



'Caring for the helpers': factors associated with professional quality of life among Hong Kong nurses during the fifth wave of the COVID-19 pandemic

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ABSTRACT

Background: Western studies have found that nurses are likely to experience both positive and negative emotions in their job, as a helping profession [professional quality of life (ProQoL)] during the coronavirus disease 2019 (COVID-19) pandemic, and that psychosocial and work-related variables (e.g. pandemic-related stressors, interpersonal and organizational support, coping strategies) are associated with such outcomes. However, relevant studies on nurses in the Asian context are limited.

Objective: This study examined the psychosocial correlates of three indicators of ProQoL, i.e. compassion satisfaction, secondary traumatic stress (STS), and burnout, among nurses during the fifth wave of the COVID-19 pandemic in Hong Kong.

Method: Nurses in Hong Kong ($N = 220$) working in hospitals and community settings during the COVID-19 pandemic were recruited between 24 May and 27 June 2022 through nursing associations to complete an online survey measuring the aforementioned psychosocial variables.

Results: Hierarchical regression results found that stressors from clinical work environments, insufficient emotional support, and less positive reframing were associated with poorer ProQoL (i.e. lower compassion satisfaction; higher STS and burnout) (β from 0.16, $p > .05$, to 0.44, $p > .001$). In addition, COVID-19-related worries/uncertainties and emotional processing were associated with higher STS (β from 0.21 to 0.23, $p < .01$), whereas insufficient organizational support for communication with the healthcare system was associated with higher burnout ($\beta = 0.12$, $p < .05$).

Conclusions: Our findings identified the important psychosocial determinants in ProQoL among nurses in Hong Kong and provide recommendations for services supporting the mental health of these nurses. Providing workshops for nurses to train their skills in coping with COVID-19-related uncertainties, worries, and stressors from the clinical work environment, in using adaptive coping strategies (e.g. positive reframing), and in soliciting emotional support from important others could facilitate their ProQoL. Moreover, the provision of organizational support through timely and transparent communication with the healthcare system could reduce STS in nurses.

'Cuidando a los proveedores de ayuda': Factores asociados con la calidad de vida profesional entre enfermeros de Hong Kong durante la quinta ola de la pandemia de COVID-19

Antecedentes: Los estudios occidentales han encontrado que los enfermeros son propensos a experimentar tanto emociones positivas como negativas en el trabajo como una profesión de ayuda (también conocida como calidad de vida profesional, ProQoL por su sigla en inglés) en medio de la pandemia de COVID-19, y que variables psicosociales y relacionadas al trabajo (ej. estresores relacionados a la pandemia, apoyo interpersonal y organizacional, estrategias de afrontamiento) se asocian a dichos resultados. Sin embargo, son limitados los estudios relevantes para enfermeras en el contexto asiático.

Objetivo: Este estudio examinó los correlatos psicosociales de los tres indicadores de ProQoL (incluyendo satisfacción de compasión, estrés traumático secundario (STS por su sigla en inglés), y burnout) entre enfermeros, durante la 5ta ola de la pandemia de COVID-19 en Hong Kong.

Método: Se reclutó a enfermeros en Hong Kong ($N = 220$) que trabajaban en ambientes hospitalarios y comunitarios durante la pandemia de COVID-19, entre el 24 de mayo y el 27 de junio de 2022, a través de asociaciones de enfermería, para completar una encuesta en línea que medía las variables psicosociales mencionadas anteriormente.

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HIGHLIGHTS

- Stressors from clinical work environments, insufficient emotional support, and less positive reframing were associated with poorer professional quality of life among nurses in Hong Kong during the COVID-19 pandemic.
- COVID-19-related worries/uncertainties and emotional processing were associated with higher secondary traumatic stress.
- Insufficient organizational support for communication with the healthcare system was associated with higher burnout.

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Resultados: Los resultados de la regresión jerárquica mostraron que los estresores de los ambientes de trabajo clínico, insuficiente apoyo emocional y reformulaciones menos positivas se asociaron con peores ProQoL (a saber, menor satisfacción de compasión, mayores STS y burnout) (β s de 0.16, $p > .05$ a 0.44, $p > .001$). Adicionalmente, las preocupaciones/incertidumbres y procesamiento emocional relacionados con el COVID-19 se asociaron con mayor STS (β s de 0.21 a 0.23, $p < .01$), mientras que el insuficiente apoyo organizacional para la comunicación con el sistema de salud se asoció a mayor burnout ($\beta = 0.12$, $p < .05$).

Conclusiones: Nuestros hallazgos identificaron los determinantes psicosociales importantes en el ProQoL entre enfermeros en Hong Kong y proveen recomendaciones para los servicios que prestan apoyo a la salud mental de aquellas enfermeras. El proveer talleres para los enfermeros para entrenar sus habilidades para el afrontamiento de las incertidumbres relacionadas al COVID-19, preocupaciones, estresores del ambiente de trabajo clínico, uso de estrategias de afrontamiento adaptativas (ej. reformulación positiva) y petición de apoyo emocional de sus personas significativas podría facilitar su calidad de vida profesional. Más aún, la provisión de apoyo organizacional mediante la comunicación oportuna y transparente con el sistema de salud podría también reducir el STS de los enfermeros.

