Hospital on Integration of Chinese and Western Medicine were required to make every effort to fight COVID-19. The Jiangsu Province Hospital on Integration of Chinese and Western Medicine IRB was temporarily closed, but it allowed non-reviewed survey research with minimal risk to be conducted on an emergency basis during its closure. Guidance by the hospital IRB was adhere to during its closure. Immediately after the hospital IRB was open, approval for the study was obtained from Jiangsu Province Hospital on Integration of Chinese and Western Medicine