關顧護理人員：第五波COVID-19 疫情 期間香港護士職業生活質量的 相關因素

背景: 西方研究發現護士在新型冠狀病毒COVID-19疫情期間很可能在工作中感受到正面和負面情緒 (又名專業生活品質, ProQoL), 而ProQoL又與個人心理和工作安排等因素 (例如, COVID-19有關的壓力源、社會及組織支持、應對策略) 相關, 然而針對亞洲護士的相關文獻並不多。因此, 本研究調查了在香港第五波COVID-19疫情 (迄今為止最致命的一波) 中與護士的 ProQoL 三個指標(包括同情滿意度、次級創傷壓力及倦怠)相關的社會心理因素。

方法: 本研究在2022年5月24日至6月27日期間, 通過護士協會招募了220名在COVID-19疫情期間於醫院和社區環境中工作的護士, 以網上問卷了解他們有關上述社會心理因素與ProQoL的關係。

結果: 從分層迴歸分析中的結果顯示, 來自臨床工作環境的壓力源、情感支持不足和較少的積極重構應(positive reframing) 都與較差的專業生活品質相關 (即較低的同情滿意度、較高的次級創傷壓力和倦怠) (β s 從 0.16, $p > .05$ 到 0.44, $p > .001$)。此外, 與COVID-19相關的擔憂和情緒處理(emotional processing) 較高的次級創傷壓力相關 (β s 從 0.21 到 0.23, $p < .01$), 而感到在醫療保健系統得不到足夠的溝通則與較高的倦怠相關 ($\beta = 0.12$, $p < .05$)。

總結: 研究結果有助了解香港護士業生活品質的相關因素, 因此可以為針對這些護士精神健康的服務提供一些建議。例如, 為護士提供工作坊訓練他們應對臨床工作環境中與COVID-19相關的壓力源的技巧、有效應對策略的使用 (例如, 積極重構應對)、向信任的人尋求情感支持等, 都可以促進他們的專業生活品質。此外, 於醫療保健系統提供及時和具透明度的溝通也可以減少護士的次級創傷壓力。

1. Introduction

1.1. Nurses' mental health in the context of COVID-19

The coronavirus disease 2019 (COVID-19) pandemic, as an international public health emergency, has had enormous psychological impacts on general populations worldwide, including those in Hong Kong (Choi et al., 2020). The emergence of the fifth wave of the COVID-19 pandemic in Hong Kong was primarily due to the Omicron variants, which were more transmissible than their predecessors (e.g. Delta, Beta, Alpha) (Cheung et al., 2022). As of 29 January 2023, the fifth wave of the local pandemic has resulted in 2,863,475 cases and 13,120 deaths in Hong Kong since 31 December 2021 (Government of the Hong Kong Special Administrative Region, 2022), which substantially exceeded the figures from the previous four waves (12,631 cases and 213 deaths). In the healthcare workforce, nurses have been the largest population undertaking most of the tasks related to containment of the COVID-19 pandemic. In Hong Kong, nurses reported increased workload in caring for patients in

the hospitals, expressed concerns about the sufficiency of protective equipment in the workplace, felt worried about contracting COVID-19 and infecting their family members, and perceived limited support from their peers and the organizations (Cheung et al., 2020). Moreover, at the peak of the fifth wave of the local pandemic, the provision of medical services in the community was severely affected. There were patients lying in beds outside hospitals waiting for treatment; bodies of individuals who had died from COVID-19 were even stored on trolleys in hallways or inside hospitals' accident and emergency departments owing to mortuaries reaching capacity (Yeo & Ng, 2022). Such heavy burdens on the healthcare system made the job context for the nurses uniquely stressful, which increased their vulnerability to poor professional quality of life (ProQoL) (Cheung et al., 2020).

1.2. ProQoL among nurses in the context of COVID-19

ProQoL refers to the emotions experienced by individuals in their job working in a helping profession

(Stamm, 2009). There are three important components of ProQoL; namely, compassion satisfaction (CS), secondary traumatic stress (STS), and burnout (BO). CS refers to the positive feelings derived from helping patients to deal with traumatic events as a healthcare provider. STS refers to the result of exposure to patients' traumatic experiences. BO is a negative emotional reaction to external stressors that originate within one's work environment (Stamm, 2009). Professionals who are regularly exposed to the traumatic experiences of the people they serve (e.g. healthcare and emergency workers) are particularly susceptible to poor ProQoL (i.e. lower CS and higher STS/BO) (Spoorthy et al., 2020). Most of the existing studies have focused on ProQoL among Western healthcare workers, whereas Asian nurses have been underrepresented. In a meta-analysis of 71 studies on ProQoL outcomes, only around 5% of studies were conducted in Asian countries (Cavanagh et al., 2020). In the context of COVID-19, there have been studies examining ProQoL among healthcare workers in different countries (e.g. China, France, Greece, USA). However, most of the existing studies explored the sociodemographic and work-setting related correlates (e.g. COVID-19 care units, emergency departments) of ProQoL without the guidance of a solid theoretical framework (Alharbi et al., 2020; Buselli et al., 2020; Latsou et al., 2022; Niu et al., 2022; Su et al., 2021). In addition, these studies did not explore how coping strategies and coping resources may facilitate ProQoL, above and beyond the sociodemographic factors and work settings, and the stressors experienced. This study aimed to address this knowledge gap by examining the factors associated with ProQoL among nurses during the fifth wave of the COVID-19 pandemic in Hong Kong, guided by the Stress and Coping model.

1.3. COVID-19-related job stressors in association with ProQoL

According to the Stress and Coping model (Lazarus & Folkman, 1984), when adjusting to stressful life events, people generally appraise the impact of the events and their available coping resources (e.g. interpersonal and external resources), and go through a series of coping processes. Exposure to COVID-19-related job stressors has been shown to be associated with health outcomes among frontline healthcare workers. For example, higher workloads and lower levels safety at work while caring for COVID-19 patients were associated with higher levels of BO among nurses in Spain and Italy (Garcia & Calvo, 2020; Trumello et al., 2020). Among nurses in Hong Kong, worries about contracting COVID-19 and infecting their family members, and dissatisfaction with workplace pandemic control guidelines were associated with

psychological distress (Yeung et al., 2022). By the same token, we therefore hypothesized that COVID-19 infection worries and stressors from the clinical work environment (adjustments in work arrangements due to the pandemic) would be associated with poorer ProQoL (i.e. lower CS, higher STS, and higher BO).

1.4. Coping resources in association with ProQoL

As an interpersonal coping resource, social support has been shown to be a consistent contributor to well-being among healthcare workers (Cavanagh et al., 2020; Ersin et al., 2022). Social support can serve as an antecedent of positive well-being by facilitating more favourable appraisal and more effective coping strategies (Helgeson & Lopez, 2010). Specific to the context of COVID-19, social support was found to be associated with better ProQoL among healthcare workers in Spain (Ruiz-Fernández et al., 2020). Similarly, social support from both family members and non-family members was associated with lower BO among frontline nurses in Wuhan, China (Hu et al., 2020). However, these studies did not examine how different types of social support (e.g. emotional versus tangible) might contribute to nurses' ProQoL.

Emerging research also highlights the role of the support from working organizations in nurses' well-being. Organizational support was associated with lower COVID-19-related anxiety among frontline nurses in the Philippines (Labrague & De los Santos, 2020); workplace support was also associated with lower BO and STS among social workers in Singapore (Goh et al., 2022). Given that nurses in Hong Kong may receive social support of different types (e.g. emotional and tangible) and from different sources (e.g. interpersonal support and organizational support) during the COVID-19 pandemic (Chau et al., 2021), this study aimed to examine how different sources and types of support contribute to the ProQoL of nurses in Hong Kong during the COVID-19 pandemic. We hypothesized that higher levels of interpersonal/organizational support (emotional and tangible social support, organizational support) would be associated with better ProQoL (i.e. higher CS, lower STS, and lower BO).

1.5. Cognitive and emotional coping strategies in association with ProQoL

Western studies have found that more frequent use of approach-oriented cognitive coping strategies (e.g. acceptance, positive reframing) is associated with better well-being among general populations and healthcare professionals (Huang et al., 2020; Rahman et al., 2020). It has been suggested that those coping

strategies could help to change people's interpretation of negative life events, thus facilitating better well-being (Park et al., 2005). On the other hand, emotional approach coping was associated with better well-being among diverse populations (Hoyt et al., 2020). Emotional approach coping can be differentiated into emotional processing (i.e. active attempts to acknowledge, explore, and understand one's emotions) and emotional expression (i.e. active verbal and/or non-verbal efforts to communicate one's emotional experience) (Stanton et al., 2000). Given the lack of relevant studies in the Hong Kong context, we aimed to examine how cognitive and affective coping strategies contribute to nurses' ProQoL during the COVID-19 pandemic. Based on the aforementioned literature, we hypothesized that frequent use of adaptive coping strategies (emotional expression, emotional processing, positive reframing, acceptance) would be associated with better ProQoL (i.e. higher CS, lower STS, and lower BO).

2. Method

2.1. Participants and recruitment strategies

Nurses who were over 18 years of age, and who were working in any inpatient, outpatient, or outreach service in a hospital or community setting during the COVID-19 pandemic were eligible for this study. Those who were retired, working as administrators, or not providing direct care to patients were excluded from the study. As one of the feasible ways to recruit representative samples of local nurses (Yeung, Wong, et al., 2021), we approached and invited nurses through the mass e-mail contacts of 4000 registered members of the Association of Hong Kong Nursing Staff (i.e. the largest labour union of Hong Kong nurses). The online survey link (operated by Qualtrics) was provided in the invitation e-mail. After clicking on the survey link, a cover letter explaining the study purpose and procedure appeared, followed by an electronic consent form. After providing their consent, participants completed the questionnaire on their own electronic devices. After completion, they were compensated HK\$50 (equivalent to US\$6.37) for their time. The study protocol was approved by the Research Ethics Committee at the first author's institution (SBRE-21-0017).

The participants were recruited between 24 May, 24 and 27 June 2022 (when there were 1,227,119 diagnosed cases and 9185 individuals had died from COVID-19 in Hong Kong) (Government of the Hong Kong Special Administrative Region, 2022). Among the 355 participants responding to the survey link, 23 were retired, 15 were not working as a nurse at the time of the survey, 65 were not providing direct care to patients, and 32 completed less than half of

the survey. These participants ($N = 135$) were excluded from the final analysis. Therefore, 220 participants were retained in the analyses. According to the statistics from the Department of Health (2019), the sociodemographic characteristics of the sample were comparable to those of the local nurse populations (see footnote to Table 1 for more information).

2.2. Measures

2.2.1. Professional quality of life

The 30-item Chinese version of the Professional Quality of Life Scale version 5 (ProQOL-5) (Stamm, 2009) was used to measure participants' ProQoL, with the

Table 1. Demographic and work-related characteristics of the participants ($N = 220$).

	Frequency (%)
Age (years) ^a	
18–29	18 (8.2)
30–39	66 (30.0)
40–49	62 (28.2)
50–59	65 (29.5)
≥ 60	8 (3.6)
Refused to answer	1 (0.5)
Female gender ^a	189 (85.9)
Marital status	
Single	85 (38.6)
Married	123 (55.9)
Separated/divorced/widowed	12 (5.5)
Monthly household income (HK\$)	
≤ 30,000	8 (5.9)
30,001–50,000	46 (20.9)
50,001–70,000	82 (37.3)
> 70,000	64 (29.1)
Refused to answer	15 (6.8)
Having a religious affiliation	81 (36.8)
Work mode	
Full-time	203 (92.3)
Part-time	17 (7.7)
Years in the profession	
< 5	14 (6.4)
6–10	49 (22.3)
11–15	18 (8.2)
16–20	18 (8.2)
> 20	74 (33.6)
Refused to answer	47 (21.4)
Work setting ^a	
Public	152 (69.1)
Private	31 (14.1)
Other (e.g. non-governmental organization)	37 (16.8)
Having experience working in the team caring for COVID-19 patients	85 (38.6)
Having a prior diagnosis of COVID-19	72 (32.7)
Having participated in mental health-related workshops/activities	42 (19.1)
Having participated in workshops as a trainee for healthcare workers' adjustment to work-related crisis situations	24 (10.9)
Professional quality of life	
Moderate-to-high level of compassion satisfaction (≥ 23)	215 (97.7)
Moderate-to-high level of secondary traumatic stress (≥ 23)	150 (68.2)
Moderate-to-high level of burnout (≥ 23)	155 (70.5)

Note: ^aBased on the recent statistics on the characteristics of registered nurses (Department of Health, 2019), about 86.7% of nurses in Hong Kong were female. The median age of registered nurses was about 43 years old. Most of the registered nurses in Hong Kong worked in public settings (e.g. in hospitals operated by the Hospital Authority) (64.9%), followed by 18% in the private sector, and 16.1% in other settings. The characteristics of the current sample were generally comparable to those of the registered nurse population.

subscales Compassion Satisfaction (10 items, $\alpha = .90$), Burnout (10 items, $\alpha = .81$), and Secondary Traumatic Stress (10 items, $\alpha = .81$). Respondents indicated how frequently each item had been experienced in the past month, on a five-point Likert scale (1 = never, 5 = very often). Higher sum scores on the corresponding subscales indicated higher levels of CS, BO, and STS. The scale has been shown to be reliable and valid among Chinese medical students (Xie & Kim, 2022). A cut-off point of ≥ 23 on the subscales is recommended to indicate moderate-to-high levels of CS, BO, and STS (Stamm, 2009).

2.2.2. COVID-19-related stressors

Six items were selected, based on the pandemic context in Hong Kong, from the COVID-19-specific Stressor Scale to measure COVID-19-related stressors (Shechter et al., 2020). Using a five-point Likert scale (1 = no distress, 5 = extreme distress), participants indicated how much distress they experienced from COVID-19 uncertainties and worries (three items: worries about potential transmission of COVID-19, about transmitting COVID-19 to family and loved ones, uncertainties about the pandemic situation, $\alpha = .83$), plus stressors from the clinical work environment (three items: difficult triage decisions or rationing of care due to resource scarcity, number of clinical hours worked, performing clinical work that is outside his/her specialty, $\alpha = .84$). Higher mean scores indicate higher exposure to the stressors. The scale has been shown to be reliable and valid among healthcare workers in the USA (Shechter et al., 2020).

2.2.3. Emotional and tangible support

Six items from the Perceived Agents of Social Support (Yeung, Huang, et al., 2021) were used to measure the participants' level of social support. On a five-point Likert scale (1 = not at all, 5 = very much), participants indicated how much they felt they had received emotional and tangible support from their family members, friends, and colleagues during the COVID-19 pandemic ($\alpha = .84$). Higher mean scores represented higher levels of social support. The scale has been found to be reliable and valid among foreign domestic helpers in Hong Kong living with the COVID-19 pandemic (Yeung, Huang, et al., 2021).

2.2.4. Organizational support

Two items were selected from the COVID-19 Organization Support Scale (Zhang et al., 2020), based on the pandemic context in Hong Kong, to measure participants' level of support from their organizations. Participants rated how much support they received from their organization ('I feel I lack access to up-to-date information and communication from the healthcare system', 'I am uncertain my organization would take care of my own needs, including personal

and family, if I get COVID-19'), on a seven-point Likert scale (1 = very strongly disagree, 7 = very strongly agree). The items were reverse scored; higher scores represented higher organizational support. As the items represented different aspects of organizational support, they were analysed as separate independent variables in this study.

2.2.5. Emotional approach coping

Four items from the Emotional Approach Coping Scale (Stanton et al., 2000) were used to measure participants' frequency of processing and expressing emotions. On a four-point scale (1 = I usually don't do this at all, 4 = I usually do this a lot), participants rated how frequently they processed (two items, e.g. 'I take the time to figure out what I'm really feeling', $\alpha = .62$) and expressed (two items, e.g. 'I take time to express my emotions', $\alpha = .82$) their emotions to cope with COVID-19-related stressors. The scales have been shown to be reliable and valid among Chinese college students (Tse et al., 2020).

2.2.6. Cognitive coping strategies

The Positive Reframing and Acceptance subscales of the Brief COPE (Carver, 1997) were used to measure participants' cognitive coping strategies. On a four-point Likert scale (1 = I haven't been doing this at all, 4 = I've been doing this a lot), participants rated their frequency of using coping strategies to deal with COVID-19-related stressors. Higher mean scores indicated the more frequent use of the coping strategies. The subscales have been shown to be reliable and positively associated with active coping among Chinese adults (Qiu & Li, 2008). The Cronbach's alpha values were .80 and .79 for the Positive Reframing and Acceptance subscales, respectively, in our sample.

2.2.7. Sociodemographic variables

Sociodemographic variables (e.g. age, gender, years in the profession, marital status, religious affiliation, practice settings, prior participation in mental health workshops/activities) were also measured.

2.3. Data analytic plan

Descriptive statistics and Pearson's correlation coefficients among the major variables were computed. To examine the associations between the independent variables and ProQoL, hierarchical regression analyses were conducted with the three indicators of ProQoL as separate dependent variables. The independent variables were entered into the regression models based on the recommended sequence from previous studies on mental health outcomes in the context of other traumatic events (Yeung et al., 2016; Yeung, Wong, et al., 2021). In the first block, background variables

showing significant bivariate correlations with ProQoL indicators were entered. In the second block, COVID-19-related stressors (COVID-19 uncertainties and worries, stressors from the clinical work environment) were entered. In the third and fourth blocks, coping resource variables (emotional and tangible social support, organizational support) and coping strategies (emotional processing, emotional expression, positive reframing, acceptance), respectively, were entered. The analyses were conducted using SPSS 27.0.

2.4. Sample size planning

We expected an overall small-to-medium effect size ($f^2 = 0.10$) in the association between the independent variables and ProQoL in the hierarchical regression analysis. To achieve a statistical power of .85 at $p = .05$, a minimum of 216 of participants was needed (G*Power 3.1.2). The current sample size ($N = 220$) should allow the detection of the expected effect size with sufficient statistical power.

3. Results

3.1. Participants' characteristics

Most of the participants were aged between 30 and 49 years (58.2%), were married (55.9%), and reported a household income level of at least HK\$50,000 (66.4%). Half of the participants had been working in the profession for more than 10 years (50%). About one-third of the participants had a religious affiliation (36.8%), had previously had a COVID-19 diagnosis (32.7%), and had experienced working in the team taking care for patients diagnosed with or suspected of having COVID-19 (38.6%) (Table 1).

3.2. Correlations between stress/coping variables and ProQoL

The results of correlation results showed that younger participants were more likely to report higher BO ($p < .01$). COVID-19 uncertainties/worries and stressors from the clinical work environment were positively correlated with STS ($r = 0.35$, $p < .001$) and BO ($r = 0.33$ to 0.49 , $p < .001$), and negatively correlated with CS ($r = -0.15$ to -0.20 , $p < .05$). Higher levels of emotional support, tangible support, organizational support for timely communication, emotional processing, emotional expression, positive reframing, and acceptance were correlated with higher CS ($r = 0.23$ to 0.46 , $p < .001$). Lower levels of emotional support, tangible support, organizational support for timely communication and COVID-19-diagnosed nurses, emotional expression, positive reframing, and acceptance were correlated with higher BO ($r = -0.20$ to -0.47 , $p < .01$). Lower levels of emotional support,

tangible support, and positive reframing were correlated with higher STS ($r = -0.14$ to -0.20 , $p < .05$) (Table 2). Other sociodemographic characteristics (including gender, marital status, religious affiliation, practice settings) were not correlated with ProQoL ($p > .05$, not tabulated).

3.3. Hierarchical regression analyses explaining ProQoL

The independent variables were checked for multicollinearity in the regression analysis, given that these variables were moderately correlated. None of these variables reported a variance inflation factor ≥ 4 , indicating the absence of multicollinearity problems. In block 1, as a covariate, age significantly contributed to 3% of the variance in BO. Specifically, age ($\beta = -0.17$, $p < .01$) was associated with higher BO. In block 2, COVID-19 stressors contributed to an additional 3%, 17%, and 22% of variances in CS, STS, and BO, respectively. Specifically, stressors from the clinical work environment were associated with lower CS ($\beta = -0.16$), higher STS ($\beta = 0.24$), and higher BO ($\beta = 0.44$) (all $p < .01$). In block 3, coping resources contributed to an additional 21%, 5%, and 14% of variances in CS, STS, and BO, respectively. Specifically, higher emotional support was associated with higher CS ($\beta = 0.41$), lower STS ($\beta = -0.27$), and lower BO ($\beta = -0.36$) (all $p < .001$). In block 4, the coping strategies contributed to an additional 6%, 6%, and 7% of variances in CS, STS, and BO, respectively. Specifically, positive reframing was significantly associated with higher CS ($\beta = 0.18$, $p < .05$), lower STS ($\beta = -0.17$, $p < .05$), and lower BO ($\beta = -0.30$, $p < .001$), while emotional processing ($\beta = 0.23$, $p < .01$) was associated with higher STS. The overall model explained 32%, 27%, and 46% of the variance in CS, STS, and BO, respectively (Table 3).

4. Discussion

We examined the prevalence of ProQoL outcomes (CS, STS, and BO) and their associated factors among nurses in Hong Kong during the fifth wave (i.e. the most disastrous wave) of the COVID-19 pandemic. We found that 97.7%, 68.2%, and 70.5% of the nurses reported moderate-to-high levels (≥ 23) of CS, STS, and BO, respectively. Using the same scale (ProQOL-5), the prevalence of STS and BO varied slightly between our sample of nurses and their counterparts in other countries. In Greece, 97.9%, 50.6%, and 78.5% of healthcare workers reported moderate-to-high levels of CS, STS and BO, respectively. In Portugal, the corresponding figures were 98%, 69%, and 72% among physicians and nurses (Serrão et al., 2022). It is important to note that the prevalence of ProQoL indicators could be varied owing to the

Table 2. Descriptive statistics and correlations among major variables (*N* = 220).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1. Compassion satisfaction	–													
2. Burnout	–.66***	–												
3. Secondary traumatic stress	–.13	.59***	–											
4. Age ^a	.12	–.17**	.00	–										
5. COVID-19 uncertainties and worries	–.15*	.33***	.35***	–.19**	–									
6. Clinical work environment stressor	–.20**	.49***	.35***	–.20**	.56***	–								
7. Emotional support	.46***	–.39***	–.16*	–.05	–.10	–.07	–							
8. Tangible support	.32***	–.24***	.03	–.05	–.03	–.04	.66***	–						
9. Healthcare system communication support ^b	.23***	–.34***	–.14*	.22***	–.31***	–.30***	–.20**	.15*	–					
10. Support for infected nurses and their families ^a	.13	–.21**	–.10	.12	–.34***	–.29***	.12	.14*	.33***	–				
11. Emotional processing	.26***	–.05	.14*	–.09	.01	–.04	.27***	.24***	.09	.11	–			
12. Emotional expression	.29***	–.20**	–.00	–.12	–.13	–.05	.36***	.23***	.17*	.15*	.59***	–		
13. Positive reframing	.42***	–.47***	–.20**	.12	–.22***	–.23***	.37***	.24***	.23**	.20**	.35***	.48***	–	
14. Acceptance	.25***	–.23***	–.11	–.04	–.07	–.05	.17*	.03	.17*	.07	.21**	.35***	.56***	–
Mean	35.89	25.26	24.70	2.93	3.03	2.94	3.29	2.91	4.27	3.46	2.40	2.49	2.89	3.03
Standard deviation	5.91	5.42	5.13	1.09	0.90	0.93	0.72	0.82	1.39	1.74	0.76	0.77	0.81	0.90
Skewness	–0.27	0.40	0.27	0.36	–0.07	0.32	–0.01	–0.20	–0.20	0.40	0.39	0.43	0.07	–0.27
Kurtosis	0.30	0.20	0.33	0.97	–0.13	–0.27	–0.33	–0.40	–0.58	–0.88	–0.32	–0.48	–0.92	–0.84
Cronbach's alpha	.90	.81	.81	N/A	.83	.84	.73	.79	N/A	N/A	.61	.82	.79	.81

Note: ^aAge: 18–29 (1), 30–39 (2), 40–49 (3), 50–59 (4), ≥ 60 years (5). 'Healthcare system communication support': organizational support for timely communication with the healthcare system; 'Support for infected nurses and their families': organizational support for COVID-19-diagnosed nurses and their families.

p* ≤ .05, *p* ≤ .01, ****p* ≤ .001.

Table 3. Hierarchical regression analyses explaining professional quality of life ($N = 220$).

Variables	Compassion satisfaction		Secondary traumatic stress		Burnout	
	β	ΔR^2	β	ΔR^2	β	ΔR^2
Step 1: Background variable		0.01		0.00		0.03*
Age ^a	.12		.00		-.17**	
Step 2: COVID-19 worries and distress		0.03*		0.17***		0.22***
Age ^a	.08		.09		-.07	
COVID-19 uncertainties and worries	-.04		.24**		.08	
Clinical work environment stressor	-.16*		.24**		.44***	
Step 3: Coping resources		0.21***		0.05*		0.14***
Age ^a	.10		.09		-.07	
COVID-19 uncertainties and worries	.02		.22**		.02	
Clinical work environment stressor	-.13		.25***		.41***	
Emotional support	.41***		-.27***		-.36***	
Tangible support	.04		.23**		.03	
Healthcare system communication support ^a	.09		-.01		-.13*	
Support for infected nurses and their families ^a	.01		.03		.01	
Step 4: Coping strategies		0.06**		0.06**		0.07***
Age ^a	.09		.13*		-.04	
COVID-19 uncertainties and worries	.02		.21**		.00	
Clinical work environment stressor	-.12		.21**		.37***	
Emotional support	.32***		-.27***		-.28***	
Tangible support	.04		.21**		.02	
Healthcare system communication support ^a	.06		-.02		-.12*	
Support for infected nurses and their families ^a	-.02		.02		.02	
Emotional processing	.10		.23**		.11	
Emotional expression	-.01		.04		.01	
Positive reframing	.18*		-.17*		-.30***	
Acceptance	.06		-.00		-.01	
Total R^2		0.32		0.27		0.46

Note: ^aAge: 18–29 (1), 30–39 (2), 40–49 (3), 50–59 (4), ≥ 60 years (5). 'Healthcare system communication support': organizational support for timely communication with the healthcare system; 'Support for infected nurses and their families': organizational support for COVID-19-diagnosed nurses and their families.

* $p \leq .05$, ** $p \leq .01$, *** $p \leq .001$.

severity of pandemic situations, specific work settings, and pandemic control measures in particular countries/regions during the different time frames of the surveys. Future research should investigate how those factors jointly contribute to nurses' ProQoL.

4.1. COVID-19-related worries, stressors from clinical work environment, and ProQoL

We found that COVID-19 uncertainties and worries were associated with higher STS. This was consistent with a study in the USA showing that stressors related to COVID-19 (e.g. worries about COVID-19, family conflict) were negative predictors for STS and BO among professionals from a foster-care system (Whitt-Woosley et al., 2022). Similarly, fear of COVID-19 contamination for household members was also associated with STS and BO (but not CS) among foster-care workers in Belgium (Verheyden et al., 2020). In response to the rapidly changing pandemic situation, adjustments in organizational practices may bring additional stressors to frontline healthcare workers. In this study, stressors from the clinical work environment (e.g. difficult triage decisions, increased workload) were associated with higher STS and BO among the nurses. Similar findings were also apparent in other countries. In a mixed-methods study among healthcare workers in intensive care units in Spain (Moreno-Mulet et al., 2021), increased clinical workload was associated with BO

and STS; changes in clinical practice (e.g. rearrangement of spaces, difficult decisions for rationing of care, having colleagues working in other departments) also contributed to negative well-being among healthcare professionals. Our supplementary analyses found that the level of stressors from the clinical work environment did not differ significantly among those having and those not having experienced working in a team caring for COVID-19 patients, implying that such stressors are generally applicable to different working contexts during the pandemic in Hong Kong.

Even with significant bivariate negative correlations, COVID-19 uncertainties and worries were not associated with CS; clinical work environment stressors did not consistently contribute to lower CS in the regression analysis. Similar patterns were found in studies in other cultural contexts. For example, a study in the UK indicated that COVID-19-related stress did not predict CS in mental health practitioners (Panourgia et al., 2021). A study in Israel also found that the elevation of the clinical workload did not contribute to lower satisfaction with the job among nurses during the COVID-19 pandemic (Savitsky et al., 2021). Other factors may contribute to CS more than COVID-19 stressors. For example, having the perception that the working institution valued their contribution was associated with higher CS among paediatric subspecialists in the USA (Kase et al., 2022). Among social workers in Israel, viewing work as having purpose and the work aligning with

one's core value and beliefs allowed them to acquire a sense of CS (Ratzon et al., 2022). Future studies could explore whether the perception about meaning in work has a stronger association than COVID-19 stressors with CS.

4.2. Social support, organizational support, and ProQoL

Emotional support (but not tangible support) was associated with higher CS, lower STS, and lower BO. In the context of traumatic events, emotional support may reap more benefits than material support, as it could provide opportunities to process trauma-related thoughts and feelings (McNally et al., 2003), which, in turn, would be associated with better ProQoL. The higher prominence of emotional support than tangible support was also apparent among foreign domestic helpers in Hong Kong during the COVID-19 pandemic (Yeung, Huang, et al., 2021). Our findings suggest that not all types of social support significantly contribute to ProQoL to the same extent.

Contrary to the hypothesis, tangible support was associated with higher STS in the regression analysis. Previous findings on the role of tangible support on STS in the context of COVID-19 are mixed. Among medical social workers in China, tangible support was not associated with STS (Fu et al., 2022). However, among social workers in Singapore, social support and workplace support were associated with lower STS (Goh et al., 2022). The inconclusive findings regarding the association between social support and STS could be attributed to the presence of moderators. It is possible that such an association could be conditional on the level of social support satisfaction. Previous studies have suggested that the satisfaction of social support mattered more than the social network size and the availability of support (Cyr et al., 2021; McLaughlin et al., 2012). Even with sufficient tangible support available, it is possible for nurses not to reap the benefits if they are not satisfied with it. Further studies are warranted to elucidate the interrelationships among social support, social support satisfaction, and well-being among people adjusting to the COVID-19 pandemic.

We found that organizational support for updated information and timely communication with the healthcare system (but not support for COVID-19-diagnosed nurses and their families) was associated with lower BO. This was consistent with other studies showing that perceived organizational support was associated with lower BO among nurses in South Korea (Kim et al., 2022) and healthcare providers in the USA (Reitz et al., 2021). With rapidly changing pandemic control measures, timely communication between different structures of the healthcare system may be particularly important to streamline the

distribution of labour and effort in hospitals and clinics, which could result in lower levels of BO among nurses. On the other hand, wellness support from the organization was found to be associated with fewer negative impacts of the pandemic among infection-control professionals in the USA (Melnik et al., 2023). Future studies should explore how specific types of organizational support contribute to other aspects of nurses' ProQoL.

4.3. Not all coping strategies were associated with ProQoL

Positive reframing was positively associated with higher CS, lower STS, and lower BO. Individuals who use more positive reframing tend to see meanings in adversity (Park et al., 2008). Similarly, the beneficial role of positive reframing in healthcare workers' well-being during the COVID-19 pandemic has been found in studies in Greece and Saudi Arabia (AlJhani et al., 2021; Kalaitzaki et al., 2022). Such associations seem to be culturally universal. However, acceptance did not contribute significantly to ProQoL in the regression analyses, although we found significant correlations with CS and BO. The inconsistent findings in the literature might be explained by the types of acceptance (active/passive) that people use to cope with stressful events. Active acceptance was found to be more associated with more positive emotions, whereas passive acceptance was found to be more associated with more negative emotions (Nakamura & Orth, 2005). Given that the Brief COPE acceptance scale might not be able to differentiate between active and passive acceptance, future studies should examine whether these two types of acceptance have varied associations with ProQoL.

Emotional processing was associated with higher STS, similarly to the findings from professional caregivers of traumatized victims in United Arab Emirates (Hamid & Musa, 2017). Although some studies found that emotional processing is associated with making meaning from negative events (Park et al., 2008), others found that emotional processing was associated with lower positive affect and emotional functioning (Shapiro et al., 2010). Satisfactory emotional processing will lead to a decline in distress, whereas incomplete emotion processing could be a ruminative process, elevating unpleasant intrusive thoughts and post-traumatic stress (Nolen-Hoeksema, 2000). Given that the pandemic brings ever-changing stressors for the nurses, it may be more difficult for the nurses to go through complete emotional processing, which requires more time to reap the benefits.

Contrary to our expectations, emotional expression did not significantly contribute to ProQoL, despite significant bivariate correlations with CS and BO. With

the emphasis on harmonious and balanced relationships in Chinese culture, it is common for Chinese individuals to follow cultural expectations to conceal negative emotions in social interactions, even when facing traumatic events (Wei et al., 2013). In line with this, a previous study found that negative emotional expressivity was not associated with positive well-being among Chinese victims of accidental injuries (Pan et al., 2022). During the COVID-19 pandemic, a qualitative study also showed that Chinese healthcare workers experienced difficulties in expressing negative emotions with close others, to avoid disrupting social harmony (Hsu et al., 2020). We could imagine that there may also be barriers for Chinese healthcare professionals in expressing negative emotions, which would potentially weaken the contribution of emotional expression in positive ProQoL among nurses in Hong Kong.

4.4. Limitations

This study is subject to several limitations. First, this was a cross-sectional study, in which the tested relationships were at best correlational. Longitudinal studies are recommended to further understand the causal relationships among the variables. Secondly, we recruited nurses through nursing associations in Hong Kong, which may be subject to self-selected bias. Comparable to response rates in some previous online survey studies on healthcare workers during the COVID-19 pandemic (Alenazi et al., 2020; Asaoka et al., 2022), our response rate was low at 5.5% (220/4000). Despite the low response rate, the characteristics of this sample were highly comparable to the nurse population in Hong Kong, according to the latest statistics (Department of Health, 2019), and previous local studies using the same recruitment strategy (Yeung et al., 2022). With sufficient statistical power, the current findings should still be valuable. Similarly to experiences in the UK (Gnanapragasam et al., 2022), healthcare workers have received multiple survey invitations for online surveys at different stages of the pandemic, which could be burdensome to this already busy population. We believe that a low response rate in this study could also be attributed to the lower motivation for participating in research projects just after the battle against the peak of the fifth wave of the local pandemic. Readers should be cautious about the generalizability of the findings to healthcare professionals in other countries. Thirdly, the variables only explained a moderate proportion (ranging from 27% to 46%) of the variance in nurses' ProQoL. Other contributors may be at play. Research has found that other individual characteristics (e.g. resilience, strength of professional self-identity) (Labrague & De los Santos, 2020; Mo et al., 2022) are associated with healthcare workers' well-being. Taking

these variables into consideration may further improve the explanatory power of the regression model. Fourthly, some measures were used in their abbreviated versions, which were yet to be fully validated in this population (e.g. emotional coping strategies, COVID-19 stressors, organizational support). Given that some of the measures were originally developed in the early waves of the COVID-19 pandemic context in other countries, we selected only the most relevant items for the specific local pandemic context to reduce participants' burden in answering the questionnaire. It is also worth noting that specifically developed items were commonly used as predictors of mental health outcomes among different Asian populations during the COVID-19 pandemic (Choi et al., 2020; Yeung, Wong, et al., 2021). Even though these abbreviated scales reported acceptable psychometric properties, we would recommend other researchers validating our findings by measuring similar concepts with other fully validated standardized scales.

5. Conclusion

This study found that COVID-19 stressors, emotional support, sufficient organizational support communication in the healthcare system, and positive reframing were prominent contributors to the ProQoL of nurses after the fifth wave of the COVID-19 pandemic in Hong Kong. Practitioners may find the results useful if they want to focus on specific independent variables for the improvement of specific aspects of ProQoL. The provision of workshops for nurses to train their skills in coping with COVID-19-related uncertainties, worries, and stressors from the clinical work environment, in practising the use of cognitive coping strategies (e.g. positive reframing), and in soliciting emotional support from important others could facilitate their ProQoL. In addition, the provision of organizational support through timely and transparent communication with the healthcare system could reduce STS in nurses.

Data availability statement

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

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Disclosure statement

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